Outsourced Fund and Risk-taking: A Tale of Two Contracts

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ABSTRACT

We investigate the effect of compensation contracts on the conditional risk choice of outsourced mutual funds. Unlike the results from the existing literature, outsourced funds display two times more "strategic" risk-shifting than in-house managed funds to maximize the value of payoffs. We further establish that compensation contracts, along with outsourcing status, have a causal effect on risk-shifting. Our evidence shows this behavior to be more consistent with a motive to manage the risk of contract termination and less with the motive to exploit the optionality in portfolio manager compensation contracts. Fund families can employ additional mechanisms to mitigate the intrinsic risk-shifting behavior of the outsourced managers.

JEL classification: G11, G20, G23.

Keywords: Mutual fund, Compensation contracts, Management outsourcing, Risk-shifting

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1 Introduction

In the delegated portfolio management industry, there is a growing trend toward outsourcing the investment management part of the business. Outsourcing allows mutual fund families to divide work along the lines of specialization, to gain market share by expanding their product offerings in new investment styles, and to extract cost efficiencies. As of 2018, over 30 percent of all equity mutual funds delegate their investment management process to an external unaffiliated investment advisor.

Chen, Hong, Jiang, and Kubik (2013) study the agency problems associated with outsourcing the fund management to an external investment advisor. In their seminal paper, they investigate the effect of firm boundaries on contracting and on fund performance. Firm boundaries prohibits the fund family from choosing the portfolio manager(s) or analyst(s), the compensation structure used, and the monitoring mechanisms put in place. In this imperfect informational environment, offering the advisor a contract with high-powered incentives, despite it being the second-best solution, can be optimal. Chen et al. (2013) confirm this intuition and show that the propensity of fund closure due to poor performance is higher when the fund is outsourced. More importantly, they argue that, as a consequence of such a contract, outsourced funds, when compared to funds managed in-house, would take significantly *less* risk, which, in turn, could result in the observed lower returns.

While this might be true unconditionally, in this paper, we propose two distinct reasons why outsourced funds could, conditionally, take *more* risk than funds managed in-house. For this discussion, we focus more on strategic mid-year risk-shifting rather than average risk-taking not only because it is prominent in financial economics (i.e., Brown, Harlow, and Starks (1996)) but also because advisors and portfolio managers of outsourced funds, either implicitly or explicitly, face convex incentives. First, the high-power compensation contracts offered to external advisors can make their payoff, in certain states of the world, option-like. If they underperform the benchmark, they increase the likelihood of losing their advisory contract in the following period, making their payoff zero. Alternatively, outperformance increases the propensity of retaining the advisory contract and getting a positive payoff. The trade-off is quite steep because most advisors, outsourced or not, are compensated based on a percentage of assets under management (AUM).[1] Therefore, advisors have an incentive to increase their portfolio risk in the second part of the year, especially when the mid-year fund performance is close to their performance benchmark. Increasing volatility, to beat the benchmark, is most valuable in this region, and this incentive dissipates as fund performance deviates from the benchmark return on either side. We call this the *employment hypothesis* of risk-shifting.[2]

Second, the compensation contracts offered by the investment advisors to the portfolio manager(s), the employee(s) who make the day-to-day portfolio decisions, are very different from what the fund family offers to the investment advisor (see Lee, Trzcinka, and Venkatesan (2019) and Ma, Tang, and Gomez (2019)). Portfolio manager contracts often have a significant bonus component based on the performance of the fund, and, notably, they have an asymmetric payoff. The asymmetric contracts ensure that the manager is not penalized if the fund underperforms the benchmark. As in the case of the *employment hypothesis*, managers with asymmetric contracts have an incentive to increase their portfolio risk in the second part of the year, especially, when the excess return relative to the performance benchmark is close to zero. We expect outsourcing arrangements to accentuate these incentives as firm boundaries impede monitoring by the principal (outsourcing fund family). We call this the *compensation hypothesis* of risk-shifting. Following these arguments, we expect managers of outsourced funds, conditional on their mid-year performance, to take on more risk. This strategic risk-taking could be another reason why outsourced funds underperform

[1] Typically, the advisor's contract with the fund complex is specified as a percentage of the fund's AUM and should be symmetric if there is ever a performance bonus (a fulcrum fee). See Elton, Gruber, and Blake (2011) for the details. Only 5 percent of the fund advisors in their sample have a fulcrum component. Besides, this performance bonus is a matter of second-order importance when considering the risk of employment.

[2] In certain regions of the performance distribution, the payoff of the outsourced advisor is equivalent to the payoff of having a long position in an exchange option (i.e., Margrabe (1978)). Lee, Trzcinka, and Venkatesan (2019) show that the vega of an exchange option-that is, the derivative of the option's price with respect to the volatility of the portfolio-reaches its maximum value when the distance of the fund's return from the benchmark's return is smallest.

in-house managed funds (Huang, Sialm, and Zhang (2011)).

A logical follow-up question is what mechanisms, if any, can help fund families mitigate these agency problems. To answer this, we test the effectiveness of three such mechanisms. First, we look at *co-managed* funds. When there are multiple advisors managing the same fund (*co-managed*), firm boundaries among them limit the extent of collusion and promote effective peer-monitoring (see Kandel and Lazear (1992)). Second, geographical proximity matters for effective monitoring (see Kang and Kim (2008) and Jensen, Kim, and Yi (2015)). Therefore, we focus on funds whose fund family and advisors are located nearby (*co-located*). We expect to observe less risk-shifting among these funds. Third, we look at *co-branded* funds. Often, fund families enter into partnership with unaffiliated external advisors and put the advisor's name in the fund name to attract flows using the advisor's reputation *(co-branded)*. The potential reputation cost, due to co-branding, can be effective in assuaging potential conflicts of interest and reducing risk-shifting (see Moreno, Rodriguez, and Zambrana (2018)).

To empirically test our hypotheses, we use the universe of U.S. equity mutual funds from 1999 to 2018. Daily fund return and the return of the fund's self-designated benchmark are used to estimate the extent of risk-shifting. Our baseline results show that the distance from the benchmark is inversely related to the ratio of the standard deviations (or risk-shifting ratio). Most importantly, this inverse relationship is significantly higher for outsourced funds than those managed in-house. In fact, outsourced funds (coef: -1.971) engage in 100% more strategic risk-shifting than in-house (coef: -0.917) managed funds when the fund performance is close to the benchmark returns. Given we control for all known variables that affect risk-shifting, these effects are economically significant because risk-shifting, on average, leads to poor fund performance. Furthermore, our main results are robust to the use of alternative-holdings-based measure of risk-shifting and to other empirical specifications.

We acknowledge that the fund's outsourcing status might be endogenous to its risk choice. To address this issue, we use an instrumental variable (IV) approach to establish a causal relation between outsourcing and mid-year risk-shifting. Following Chen et al. (2013), we instrument for a fund's outsourcing status based on the number of funds a family offers at its inception, controlling for family size. The idea is that fund complexes have a limited span of control, and as they offer more funds, they reach the capacity constraint and are more likely to outsource the management. This instrument meets the strict exogeneity requirement as the number of funds a family offered at fund inception has nothing to do with mid-year risk-shifting. The first stage regression confirms the economic intuition that the instrument affects the fund's outsourcing decision. The second stage regression confirms our earlier findings because we continue to find higher risk-shifting in outsourced funds. To further examine the causal effect of a fund's management status on its risk choices, we match outsourced funds (treated) to funds managed in-house (control) on observable characteristics that plausibly affect the funds' assignment to either one of these two groups. When we assess the difference between the two groups, we find that managerial status, along with mid-year fund performance, has a causal effect on the risk-shifting decision.

Having established a causal relationship between outsourcing and risk-shifting, we evaluate the extent to which the two motives, *employment* or *compensation*, drive the decision making. To address this question, we hand-collect portfolio manager compensation data from the Statement Additional Information (SAI) and categorize each fund into two sub-groups: funds with performance-based compensation and those without performance incentives. In-house and outsourced funds display strikingly different risk-shifting behaviors. Outsourced funds with a performance-based compensation do not shift their portfolio risk more relative to those without performance-based compensation, while in-house funds with a compensation benchmark risk-shift significantly more. In other words, for outsourced managers, their risk-shifting incentives arising from the compensation contracts do not completely dictate the portfolio risk choice. Weaker monitoring in outsourced funds and the findings of Lee et al. (2019) suggest a broader role for *compensation hypothesis* in explaining the increased risk-shifting. However, a careful consideration of the economic value of losing an employment contract quickly accentuates the prominence of the *employment hypothesis* of risk-shifting. To further tease out the *employment hypothesis,* we explore the heterogeneity in the advisors of outsourced funds and argue that advisors with a higher AUM and those with higher number of client accounts have a lower incentive to increase portfolio risk. Our empirical finding supports this prediction.

We next test whether *co-managed*, *co-located*, and *co-branded* have any moderating effect on the intrinsic risk-shifting behavior of the manager of an outsourced fund. In our empirical results, we find evidence that these mechanisms, in fact, moderate the actions of the outsourced portfolio manager. In all three instances, we find that the extent of mid-year risk-shifting is diminished when the fund complex takes these additional measures to reduce agency frictions.

Lastly, Del Guercio and Reuter (2014) argue that experienced investors are likely to select themselves into funds sold directly by the fund families to the investors while unsophisticated investors seek advice from their investment broker(s) and are more likely to buy funds distributed by such broker(s). Thus, mutual funds sold through brokers face a weaker monitoring. Similarly, they argue that, due to their clientele, *direct-sold* funds are less likely to be outsourced when compared to *broker-sold* funds. If broker-sold funds are more likely to be outsourced and have weaker monitoring, as measured by the investor's flow-performance reaction, then the fund's distribution status may drive our earlier results. However, our sub-sample analysis shows that the distribution channels do not explain our main result.

Our paper makes several contributions to the literature. First, we shed more light on the outsourcing literature (i.e., Chen et al. (2013), Chuprinin, Massa, and Schumacher (2015), Debaere and Evans (2015), and Moreno et al. (2018)) that investigates the various aspects of contract design. In particular, we provide a fresh perspective on the efficiency of existing contracts awarded to advisors of outsourced funds. Prior literature argues that the high-powered incentives given to these advisors curb excessive risk-taking and that the contractual externalities driven by firm boundaries make it difficult to extract performance from an outsourced fund.[3] Although the overall fund risk may be diminished, we show that the high-powered incentives can incentivize portfolio managers to strategically increase portfolio risk, around the benchmark, and maximize the value of their payoff. This finding suggests to fund complexes that the contract they provide is not complete and that additional mechanisms are needed to improve the investor outcomes. We test the influence of three potential offsetting arrangements, some of which were previously identified by the literature, and show that they mitigate risk-shifting.

Second, we highlight the role of organizational form on risk-shifting. Our evidence that outsourced funds, where the extent to which managers are monitored is lax, exhibit more risk-shifting and that this is moderated by the presence of effective monitoring provides incremental support to the idea that the mid-year risk-shifting is driven by outsourcing arrangement and not just by a tournament to capture flows.

Third, we contribute to the growing literature that enhances the understanding about the effect of portfolio manager contracts. Lee et al. (2019), Ma et al. (2019), Evans et al. (2020), and Han (2020) are a few articles that showcase the implications of managerial compensation contracts on outcomes such as return, risk-taking, and within-family dynamics. The study of these contracts has been missing from the literature largely because the SEC rules did not mandate disclosure until 2005. Currently, although the funds are mandated to disclose some critical features of the managerial compensation structure, the exact details are largely unavailable. Our findings present additional grounds to improve the disclosure requirements so that investors can clearly understand the financial incentives of the outsourced manager(s) they are hiring to make the portfolio decisions.

The remainder of this paper proceeds as follows. Section 2 presents the data and reports the sample descriptive statistics. Section 3 provides empirical evidence of increased risk-shifting among outsourced funds. In addition, we establish a causal effect of outsourcing

[3] There are other reasons for underperformance of outsourced funds. Advisors who manage outsourced funds, generally, manage their own funds too. When such conflicts of interest exist, management companies tend to favor their own mutual funds over sub-advised funds in initial public offering (IPO) allocations and also engage in abnormal cross-trading activities (i.e., Chuprinin, Massa, and Schumacher (2015)).

status on risk-shifting decisions. Section 4 presents evidence on how certain features of the industrial organization help overcome the contracting externalities. Section 5 describes the robustness check. Section 6 provides our concluding remarks.

2 Data and Summary Statistics

We construct our sample from several data sources. Our first source is the Morningstar Direct Mutual Fund database, which covers U.S. equity mutual funds and includes mutual funds' name, style category, and benchmark. The benchmark is the self-designated index disclosed in each fund's prospectus. Funds' benchmarks became available after the SEC mandated that each fund's prospectus include the fund's historical returns as well as their passive benchmark. Our sample period begins in January 1999. We cover funds until December 2018. Data regarding the daily returns of benchmark portfolios also comes from Morningstar. We next match the Morningstar data to the Center for Research in Security Prices (CRSP) Mutual Fund database using the CUSIP number, ticker, or both. The CRSP Mutual Fund database includes fund characteristics, net asset values (NAVs), and returns for each share class at a daily frequency. We use a name-matching algorithm for the remaining unmatched observations. We exclude index funds from the sample using their names and CRSP index fund identifiers. A share class should have at least 200 daily return observations in a year to be included in the sample for the given year.

For funds with multiple share classes, we aggregate across the different share classes to compute fund-level variables using MFLINKS data.[4] More specifically, we calculate the sum of assets across all share classes and compute the value-weighted average of fund characteristics across share classes. To compute the intended relative risk of each fund, we use holdings data from the Thomson Reuters Mutual Fund Holdings database.

We also use N-SAR filings and the new N-CEN fillings (post-2017) made by the funds to

[4]Despite the use of the MFLINKS file, some share classes are still not mapped to any identifier.For these remaining observations, we use the CRSP portfolio identifier crsp_cl_grp to aggregate the different share classes.

collect information on fund advisors and sub-advisors. The information collected includes their name, address, fund family name, and their SEC advisor number. We then look up the Form ADV, filed by investment advisory firms, to check the affiliation of the advisor with the fund registrant and that of the subadvisor(s) with the registrant and the advisor. If the names match or if our review of Form ADV shows affiliation, we identify that fund as managed in-house; otherwise, we identify it as outsourced. Funds seldom have multiple advisors, but conditional on being sub-advised, it is common that they have multiple sub-advisors. We follow Chen et al. (2013) and identify the fund as outsourced if at least one investment advisor's name differs from the name of the fund family complex and that advisor does not belong to the same business group as the fund family complex. Note, by our definition, not all sub-advised funds are outsourced. In addition, the lack of a subadvisor does not preclude it from being outsourced.

Mutual funds disclose the compensation structure of the fund manager(s) in the Statement of Additional Information (SAI). We retrieve the SAI of each fund in our sample from the Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database and classify the contract into various categories to identify whether they have certain characteristics. More precisely, we record whether an incentive bonus exists; if the bonus exists, whether it is tied to the fund's investment performance; and, if the bonus is tied to the investment performance, whether the benchmark is clearly mentioned. We also record the relevant evaluation horizon if the investment performance-based bonus exists. In addition, by reading the SAI, we are able to identify the compensation structure of subadvisors if fund management is outsourced. We classify the compensation structure of the subadvisor(s) in a similar fashion.

Our sample contains 3,527 unique funds and 25,485 fund-year observations for which complete data regarding fund returns, fund characteristics, and benchmark returns are available. A typical fund in the sample is 11.5 years old, while an outsourced fund is 7.5 years old. An outsourced fund charges a slightly higher expense ratio of 1.2 percent of AUM than a typical fund. Lastly, over the past two decades, outsourced funds display a gradual increase in the numbers, and in 2018, approximately, 3 out out 10 funds outsource the management of funds to subadvisors.

3 Outsourcing and Mutual Fund Risk-Shifting

3.1 Variable construction

We quantify risk-shifting by comparing the relative volatility or~the volatility of the tracking error. Given the importance of asymmetric~performance bonuses in portfolio manager compensation, if managers attempt to beat the benchmark by increasing portfolio risk, they have to increase the risk of the portfolio relative to the benchmark. To capture changes in portfolio volatility, following Lee et al. (2019), we define the risk adjustment ratio RAR as follows:

$$RAR_{j,t} = \frac{\sigma_2(r_{j,t} - b_{j,t})}{\sigma_1(r_{j,t} - b_{j,t})} \tag{1}$$

where $\sigma_1(r_{j,t} - b_{j,t})$ and $\sigma_2(r_{j,t} - b_{j,t})$ are the standard deviations of fund j's return over the benchmark return for the first six months and the second six months of the year, respectively. These standard deviations are computed using daily returns and hence provide a much more reliable estimate of manager's actions regarding fund volatility.

We compute the excess return of each fund over its respective benchmark as the difference between the compounded daily returns of the fund and its benchmark for the duration of the first six months. For each year, we calculate

$$Exret_{j,t} = (1 + r_{j,t,1}) * (1 + r_{j,t,2}).....(1 + r_{j,t,n}) - (1 + b_{j,t,1}) * (1 + b_{j,t,2}).....(1 + b_{j,t,n}), \tag{2}$$

where $r_{j,t,n}$ is the daily return for fund j in year t, $b_{j,t,n}$ is the daily return on the benchmark associated with fund j, and n is the number of days in the first six months of year t. After computing $Exret$, we measure the distance of the fund's return from its benchmark return as the square of $Exret$, giving equal importance to returns above and below the benchmark. It is also worth noting that RAR is not the ratio of standard deviations first analyzed by Brown, Harlow, and Starks (1996). Instead, this is the ratio of tracking errors relative to the fund's self-selected benchmark.

3.2 Panel regressions

We now examine the risk-shifting behavior of in-house and outsourced fund managers using a regression approach. Following Lee et al. (2019), we begin by estimating the following pooled ordinary least square (OLS) model:

$$RAR_{j,t} = a_t + c_1 Distance_{j,t} + c_2 Distance_{j,t} * I_{Outsourced} + c_3 I_{Outsourced} + c_4 Controls_{j,t} + e_{j,t}. \quad (3)$$

The dependent variable, $RAR_{j,t}$, is the change in fund risk relative to a benchmark between the first and second half of year t. The key explanatory variable in equation (3), $Distance$, is given as the square of the excess return ($Exret$) and captures how far the excess return lies from zero. The vast majority of mutual fund managers have variable compensation contracts based on the fund's performance relative to a specified benchmark. Moreover, these contracts are asymmetric: the manager is not penalized if the fund underperforms the benchmark, giving them an incentive to take additional risk. Lee et al. (2019) document that due to the asymmetric compensation structure, risk-shifting in the second half of the year is inversely related to the distance of the portfolio's return from the benchmark's return. Squaring $Exret$ gives equal importance to returns above and below the benchmark. $I_{Outsourced}$ is a dummy variable which takes the value of one if the fund is outsourced and zero otherwise. The additional control variables are the expense ratio ($Exp\,ratio$), the turnover ratio ($Turn\,ratio$), the percentage of flows into the fund during the first six months of the year (*Flows*), the log of the number of years since fund inception (*Log age*), the compounded return of the fund for the previous calendar year (*PastReturn*), and the log of total assets under management (*Log size*). These variables are all evaluated at the beginning of the calendar year. Kempf et al. (2009) argue that managerial risk-taking changes as a function of the state of the economy. To account for this temporal variation, all of the specifications include time fixed effects.

Column (I) of Table 2 presents the results from a pooled OLS regression. The specification includes the key variable of interest, *Distance*, along with other control variables. The standard errors are clustered by time and fund to correct for any correlation in the error terms. The negative distance coefficient confirms the main finding of Lee et al. (2019) that risk-shifting is strongest in the region in which the fund's return is close to the benchmark's return. In Column (II), we examine the key hypothesis of this paper by adding the interaction term between *Distance* and management outsourcing dummy ($I_{outsourced}$). This dummy variable takes the value of 1 when the fund is outsourced and zero otherwise. The negative coefficient on the interaction term indicates that the portfolio managers of outsourced funds, when compared to managers of in-house funds, strategically increase portfolio risk in the second half of the year to maximize the value of their payoff. Interestingly, the magnitude of the coefficient on the interaction term is almost as large as the point estimate on *Distance*. This suggests that the outsourced funds risk-shift almost twice as much as an in-house fund.

As an alternative specification to the pooled OLS, Lee et al. (2019) estimate a quantile regression model. The robustness of quantile regressions to any potential outliers merits its use. In a quantile regression, we estimate the parameters of the conditional quantile function instead of the conditional expectation. We choose to estimate this model at the median of RAR distribution; thus, we examine the response of the median fund managers. As before, all specifications include time-fixed effects. Standard errors, however, are estimated using a bootstrapping process. Column (III) and (IV) of Table 2 presents our results for the quantile regression. Interpreting these point estimates is similar to interpreting OLS estimates; they represent the marginal effect of the independent variable on the dependent variable, holding constant the effect of other independent variables. These estimates, however, are relevant only for the quantile for which they are estimated. The coefficient of *Distance* is statistically significant and negative, suggesting that for the median manager, the portfolio risk in the second half of the year will decrease as the portfolio's return deviates from the benchmark's return. More importantly, the coefficient on the interaction term is still negative and highly significant. Also, consistent with the OLS results, the magnitude of the interaction term is similar to the main effect. These results clearly establish that managers of outsourced firms engage in incremental risk-shifting.

Overall, our results support the hypothesis that the effects of high-powered incentives on risk-taking, proposed by Chen, Hong, Jiang, and Kubik (2013), are in effect offset by the two incentives that are not mutually exclusive: employment retention and compensation maximization. Although the average fund risk may diminish due to the potential termination of the outsourcing contract, we document that the portfolio managers of outsourced funds strategically increase portfolio risk to maximize the value of the option inherent in their payoffs. The current specification in equation (3) does not discern between the above mentioned motives. In a later section below, we identify which of the two motives has a stronger impact.

3.3 Causal effect of outsourcing

Our results thus far do not claim a causal impact of outsourcing on fund risk-shifting. Furthermore, it is possible, although unlikely, that the fund family's decision to outsource a fund is endogenous to the portfolio manager's decision to increase the portfolio risk. If true, this could bias the coefficient estimates. Below, we present two different approaches to get around the potential endogeneity and establish that, indeed, outsourcing status of the fund has a causal impact on the strategic risk-taking behaviour of managers.

3.3.1 Instrumental variables analysis

To examine the causal effect of outsourcing on mutual fund risk-shifting, first, we use an instrumental variable approach. Our analysis is well motivated by Chen, Hong, Jiang, and Kubik (2013), who propose an instrument for whether a fund is outsourced based on the number of other funds that the fund family offers at the time of inception of the fund ($LogFamFunds_{i,0}$). The basic idea behind this approach is that as fund families increase their product offerings relative to the family size, they are more likely to hit the capacity constraints and hire external advisors. Importantly, $LogFamFunds_{i,0}$ satisfies the exclusion restriction as it is reasonable to assume that the number of other funds offered at the new fund inception has nothing to do with the manager's risk choices. In other words, we are assuming that the past number of funds in a family affects risk-shifting only through the outsourcing decision.

We begin our empirical test by running the first-stage regression. We intend to establish that the number of funds in the fund family at the time of inception is highly correlated with the outsourcing status of the fund. Given that the unit of analysis in the second stage is at the fund-year level, we run the following specification using a similar level of data:

$$Pr(Outsourced_{i,t} = 1) = \Gamma(\mu + \phi LogFamFunds_{i,0} + \kappa FamSizeDummies_{i,0} + \eta LogFamFunds_{i,t} + \nu LogFamSize_{i,t} + \gamma X_{i,t} + \delta I_t) \quad (4)$$

where $Outsourced_{i,t}$ is a dummy variable that equals 1 if fund i is outsourced in year t and zero otherwise, $LogFamFunds_{i,0}$ is the natural log of 1 plus the number of funds in the family at the inception of the fund, and $LogFamFunds_{i,t}$ is the natural log of 1 plus the number of funds in the family in year t. The subscript zero is used to denote the time when the fund was started. In addition, we include percentile dummies for the size of the fund family when the fund was launched ($FamSizeDummies_{i,0}$), and the natural log of family size for year t ($LogFamSize_{i,t}$). Other fund level control variables ($X_{i,t}$) were also included along with the dummies for each year in our sample. Our dependent variable takes binary values and so we use the logistic regression to estimate the conditional probability of the fund being outsourced. $\Gamma(.)$ in equation (4) represents the logistic distribution function.

The results of the first-stage regression are presented in Table 3. The positive coefficient on $LogFamFunds_{i,0}$ confirms our earlier expectation and is consistent with what Chen, Hong, Jiang, and Kubik (2013) also find. Families that have to manage a higher number of funds do outsource more. In fact, this is not just true of the number of funds at inception but, based on the coefficient of $LogFamFunds_{i,t}$, also true of the number of funds currently managed. Furthermore, the statistical significance of the coefficient estimate rules out any concerns regarding the suitability of the instrument.

After establishing the first-stage regression result, we move on to the next step by implementing a two-stage residual inclusion (2SRI) approach. This is the ideal approach since we use a non-linear estimation in the previous stage. We use the following specification for the second-stage:

$$
\begin{aligned}
Rar_{i,t} = \mu + \alpha Distance_{i,t} + \beta Distance_{i,t} * I_{Outsourced_{i,t}} + \varphi I_{Outsourced_{i,t}} \\
+\kappa FamSizeDummies_{i,0} + \eta LogFamFunds_{i,t} + \theta LogFamSize_{i,t} \\
+\gamma X_{i,t} + \delta I_t + \psi FirstStageResiduals_{i,t} + \varepsilon_{i,t}, \qquad (5)
\end{aligned}
$$

where $FirstStageResiduals$ is the residuals from the estimation of equation (4). We fit equation (5) using a pooled OLS where year dummies are included and the standard errors are clustered by fund.We include all explanatory variable from the first-stage in our second-stage regression except for our instrument, $LogFamFunds_{i,0}$.

Table 4 reports the results from our second stage regression. Controlling for the residuals from the first stage, we find a negative and statistically significant coefficient on $Distance$

and, more importantly, on the two-way interaction term between Distance and outsourcing dummy. This result is consistent with our earlier finding. Furthermore, the magnitude of the coefficient has not diminished at all when we instrument for the potential endogenous variable. The insignificant coefficient of $FirstStageResiduals$ and its interaction with $Distance$ suggest that other unexplained factors that affect the outsourcing status of a fund have a limited impact on the fund's risk-taking decisions. Overall, our instrumental variable analysis suggests that the outsourcing of mutual fund management has a causal effect on the risk-shifting decision even after controlling for a potential endogeneity.

3.3.2 Matching analysis

As discussed in the previous section, the management outsourcing decision may take into account the fund, fund family, and manager characteristics. To further claim that fund management outsourcing has a causal effect on the risk-shifting decision, for each fund in the outsourced group (treated sample), we find an observationally similar fund in the non-outsourced group (control sample). More precisely, based on the size of fund, age of the fund, expense ratio, turnover ratio, fund flows, and previous year fund return, we match the fund in the treated sample to another fund in the control sample. We further require that the treated fund and the matched control fund be in the exact same year and have the same fund style, as this creates more a precise match. Figure 1 shows the extent of the covariate balances between the two groups. Our matching procedure effectively balances the covariates as the two groups become very similar in the observed dimensions. The overall balance of the propensity scores is also displayed. While we cannot rule out the possibility that treated funds are different from controls along some unobserved dimensions, we can reasonably assume that conditional on these important observable characteristics, assignments to the treatment and control group are random. Thus, the only difference between the two groups is the outsourcing status.

We repeat the earlier regression analysis on the matched sample to test whether the treated funds (or the funds that outsource the fund management) in fact shift risk significantly more. Table 5 presents relevant results. In column (I) of the table, we use a greedy matching algorithm to match the treated with the control sample. In column (II), we use an optimal matching algorithm with replacement. As with previous regression results, the coefficient on the interaction term is negative and statistically significant regardless of the matching procedure. As a robustness check, we adopt alternative matching processes, which match on the basis of Mahalanobis distance computed from the covariates rather than the differences in the propensity score of the logit model. The results are qualitatively similar. Overall, this result confirms our hypothesis that, on average, outsourcing status, along with mid-year performance, has a causal effect on the mutual fund risk-shifting decision.

3.3.3 Contract type explaining the variation in risk-shifting

In this section, we estimate the relative contribution of the two proposed hypotheses of risk-shifting in outsourced funds. Based on the results from Lee, Trzcinka, and Venkatesan (2019), we begin by focusing on the *compensation hypothesis*. Given the convexity in their compensation contract, we conjecture that outsourced portfolio managers who receive a performance-based compensation have a stronger incentive to strategically shift risk. Furthermore, the presence of firm boundaries and lack of monitoring should only exacerbate the problem.

To test this hypothesis, we hand-collect the information on portfolio manager compensation structure from 2005 to 2018. From 2005, the SEC mandated funds to disclose some of the key features of the managerial compensation structure. One such piece of information that funds report is whether the compensation is tied to the fund's investment performance. Information on the portfolio manager's compensation is reported in the SAI. Of our original sample, we find compensation data for 21,387 fund-year observations. In order to assess the effect of compensation structure on mid-year risk-shifting, we capture the cross-sectional variation in compensation by segmenting our sample into two contract types. The first type is a group of funds that clearly state that portfolio manager compensation is not tied to fund performance. The second type includes funds whose managers are paid based on fund performance.[5] Mostly, the second group consists of funds that clearly specify that the manager's compensation is based on performance relative to a specific benchmark. We label the first group above as "*no performance*" and the second as "*performance*". In our sample, about 28 percent of the funds do not have their compensation based on fund performance. This is qualitatively very similar to that reported in Lee, Trzcinka, and Venkatesan (2019).

Table 6 reports the results from a specification that exploits the heterogeneity in managerial compensation contracts. Here, $I_{performance}$ is a dummy variable that takes the value of 1 when the manager has a performance-based contract and zero otherwise. The first two columns of Table 6 report results from a sub-sample analysis. The interaction between *distance* and a performance dummy is our main variable of interest. In column (I), coefficient of this interaction term is negative and statistically significant, confirming that, on average, managerial compensation, along with mid-year fund performance, has a significant effect on the risk-shifting decision of in-house managed funds. However, surprisingly, for outsourced funds, we do not observe a similar response in column (II). For the outsourced sample, the coefficient on the interaction between *distance* and a performance dummy the variable is statistically indistinguishable from zero. In other words, their explicit risk-shifting incentives arising from the compensation contracts do not completely dictate the portfolio risk choice. Moreover, to statistically test the differences between these groups, in column (III) of Table 6, we report the results from the pooled regression. The specification in column (III) includes the three-way interaction variable, *distance*, $I_{performance}$, and $I_{outsourced}$, as this captures the incremental risk-shifting undertaken by outsourced managers with performance-based compensation. The coefficient on this interaction term is positive and statistically significant, which is not completely aligned with the hypothesis of compensation contracts of outsourced

[5]Sometimes, the details provided in the SAI are not very clear. Either no details are provided about how fund performance is evaluated to determine the compensation, or, in case the SAI mentions that fund performance relative to a benchmark is used, it is not clear which precise benchmark is relevant. What matters for our research is the existence of a performance-based component in the total compensation.

managers driving the risk choices.

Overall, we find little support for the compensation hypothesis of risk-shifting which leads us to believe that majority of the incremental risk-shifting in outsourced funds is coming from the *employment hypothesis*. We explore this idea further below.

3.3.4 Employment risk explaining the variation in risk-shifting

The analysis in the previous section indicates that compensation contracts do not completely determine the risk choice of the outsourced managers. In this section, we consider the importance of *employment hypothesis* to risk-shifting. A simple thought experiment illustrates why managing the employment risk is crucial to an external advisor. Chen et al. (2013) argue that poor performance of outsourced funds leads to fund closures due to contractual externalities. Since most external advisors receive a fixed percentage of AUM as compensation, the loss from contract termination should be economically more significant than any gains from maximizing the portfolio manager compensation contract.

We use the variation in the scale and scope of external advisors' operations to identify the impact of employment hypothesis on mid-year risk-shifting. Debaere and Evans (2015) document that the limited access to mutual fund investment dollars through marketing and distribution channels leads the outsourced advisors to manage an external fund rather than starting their own fund.[6] The limited visibility in the retail space (i.e., due to a specialty in managing institutional accounts) may incentivize external advisors to attract funds through sub-advising for large fund families. This observation motivates us to examine the extent of risk-shifting across the different types of external advisors. If the external advisor already enjoys a superior reputation in the management outsourcing industry, maintaining a less volatile track record will create a positive spillover effect in attracting fund flows (i.e., Nanda, Wang, and Zheng (2004)). Furthermore, this can lead to a reputation-stretching strategy in

[6]According to the Investment Company Institute, the market share of the top 25 fund families is more than 70 percent in the mutual funds industry. This observation reflects the fact that the marketing and distribution resources of a fund family are an important channel for attracting assets in the retail investor space.

terms of future outsourcing arrangements (i.e., Chen and Lai (2010)) and Moreno, Rodriguez, and Zambrana (2018)).

We introduce two variables to capture the variation in advisor attributes. First, $AdvSize$ is defined as the log demeaned total assets under management of the advisor. Second, we create a dummy variable, $I_{AdvCount}$, which takes the value of 1 when the total number of funds under the management of the advisor is greater than the median number and zero otherwise. Table 7 presents the results from including these two variables in our earlier specification. Our expectation is that advisors who have higher AUM and advisors who manage a higher number of funds should care less about losing an advising contract as the marginal utility of the payoff from that contract is lower to them.[7] In addition, such advisors would also care more about reputation building and maintaining a smooth track record.

Columns (I) and (II) of Table 7 report the coefficients on the three-way interaction terms ($Distance * I_{outsourced} * AdvSize$) and ($Distance * I_{outsourced} * I_{AdvCount}$). These terms represent the incremental effect on risk-shifting for the advisors with lower employment risk or those with higher reputation concerns. The results clearly indicate that more established advisory firms who manage assets for a host of funds engage in less risk-shifting as these advisors face very little economic loss from a potential termination of employment contract. Overall, we find substantial support for the *employment hypothesis* of risk-shifting.

4 Management Arrangement and Risk-Shifting

So far, our analysis reveals some of the hidden dynamics behind outsourcing arrangements. Huang, Sialm, and Zhang (2011) show that, on average, funds that risk-shift have a significant lower ex-post performance. We argue that the underperformance of outsourced funds can be explained by the excessive risk-shifting behaviour of the outsourced managers. In other words, the convex incentives inherent in the contractual arrangements with an exter-

[7] Note that the cases where $I_{AdvCount}$ is 0 are, typically, represented by the ones where the the portfolio manager is the owner-manager of the advisory firm.

nal advisor provide a strong motivation for risk-shifting.[8] This asymmetric compensation contract in combination with the presence of firm-boundaries oftentimes leads to a suboptimal portfolio choice or poor fund performance. The severity of the distortion in risk choice gets accentuated as well as mitigated in the presence of various contractual features. As a next step, we exploit the variation in the outsourcing environment to test the robustness of the above result(s).

4.1 Co-management by fund advisors

In our sample, outsourced funds often have more than one advisor. By this, we mean that they might either have more than one investment advisor or have more than one investment sub-advisor. Kandel and Lazear (1992) document the role played by peers in such circumstances for mutual benefit. When multiple advisors are involved, peer-to-peer monitoring pressure should have a positive impact on firm productivity and also mitigate excessive risk-taking. The shared compensation contract among the multiple advisors also reinforces this peer-monitoring process. Importantly, the SEC exempts multi-advising funds from the requirement to get approval from the shareholder to terminate contracts. Under this regulatory environment, replacement risk is likely to instill a competitive environment where only outperforming advisors can secure their contracts. For these reasons, Moreno, Rodriguez, and Zambrana (2018) argue that the contractual arrangements such as multi-advising help to overcome the lower returns of sub-advised portfolios. Additionally, as Dass, Nanda, and Wang (2013) suggest, coordination difficulties (or the lack of centralized decision rights) of multiple advisors may also curb excessive risk-shifting. Therefore, we predict that the risk-shifting among outsourced funds is more extreme in those that are managed by single advisor.

To test this hypothesis, we create a dummy variable, $I_{\{advisor>1\}}$, which takes the value

[8] Despite this distortion in risk incentives, including an incentive fee in the compensation contract can still be optimal since it motivates the manager to expend increased effort. For instance, Li and Tiwari (2009) show that due to the feedback effect of risk incentives on the effort incentives, contracts in which the fee is linearly related to fund returns lead to an under-investment of effort.

of 1 when there are more than one fund advisor and zero otherwise. Table 8 presents the results from including this dummy in the regression. The coefficients on the interaction term ($Distance * I_{\{advisor>1\}}$) represent the incremental effect in co-managed funds. The results clearly indicate that outsourced funds with single advisors engage in more risk-shifting.

In a related context, Patel and Sarkissian (2017) and Hamilton, Nickerson, and Owan (2003) show that the positive impact of a team is nonlinear in the number of its "members". Therefore, as a next step, we convert the advisor number variable into three dummy variables: $I_{\{advisor<1\}}$, $I_{\{1<advisor\leq 5\}}$, and $I_{\{advisor>5\}}$. We present the regression results of including these variables in column (II) of Table 8. They lend support to the existence of such nonlinearity. The effects of peer-monitoring do play a role in mitigating risk-shifting when the number of advisors is five or less. However, any incremental gains are nullified when the number of advisors is greater than five.

4.2 Co-location of fund advisor and registrant

The impact of geography on agency costs is fairly well established in the literature. The cost of governance and monitoring increases as principal and agent are geographically separated as, typically, there is less oversight of managerial decisions (seeKang and Kim (2008) and Jensen et al. (2015)). Since outsourced advisors do not belong to the same internal organization, our prior assumption is that the distance between the fund complex and the advisor will play a critical role in terms of monitoring. We obtain the legal address of the fund registrant and that of the advisor from the prospectus and the N-SAR filings. We then compute the geospatial distance ($GeoDistance$) using the latitude and longitude data. When there are multiple advisors, we use the distance to the closest advisor to measure the spatial distance.

Using our empirical model above, we test whether the geospatial distance exacerbates risk-shifting among outsourced funds. To make the interpretation of our analysis easier, we define two dummy variables, $I_{\{High-GeoDistance\}}$ and $I_{\{In-State\}}$. First, $I_{\{High-GeoDistance\}}$ takes the value of 1 if the distance between the registrant and fund advisor is above the median and zero otherwise. In addition to using the distance, we create the second dummy variable $I_{\{In-State\}}$, which takes the value 1 if the registrant and fund advisor are located in the same state.

Table 9 presents the results of risk-shifting among outsourced funds using a pooled OLS regression. Consistent with our expectation, we find that geographical proximity also matters. In column (I), the negative coefficient on the two-way interaction term shows that when fund advisors, the agent, are located farther than the median distance from the fund registrant, the principal, they strategically take more risk in order to maximize the value of their payoff.[9] Results in column (II) are also consistent with this finding. When the advisors are located out of state, the extent of risk-shifting is heightened. Importantly, our key variable *Distance* continues to display a negative coefficient with a higher magnitude as this analysis includes a sample of outsourced funds only.

4.3 Co-branding of fund name

Co-branding is a form of contractual arrangement where the fund family partners with an outside advisor to market and manage the fund jointly. A typical arrangement is one where the name of the outsourced sub-advisor is included in the name of the fund. Often, this is done to extract value from the reputation of the sub-advisor. In addition, such a mechanism acts as an effective tool to align the incentive of the sub-advisor to that of the fund family as there are reputation costs borne by the sub-advisor for poor performance or for any deviation from the prescribed strategy (see Moreno et al. (2018)). Therefore, we expect co-branded funds to engage in significantly less risk-shifting.

To test our hypothesis, we create a new dummy variable, $I_{\{Co-brand\}}$, that takes the value of 1 if the fund is co-branded and zero otherwise. For every outsourced fund, we compare the name of the advisor and that of the sub-advisor with the name of fund. The fund is classified as co-branded when, at least, part of the sub-advisor's name is included in the fund

[9]Note that we implicitly assume that the portfolio manager(s) of outsourced funds are operating from the registered address of the advisor(s).

name.

Table 10 presents the results of risk-shifting among outsourced funds using a pooled OLS regression. The point estimate on *Distance*, -3.759, is more than three times larger than the corresponding estimate in Table 2 as the current sample includes only the outsourced funds. However, importantly, the coefficient on the two-way interaction term, $Distance{*}I_{\{Co-brand\}}$, is positive and statistically significant. The magnitude of the interaction coefficient suggests that a co-branded fund engages in 45% less risk-shifting than the average outsourced fund. Overall, this is consistent with our hypothesis that co-branding, as a contractual mechanism, mitigates risk-shifting incentives.

5 Robustness

5.1 Broker sold funds

Del Guercio and Reuter (2014) argue that mutual fund investors are heterogeneous, and their preferences segment the market for mutual funds. Experienced and knowledgeable investors are likely to select themselves into funds sold directly by the fund families to the investors (*direct-sold*). Alternatively, unsophisticated investors seek advice from their investment broker(s) and are more likely to buy funds distributed by such broker(s) (*broker-sold*). The differences in the clientele lead to differences in response from the fund family as well. Del Guercio and Reuter (2014) show that mutual funds sold through brokers face a weaker incentive to generate alpha as the investors in *broker-sold* funds, after a poor performance, do not respond by withdrawing their money as severely as investors in *direct-sold* funds do. Similarly, they argue that, due to their clientele, *direct-sold* funds are less likely to be outsourced when compared to *broker-sold* funds.

If broker-sold funds are more likely to be outsourced and have weaker monitoring, as measured by the investor's flow-performance reaction, then the fund's distribution status may drive our earlier results. We perform a sub-sample analysis to explore this further. We follow Christoffersen, Evans, and Musto (2013) and use the information in form N-SAR to identify if the fund is *broker-sold*.[10] In our data, approximately 42% of the sample of funds are sold via a broker. Panel A of Table 11 also shows that, in our sample, only 30% of the outsourced funds are sold through brokers. This already alleviates some of our concerns.

We also run a pooled OLS regression to consider the fund's distribution status and its impact on risk-shifting decisions. We introduce a new variable, $I_{broker-sold}$, which is an indicator variable which is one if the fund is broker-sold and zero otherwise. The results in Panel B of Table 11 support our earlier findings. The interaction of $Distance$ and $I_{outsourced}$ continues to have an economic impact on the outsourced firm's risk choices.[11] Overall, the presence of high-powered incentives and the existence of firm boundaries result in increased risk-taking among outsourced funds, which is not influenced much by how the fund is distributed to the investors.

5.2 Holdings-based risk-shifting

As a robustness check, we first follow Kempf, Ruenzi, and Thiele (2009) and use portfolio holdings in the Thomson Reuters Mutual Fund Holdings database to construct the second risk-shifting ratio. We first compute the realized portfolio risk in the first half of the year, $\sigma_{j,t}^{(1)}$, using the daily stock returns, daily benchmark returns for 26 weeks, and the actual portfolio holdings in the first half of the year. This variable is the standard deviation of the difference between the portfolio return and the benchmark return. We then compute the intended portfolio risk for the second period, $\sigma_{j,t}^{(2),int}$, using daily hypothetical portfolio returns based on the actual portfolio weights in the second half of the year and stock returns and benchmark returns from the first half of the year. The standard deviation of this daily time series is $\sigma_{j,t}^{(2),int}$.[12] We finally calculate the intended risk ratio by taking the ratio of

[10] If the amount disclosed in either Q32 or Q33 of form N-SAR is non-zero, the fund is broker-sold. These are the loads received through captive and unaffiliated brokers, respectively.

[11] The interpretation of the interaction of the three variables isn't too difficult in this case as both $I_{brokered}$ and $I_{outsourced}$ are Bernoulli variables.

[12] Kempf, Ruenzi, and Thiele (2009) use weekly returns rather than daily returns. We believe daily returns provide a better measure of standard deviation and are more consistent with our measure of RAR, which is

intended risk in the second half of the year to the realized risk in the first half of the year:

$$RAR_{i,t}^{holdings} = \frac{\sigma_{i,t}^{(2),int}}{\sigma_{i,t}^{(1)}}. \tag{6}$$

Using this alternative risk-shifting measure, we re-estimate out baseline results of Table 2. Table 12 reports the findings from using the holdings based measure of risk-shifting. Using this variable does not change the main message from the earlier exercise. We continue to find that funds that have outsourced their management strategically increase their portfolio risk when their performance is around the benchmark.

5.3 Placebo test using benchmark randomization

Given our discussion on the motives of risk-shifting, advisors and managers of outsourced funds have little incentive to respond to the returns of a benchmark that does not belong to the fund that they manage. This suggests that performance benchmarks other than a fund's self-designated benchmark should make no difference to the extent of mid-year risk-shifting. To examine this implication, we try a placebo test by randomly assigning a different benchmark to each fund. We repeat the random benchmark assignment 500 times. At each iteration, we run a pooled OLS regression on the randomized sample. All the control variables in Table 2 are used in this analysis. We record the coefficient estimates of the *Distance* and $Distance{*}I_{outsourced}$ variables from each of the 500 iterations. If a manager is indifferent to the benchmark in the portfolio risk decision, we should expect to observe the same relation between distance and RAR as in Table 2, after randomizing the benchmark.

Results in Table 13 confirm that the confidence interval of the pooled OLS estimator from the 500 iterations do not contain the original point estimates of -0.917 and -1.054, respectively (see Table 2). In fact, the original point estimates are more than two standard deviations away from the confidence interval. This test demonstrates that external advisors

computed with daily returns.

make their risk choices only in response to the deviation from the self-designated benchmark and not for randomly selected benchmarks.

6 Conclusion

We investigate the effects of contractual arrangement on the portfolio risk choice of outsourced mutual funds. We first document that outsourced mutual funds engage in mid-year risk-shifting significantly more than in-house managed funds. This behavior can be explained by the optionality in both advisors' and portfolio managers' reward structures. Using an instrumental variable approach and matching analysis, we establish a causal relationship between outsourcing and strategic risk-shifting. In addition, we find that retention of management contract or concerns regarding potential termination drives excessive risk-shifting in outsourced funds. Interestingly, performance-based asymmetric contracts do not determine the majority of risk choices in outsourced funds. An analysis using the hand-collected portfolio manager compensation data reveals that managers of outsourced funds with a performance-based compensation contract do not shift their portfolio risk more than those without such a contract. However, in-house funds' risk choices are significantly influenced by the nature of contract awarded. Lastly, we examine the mechanisms that mitigate the above-discussed agency problems. Contractual arrangements, such as co-managing, co-branding, and co-location can mitigate the excessive risk-shifting by outsourced funds.

References

Brown, K.C., WV Harlow, and L.T. Starks, 1996, Of tournaments and temptations: An analysis of managerial incentives in the mutual fund industry, *Journal of Finance* 51, 85–110.

Chen, Hsuan-Chi, and Christine W Lai, 2010, Reputation stretching in mutual fund starts, *Journal of Banking & Finance* 34, 193–207.

Chen, Joseph, Harrison Hong, Wenxi Jiang, and Jeffrey D Kubik, 2013, Outsourcing mutual fund management: Firm boundaries, incentives, and performance, *The Journal of Finance* 68, 523–558.

Christoffersen, Susan EK, Richard Evans, and David K Musto, 2013, What do consumer's fund flows maximize? evidence from their broker's incentives, *The Journal of Finance* 68, 201–235.

Chuprinin, Oleg, Massimo Massa, and David Schumacher, 2015, Outsourcing in the international mutual fund industry: An equilibrium view, *The Journal of Finance* 70, 2275–2308.

Dass, Nishant, Vikram Nanda, and Qinghai Wang, 2013, Allocation of decision rights and the investment strategy of mutual funds, *Journal of Financial Economics* 110, 254–277.

Debaere, Peter Marcel, and Richard B Evans, 2015, Outsourcing vs. integration in the mutual fund industry: An incomplete contracting perspective, *Available at SSRN: https://ssrn.com/abstract=2399177* .

Del Guercio, Diane, and Jonathan Reuter, 2014, Mutual fund performance and the incentive to generate alpha, *The Journal of Finance* 69, 1673–1704.

Elton, Edwin J, Martin J Gruber, and Christopher R Blake, 2011, Incentive fees and mutual funds, in *Investments And Portfolio Performance*, 209–234 (World Scientific).

Evans, Richard Burtis, Melissa Porras Prado, and Rafael Zambrana, 2020, Competition and cooperation in mutual fund families, *Journal of Financial Economics* 136, 168–188.

Hamilton, Barton H, Jack A Nickerson, and Hideo Owan, 2003, Team incentives and worker heterogeneity: An empirical analysis of the impact of teams on productivity and participation, *Journal of political Economy* 111, 465–497.

Han, Lina, 2020, Not just one bet: Portfolio managers' cross fund risk-taking, *Available at SSRN 3731866* .

Huang, Jennifer, Clemens Sialm, and Hanjiang Zhang, 2011, Risk shifting and mutual fund performance, *The Review of Financial Studies* 24, 2575–2616.

Jensen, Kevan, Jin-Mo Kim, and Han Yi, 2015, The geography of us auditors: information quality and monitoring costs by local versus non-local auditors, *Review of Quantitative Finance and Accounting* 44, 513–549.

Kandel, Eugene, and Edward P Lazear, 1992, Peer pressure and partnerships, *Journal of political Economy* 100, 801–817.

Kang, Jun-Koo, and Jin-Mo Kim, 2008, The geography of block acquisitions, *The Journal of Finance* 63, 2817–2858.

Kempf, Alexander, Stefan Ruenzi, and Tanja Thiele, 2009, Employment risk, compensation incentives, and managerial risk taking: Evidence from the mutual fund industry, *Journal of Financial Economics* 92, 92–108.

Lee, Jung Hoon, Charles Trzcinka, and Shyam Venkatesan, 2019, Do portfolio manager contracts contract portfolio management?, *The Journal of Finance* 74, 2543–2577.

Ma, Linlin, Yuehua Tang, and Juan-Pedro Gomez, 2019, Portfolio manager compensation in the us mutual fund industry, *The Journal of Finance* 74, 587–638.

Margrabe, William, 1978, The value of an option to exchange one asset for another, *Journal of Finance* 33, 177–86.

Moreno, David, Rosa Rodriguez, and Rafael Zambrana, 2018, Management sub-advising in the mutual fund industry 127, 567–587.

Nanda, Vikram, Z Jay Wang, and Lu Zheng, 2004, Family values and the star phenomenon: Strategies of mutual fund families, *The Review of Financial Studies* 17, 667–698.

Patel, Saurin, and Sergei Sarkissian, 2017, To group or not to group? evidence from mutual fund databases, *Journal of Financial and Quantitative Analysis* 52, 1989–2021.

Table 1: Summary of the data

This table provides the summary statistics for our sample of funds from January 1999 to December 2018. Panel A provides the median of the distribution for the different observed variables in our sample. These statistics are provided for the overall sample and by their outsourcing status. The fund is deemed to be outsourced if either the investment advisor or sub-advisor, if sub-advised, does not belong to the fund-complex. The RAR is defined as the ratio of the standard deviation of the fund's excess return in the second half to the standard deviation of the fund's excess return in the first half. Expense ratio and turnover ratio are the annual percentage reported by the fund. Past year return is computed by compounding the previous calendar year return. Semi-annual compounded return of the fund in excess of its published benchmark is also reported. Panel B provides the frequency of funds outsourced in our sample by year.

Panel A: Summary of fund variables

	In-House Funds	**Outsourced Funds**	**All Funds**
Number of funds			3527
Number of fund-year observations	25485	9853	35338
Turnover ratio (%)	96.1	52.1	80.9
Expense ratio (%)	1.16	1.2	1.17
Age (in years)	11.5	7.5	10.3333
Total Net Assets (TNA) (millions)	247.5	133.7	205.5
Semi-annual return in excess of benchmark (in %)	-0.364	-0.425	-0.382
Risk Adjustment Ratio (RAR)	0.986	1.0	0.989
Past year return (%)	10.14	10.13	10.14

Panel B: Outsourcing by year			
Year	**Outsourced** (#)	**Total** Funds	**Outsourced** (%)
1999	370	1612	22.95
2000	399	1686	23.67
2001	455	1828	24.89
2002	489	1914	25.55
2003	476	1892	25.16
2004	475	1884	25.21
2005	508	1858	27.34
2006	518	1887	27.45
2007	549	1947	28.20
2008	570	1931	29.51
2009	509	1813	28.08
2010	489	1749	27.96
2011	488	1717	28.42
2012	477	1701	28.04
2013	485	1667	29.09
2014	520	1707	30.46
2015	531	1709	31.07
2016	528	1663	31.75
2017	520	1598	32.54
2018	497	1574	31.58
Total	9853	35338	27.88

Table 2: Outsourcing and risk-shifting

This table shows the interaction between the fund's first-half performance, oursourcing status, and the extent of subsequent risk-shifting. The estimates from a pooled OLS are reported in columns (I) and (II). In columns (III) and (IV), a quantile regression is estimated, where the conditional median function, $Q_{0.5}(.|.)$, is specified as

$$Q_{0.5}(dependent_{j,t}|I_{t,}) = a_t + c_1 * distance_{j,t} + c_2 * exret_{j,t} + \gamma * Controls.$$

The dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is one if the fund is outsourced and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. All the specifications have time-fixed and fund-fixed effects. For the pooled OLS regressions, standard errors are clustered by fund. For quantile regression, the bootstrapped standard errors are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	$Ols :RAR_{i,t}$		$Qtl :RAR_{i,t}$	
	(I)	(II)	(III)	(IV)
Distance	-1.016***	-0.917***	-0.808***	-0.718***
	(0.092)	(0.078)	(0.236)	(0.052)
Distance$*I_{outsourced}$		-1.054**		-0.890***
		(0.401)		(0.270)
$I_{outsourced}$	-0.013	-0.009	-0.003	-0.001
	(0.012)	(0.013)	(0.003)	(0.002)
Exret	0.219***	0.223***	0.135***	0.141***
	(0.075)	(0.076)	(0.027)	(0.021)
Turn ratio	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Exp ratio	0.457	0.490*	0.542***	0.531***
	(0.275)	(0.254)	(0.122)	(0.029)
Flows	-0.001	-0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Log age	0.008	0.008	0.001	0.001
	(0.010)	(0.010)	(0.002)	(0.002)
PastReturn	-0.047	-0.047	0.007	0.007
	(0.044)	(0.044)	(0.009)	(0.009)
Log size	0.001	0.001	-0.001	-0.001*
	(0.006)	(0.006)	(0.001)	(0.001)
Observations	32,989	32,989	32,989	32,989

Table 3: First Stage of 2SRI

This table shows the results of the first-stage of 2SRI estimation process. Our eventual goal is to showcase the effect of outsourcing on mutual fund risk-shifting. We estimate a logit regression where the dependent variable is *Outsourced*, which is an indicator that equals 1 if the fund management is outsourced and zero otherwise. The observations are at the fund-year level. The variable *LogFamFunds At Inception* is the natural logarithm of the number of funds in the fund family when the fund was created; *LogFamFunds* is the natural logarithm of the number of funds at the beginning of the year; and *LogFamSize* is the natural logarithm of the cumulative assets under management of the fund complex; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. Percentile dummies of Family Size at Inception (the size of the family that the fund belongs to when the fund was created) are also included in the specification. In addition, dummies for year and fund-family are included in our specification. Standard errors are clustered by time and are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	Outsourced
LogFamFunds At Inception	0.303***
	(0.054)
LogFamFund	0.256**
	(0.118)
LogFamSize	-0.028
	(0.043)
Log size	0.124***
	(0.020)
Log age	-0.366***
	(0.058)
Exp ratio	80.42***
	(7.346)
Turn ratio	-0.002
	(0.002)
PastReturn	0.097
	(0.125)
Flows	-0.078***
	(0.027)
Observations	26,685

Table 4: Second Stage of 2SRI

This table shows the results of the second stage of the 2SRI estimation process. The goal is to showcase the effect of outsourcing on mutual fund risk-shifting. We estimate a pooled regression where the dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The observations are at the fund-year level. The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is one if the fund is outsourced and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; *Log size* is the log of the fund's TNA at the beginning of the year; *LogFamFunds* is the natural logarithm of the number of funds at the beginning of the year; and *LogFamSize* is the natural logarithm of the cumulative assets under management of the fund complex. In addition, we include the residual from the first-stage regression (*FirstStageResiduals*) and its interaction with *Distance*. Percentile dummies of Family Size at Inception (the size of the family that the fund belongs to when the fund was created) and a dummy for each year are also included in the specification. The standard errors clustered by fund are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	$Ols : RAR_{i,t}$	$Qtl : RAR_{i,t}$
Distance	-0.838***	-0.713***
	(0.110)	(0.158)
*Distance**$I_{outsourced}$	-2.016***	-1.353***
	(0.678)	(0.470)
$I_{outsourced}$	0.001	0.002
	(0.108)	(0.004)
Exret	0.198**	0.125***
	(0.083)	(0.028)
Turn ratio	0.001	0.001
	(0.001)	(0.001)
Exp ratio	0.323	0.400**
	(0.326)	(0.163)
Flows	-0.001	-0.001
	(0.001)	(0.001)
Log age	0.012	0.001
	(0.009)	(0.002)
PastReturn	-0.052	0.004
	(0.059)	(0.009)
Log size	-0.001	0.001
	(0.005)	(0.001)
LogFamFund	-0.028	-0.001
	(0.018)	(0.003)
LogFamSize	0.001	-0.002
	(0.006)	(0.001)
FirstStageResiduals	-0.015	-0.004
	(0.104)	(0.007)
*Distance***FirstStageResiduals*	1.336*	0.859
	(0.812)	(1.126)
Observations	26,685	26,685

Table 5: Matched sample: outsourcing and risk-shifting

We report the results from the matched sample study. Funds managed by advisors outside of the fund complex (treated sample) are matched to funds that are managed in-house (control sample) on a variety of dimensions. We match the funds in the treated sample and in the control sample based on size of the fund, age of the fund, expense ratio, turnover ratio, fund flows, and previous year fund return. In addition, we enforce that the treated fund and the matched control fund are in the exact same year and have the same fund style. Figure 1 displays the balance of the sample post mataching. We run a pooled regression on the matched sample where the dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is one if the fund is outsourced and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. In column (I) a Greedy matching algorithm has been used to match the treated and a control sample. In column (II) a similar matching algorithm without replacement is used. Both the specifications have year dummies, and the standard errors are clustered by time. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

$RAR_{i,t}$	Greedy Match	Replace Match
	(I)	(II)
Distance	-0.881***	-0.825***
	(0.196)	(0.230)
*Distance**$I_{outsourced}$	-0.758**	-0.782**
	(0.345)	(0.365)
$I_{outsourced}$	-0.010	-0.013
	(0.011)	(0.012)
Exret	0.074	0.062
	(0.078)	(0.088)
Turn ratio	0.001	0.001
	(0.001)	(0.001)
Exp ratio	0.145	0.104
	(0.348)	(0.355)
Flows	0.001**	0.001**
	(0.001)	(0.001)
Log age	-0.001	0.001
	(0.005)	(0.005)
PastReturn	0.019	0.017
	(0.023)	(0.024)
Log size	-0.004*	-0.004
	(0.002)	(0.002)
Observations	16,034	14,770

Table 6: Contract type and risk-shifting

We run a pooled regression on the sample where the dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is one if the fund is outsourced and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. $I_{performance}$ is an indicator variable which is one if the fund manager's compensation is based on the performance of the fund and zero otherwise. Column (I) includes only the sample of funds that are managed in-house; column (II) includes only the sample of funds that are outsourced; and column (III) has funds of both type. All the specifications have year dummies and the standard errors are clustered by time. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	In-house (I)	Outsourced (II)	All funds(III)
Distance	-0.822**	-4.643***	-0.845**
	(0.374)	(0.845)	(0.368)
$Distance*I_{performance}$	-1.922***	0.675	-1.916***
	(0.743)	(1.478)	(0.717)
Exret	0.253***	0.393***	0.284***
	(0.084)	(0.103)	(0.067)
Turn ratio	0.001	-0.001	0.001
	(0.001)	(0.002)	(0.001)
Exp ratio	-1.076	0.533	-0.985
	(2.467)	(3.179)	(2.143)
Flows	-0.002	-0.001***	-0.001***
	(0.001)	(0.001)	(0.001)
Log age	0.016	0.026	0.013
	(0.017)	(0.016)	(0.013)
PastReturn	-0.102**	0.103***	0.014
	(0.050)	(0.022)	(0.057)
Log size	-0.003	0.004	-0.002
	(0.004)	(0.006)	(0.003)
$I_{performance}$	-0.017	0.015	-0.013
	(0.031)	(0.024)	(0.021)
$I_{outsourced}$			-0.012
			(0.018)
$Distance*I_{outsourced}$			-3.439***
			(0.890)
$Distance*I_{performance}*I_{outsourced}$			2.955**
			(1.512)
Observations	14,385	5,904	20,289

Table 7: Advisor characteristics and risk-shifting

The dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is one if the fund is outsourced and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. *AdvSize* is the log demeaned total assets under management of the advisor(s) managing the fund. $I_{AdvCount}$ is a dummy variable which takes the value of one if the total number of funds (count) under the management of the advisor(s) is greater than the median number and zero otherwise. All the specifications have time-fixed and fund-fixed effects. Standard errors are clustered by fund and are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	(I)	(II)
Distance	-1.547***	-0.889***
	(0.302)	(0.116)
$Distance*I_{outsourced}$	-1.125**	-2.406***
	(0.508)	(0.463)
$Distance*I_{outsourced}*AdvSize$	0.224**	
	(0.099)	
$Distance*I_{outsourced}*I_{AdvCount}$		3.327***
		(0.835)
$I_{outsourced}*AdvSize$	0.002	
	(0.005)	
$I_{outsourced}*I_{AdvCount}$		0.001
		(0.023)
$Distance*AdvSize$	-0.159***	
	(0.056)	
$Distance*I_{AdvCount}$		-2.239***
		(0.629)
$I_{outsourced}$	-0.002	-0.005
	(0.011)	(0.019)
Exret	0.102**	0.123***
	(0.047)	(0.044)
Turn ratio	-0.005	-0.005
	(0.005)	(0.005)
Exp ratio	0.454**	0.545***
	(0.200)	(0.191)
Flows	-0.011*	-0.010*
	(0.006)	(0.006)
Log age	0.018**	0.018*
	(0.009)	(0.010)
PastReturn	-0.033	-0.034
	(0.059)	(0.059)
Log size	0.002	0.001
	(0.009)	(0.009)
AdvSize	-0.005	
	(0.005)	
$I_{AdvCount}$		0.005
		(0.021)
Observations	24,456	24,456

Table 8: Risk-Shifting in Co-Managed funds

This table shows the effect of having multiple advisors on risk-shifting amoung outsourced funds. The estimates from a pooled OLS are reported in columns (I) and (II). The dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is 1 if the fund is outsourced and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. In column (I), $I_{\{advisor>1\}}$ is a dummy variable that takes the value of one when the number of fund advisors is greater than one. The base case, the coefficient for which has not been estimated to avoid multi-colinearity, is when the number of fund advisors is exactly one. In column (II) we use the same base case. However, $I_{\{1<advisor\leqslant 5\}}$ is a dummy variable that takes the value of one when the number of fund advisors is greater than one but is less than or equal to 5; and $I_{\{advisor>5\}}$ is a dummy variable that takes the value of one when the number of fund advisors is greater than five. All the specifications have time-fixed and fund-fixed effects. Standard errors are clustered by fund and are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	$RAR_{i,t}$	$RAR_{i,t}$
	(I)	(II)
Distance	-3.498***	-3.488***
	(0.473)	(0.473)
*Distance**$I_{\{advisor>1\}}$	1.458*	
	(0.770)	
*Distance**$I_{\{1<advisor\leq 5\}}$		1.814**
		(0.796)
*Distance**$I_{\{advisor>5\}}$		-0.840
		(2.012)
$I_{\{advisor>1\}}$	0.001	
	(0.014)	
$I_{\{1<advisor\leq 5\}}$		-0.006
		(0.015)
$I_{\{advisor>5\}}$		0.045
		(0.033)
Exret	0.228***	0.230***
	(0.068)	(0.068)
Turn ratio	-0.002	-0.002
	(0.001)	(0.001)
Exp ratio	0.721***	0.713***
	(0.144)	(0.142)
Flows	-0.012*	-0.012*
	(0.007)	(0.007)
Log age	0.018	0.018
	(0.011)	(0.011)
PastReturn	0.065*	0.065*
	(0.035)	(0.035)
Log size	0.004	0.004
	(0.004)	(0.004)
Observations	8,048	8,048

Table 9: Risk-Shifting in Co-Located Advisors

This table shows the effect of co-location of fund complex and advisors on risk-shifting amoung outsourced funds. The estimates from a pooled OLS are reported in columns (I) and (II). The dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is one if the fund is outsourced and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. *GeoDistance* is the log of the distance in kms between the registrant and the advisor. When there are multiple advisors, we use the average distance across them. $I_{\{High-GeoDistance\}}$ is an indicator variable which takes the value of one when the distance between the registrant's address and the advisor's address is above the median distance. $I_{\{In-State\}}$ is an indicator variable which takes the value of one when the registrant's address and the advisor's address is in the same state. All the specifications have time-fixed and fund-fixed effects. Standard errors are clustered by fund and are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	$RAR_{i,t}$	$RAR_{i,t}$
	(I)	(II)
Distance	-2.458***	-3.628***
	(0.437)	(0.585)
*Distance**$I_{\{High-GeoDistance\}}$	-1.702**	
	(0.726)	
*Distance**$I_{\{In-State\}}$		1.329*
		(0.746)
$I_{\{In-State\}}$		-0.002
		(0.016)
$I_{\{High-GeoDistance\}}$	0.007	
	(0.013)	
Exret	0.245***	0.241***
	(0.070)	(0.070)
Turn ratio	-0.001	-0.001
	(0.004)	(0.004)
Exp ratio	0.479***	0.444***
	(0.128)	(0.135)
Flows	-0.011	-0.011
	(0.009)	(0.008)
Log age	0.020	0.018
	(0.013)	(0.013)
PastReturn	0.067	0.067*
	(0.036)	(0.036)
Log size	0.001	0.002
	(0.005)	(0.005)
Observations	7,718	7,977

Table 10: Risk-Shifting and Co-branding

This table shows the effect of co-branding on risk-shifting among outsourced funds. Co-branding arrangement is one where the name of the sub-advisor is included in the fund name. The fund family partners with a sub-advisor to capitalize on the sub-advisor's reputation. The estimates are from a pooled OLS regression, and the sample includes only the outsourced funds. The dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{Co-brand}$ is an indicator variable that takes the value of one if the fund is co-branded and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. *Log SubAdvisor* and *Log Advisor* are the log number of sub-advisors and advisers,repectively, in the fund. All the specifications have time-fixed and fund-fixed effects. Standard errors are clustered by fund and are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	$RAR_{i,t}$
Distance	-3.759***
	(0.467)
$Distance*I_{\{Co-brand\}}$	1.710**
	(0.764)
$I_{\{Co-brand\}}$	-0.002
	(0.020)
Exret	0.189***
	(0.070)
Turn ratio	0.001
	(0.003)
Exp ratio	0.763***
	(0.142)
Flows	-0.010
	(0.007)
Log age	0.019
	(0.012)
PastReturn	0.064*
	(0.036)
Log size	0.001
	(0.005)
Log SubAdvisor	0.011
	(0.016)
Log Advisor	-0.147
	(0.090)
Observations	7,169

Table 11: Outsourcing vs Broker Sold

The estimates are from a pooled OLS regression. The dependent variable is the ratio of the standard deviation of the tracking error from the second half of the year to that from the first part of the year ($\frac{\sigma_2(r_{j,t}-b_{j,t})}{\sigma_1(r_{j,t}-b_{j,t})}$). The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is one if the fund is outsourced and zero otherwise; $I_{broker-sold}$ is an indicator variable which is one if the fund is broker-sold and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. All the specifications have time-fixed and fund-fixed effects. Standard errors are clustered by fund and are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

Panel A: Summary of data

	In-house		Outsourced	
	Direct sold	Broker sold	Direct sold	Broker sold
Number of fund-year observation	7,551	6,632	4,349	1,927
% of sample	36.91	32.42	21.26	9.42

Panel B: Pooled OLS regression

	$RAR_{i,t}$
Distance	-1.879***
	(0.521)
$Distance*I_{outsourced}$	-2.615**
	(1.125)
$Distance*I_{broker-sold}$	0.846
	(0.593)
$Distance*I_{broker-sold}*I_{outsourced}$	-0.910
	(1.498)
$I_{brokered}$	-0.038
	(0.031)
$I_{outsourced}$	-0.004
	(0.021)
Exret	0.283***
	(0.069)
Turn ratio	-0.003
	(0.003)
Exp ratio	-2.532
	(2.311)
Flows	-0.022***
	(0.005)
Log age	0.007
	(0.015)
PastReturn	0.018
	(0.056)
Log size	0.003
	(0.005)
Observations	17,012

Table 12: Outsourcing and risk-shifting (Holdings)

This table shows the interaction between the fund's first-half performance, outsourcing status, and the extent of subsequent risk-shifting. The estimates from a pooled OLS and a quantile regression are presented below. The dependent variable is the intended change in portfolio risk computed using holdings of the fund. The intended change in portfolio risk, $RAR_{i,t}^{holdings} = \frac{\sigma_{i,t}^{(2),int}}{\sigma_{i,t}^{(1)}}$, is the ratio of the standard deviation of tracking error of the intended portfolio in the second half of the year to the realized standard deviation of tracking error for the first half of the year. See the text of the paper for more details. The variable *Exret* is the fund's first-half return in excess of its own self-designated benchmark; *Distance* is the square of the fund's return in excess of its benchmark, and it measures the extent to which the excess return deviates from zero; $I_{outsourced}$ is an indicator variable which is one if the fund is outsourced and zero otherwise; *Exp ratio* is the expense ratio of the fund at the beginning of the year; *Turn ratio* is the turnover ratio of the fund at the beginning of the year; *Flows* is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the first half of the year; *Log age* is the log of the number of years since the first shareclass in the fund was issued; *PastReturn* is the compounded return of the fund for the previous calendar year; and *Log size* is the log of the fund's TNA at the beginning of the year. All the specifications have time-fixed and fund-fixed effects. For the pooled OLS regressions, standard errors are clustered by fund. For quantile regression, the bootstrapped standard errors are provided in parentheses below the point estimates. The significance levels are denoted by *, **, and *** and indicate whether the results are statistically different from zero at the 10%, 5%, and 1% significance levels, respectively.

	$Ols: RAR_{i,t}$		$Qtl: RAR_{i,t}$	
	(I)	(II)	(III)	(IV)
Distance	-0.801**	-0.663**	-0.650***	-0.528*
	(0.289)	(0.309)	(0.213)	(0.300)
$Distance*I_{outsourced}$		-1.455**		-0.786**
		(0.661)		(0.326)
$I_{outsourced}$	-0.005	-0.002	-0.001	0.001
	(0.005)	(0.004)	(0.002)	(0.002)
Exret	-0.200**	-0.197**	-0.120***	-0.115***
	(0.079)	(0.080)	(0.025)	(0.025)
Turn ratio	0.001	0.001	-0.001**	-0.001*
	(0.001)	(0.001)	(0.001)	(0.001)
Exp ratio	-0.620*	-0.632**	-0.491	-0.492
	(0.306)	(0.293)	(0.400)	(0.351)
Flows	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Log age	0.001	0.001	0.002	0.002
	(0.004)	(0.004)	(0.001)	(0.001)
PastReturn	-0.038	-0.038	-0.025**	-0.026**
	(0.032)	(0.032)	(0.012)	(0.012)
Log size	0.001	0.001	0.001	0.001
	(0.002)	(0.002)	(0.001)	(0.001)
Observations	21,741	21,741	21,741	21,741

Table 13: Placebo test

This table summarizes the results from a placebo test via a bootstrapping exercise. The boostrapping exercise randomly assigns a benchmark to each fund. A total of 500 different randomization trials are performed. For each iteration, we perform a pooled OLS regression. These regression specifications is the same as the one in Column (II) of Table 2. We provide the 5th and 95th percentiles of the point estimates associated with the *Distance* and $Distance * I_{outsourced}$ variables from the 500 random benchmark assignments exercise. We also provide the coefficient estimates from our baseline regression for comparision.

Confidence Interval from Random Benchmark Assignments Exercise

	5%	95%	Original Estimate
Distance	-0.654	-0.384	-0.917
$Distance{*}I_{outsourced}$	-0.143	0.234	-1.054

Figure 1: Covariate balance

The graph below plots the covariate balance between the control group and the treated group. The treated group contains funds managed by advisors outside the fund complex and the control group contains funds that are managed in-house. $Expense_Ratio$ is the expense ratio of the fund at the beginning of the year; $Size$ is the log of the fund's TNA at the beginning of the year; Age is the log of the number of years since the first shareclass in the fund was issued; $Turnover$ is the turnover ratio of the fund at the beginning of the year; $Fund_Flow$ is the new money into fund j, defined as $\frac{TNA_{j,t+1}-TNA_{j,t}(1+r_{j,t+1})}{TNA_{j,t}}$, during the previous year; and $Previous_year$ is the return of the fund in the previous calendar year. We match the funds in the treated sample and in the control sample based on size of the fund, age of the fund, expense ratio, turnover ratio, fund flows, and previous year fund return. In addition, we enforce that the treated fund and the matched control fund are in the exact same year and have the same fund style.