

MANAGEMENT SUBADVISING: THE MUTUAL FUND INDUSTRY

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ABSTRACT

This paper extends the literature on mutual fund governance and the role of third-party organizations in incentives and performance. We used the Form NSAR-B filings reported by the U.S. Securities and Exchange Commission from 1996 to 2011 to analyze the differences in performance associated with different types of outsourcing chosen by mutual funds. Whereas the previous literature is unsettled regarding the efficiency of management outsourcing, we confirm an inefficiency that arises from a conflict of interest when management companies act as both advisors for their own funds and as external subadvisors for other funds. First, we show that management companies give their own funds preferential treatment by transferring relatively poorly performing portfolio managers with relatively less tenure to outsourced funds. Second, we show that when an unaffiliated subadvisor does not act as advisor for its own funds, its subadvised funds do not underperform its in-house peers. Third, we demonstrate that an incentive-fee mechanism and various subadvisory arrangements – such as co-branding and multi-manager contracts – may help control and monitor this management conflict of interest. When such mechanisms are employed, we find that outsourcing can be an efficient business model.

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1. Introduction

Recent literature on mutual funds has focused on the decisions made by firms that provide mutual funds and their consequences for investors, including decisions about fund family structure and strategy (Nanda *et al.*, 2004 and Gaspar *et al.*, 2006), whether to merge or liquidate funds (Khorana *et al.*, 2007), and the role of fund boards and their impact on fund fees (Ding and Wermers, 2009). In addition, it is understood that fund families often outsource management of their funds. This paper addresses the consequences for investors of such subadvisory arrangements, including the efficiency of such contracts.

In recent years, the number of subadvised funds has grown faster than the fund industry itself, which suggests the emergence of a new business model for mutual fund management. One explanation for this recent trend in outsourcing might be traced to fund families competing in the market by offering wider ranges of products and more differentiated funds. Khorana and Servaes (2012) show that fund families offer new funds to increase their market share in the mutual fund industry. In addition, a wider range of investment styles offered by a fund family means higher future fund flows, and fund families seek future fund flows to gain higher fees, as shown by Gallaher *et al.* (2008). Thus, outsourcing might also be motivated by a desire to offer a wider range of different investment styles.

Despite the growth in outsourcing of portfolio management by fund families, there has been relatively little research on outsourcing in the mutual fund industry, and the few findings there are have been inconclusive. Chen *et al.* (2013) examine the consequences of outsourcing on mutual fund performance and find that subadvised funds underperform because they are difficult to monitor. These funds engage in less risky behavior because they belong to an external firm, and there is a relatively high probability of management replacement. Cashman and Deli (2009) find that outsourced funds might perform better than internally managed funds when the underlying economics suggest that a fund should be subadvised. Kuhnen (2009) analyzes whether the decision to outsource is influenced by connections between the board of directors and the advisor and finds that subadvised contracts are more likely when such relationships are strong. Del Guercio *et al.* (2010) use a sample of domestic equity mutual funds in 2002 to study the impact of investor

heterogeneity on market segmentation and find that changes in the way that investors compensate brokers will change the nature of competition among mutual funds. This same study also suggests that mutual fund families that subadvise for other families may benefit from outsourcing costly distribution services and that this type of arrangement may relax broker-induced constraints on distribution.

In a sample of the 50 largest fund families from 1994 to 2004, Duong (2010) finds no significant evidence of underperformance. However, when considering only funds managed by advisors that have both in-house managed funds and subadvised funds, this same author finds that the latter underperform the in-house managed funds, which suggests a possible conflict of interest for management firms. With respect to this conflict, Chuprinin *et al.* (2011) analyze a sample of international mutual funds and suggest that in-house funds benefit from the subsidization of outsourced funds as part of the incentive compensation of the subadvisory company.

Situations in which investors suffer as a result of fund managers' conflicts of interest are not new.¹ For instance, Brown, Harlow and Starks (1996) find that poorly performing managers make riskier decisions than strongly performing managers. Gaspar *et al.* (2006) show that fund families tend to favor certain funds to the detriment of others within the family. Musto (1999) finds that fund managers window dress their portfolio returns. Carhart *et al.* (2002) and Bernhardt and Davies (2005) find evidence of so-called "portfolio pumping" by fund managers.

First, we begin this study by re-evaluating the performance of outsourced U.S. equity funds because the results presented in the literature are inconclusive. Using a new database of subadvisory contracts from 1996 to 2011, we prove that outsourced equity funds underperform in-house funds, on average. However, we propose that this underperformance is caused not by outsourcing itself but by a new conflict of interest that arises in management companies that simultaneously manage their own funds and those of competitors.² This conflict of interest may generate underperformance in subadvised funds,

¹ See Golec, J. (1992) for a study of principal-agent model of the investor-investment advisor relationship.

² Approximately 40% of the subadvised funds in our sample are managed by external management companies that also manage their own funds, which may compete in the same market as the subadvised funds.

and, consistent with this, Chen *et al.* (2013) show that outsourced funds are less likely to benefit from preferential IPO allocations or other subsidies than an in-house fund. Second, by further exploring hidden actions that might generate underperformance in outsourced funds as a result of conflicts of interest, we focus on human capital allocation to examine whether transferring portfolio managers among in-house and subadvised funds within a fund family might explain underperformance; we find that there is a strategic allocation of managers according to past performance and tenure. Portfolio managers of in-house funds that performed poorly during the immediately preceding 18-month period are more likely to be transferred to outsourced funds. Manager tenure at the fund family also appears to play an important role in human capital allocation because the longer a portfolio manager has been affiliated with the family, the less likely she is to be transferred to an outsourced fund and the more likely she is to be transferred to internal funds. These findings are consistent with Fang *et al.* (2012), who show that fund families allocate their best managers to the least efficient market segment to better exploit such inefficiencies.

To understand why managers may handle outsourced and in-house funds differently, it is important to note that income from these different types of funds differs. The management company collects management, distribution and administrative fees (among others) from those funds managed in-house, whereas under a typical outsourcing arrangement, the subadvisor receives only a subadvisory fee. A good example in our database is ICON Advisers, Inc., which manages its own fund (*ICON Equity Income Fund*) and an external one (*Ohio National Fund Income Opportunity Portfolio*, which belongs to Ohio National Investments, Inc.). ICON Advisers receives from its own mutual fund a management fee of 0.75%, a 12b-1 distribution fee of 0.75% and other expenses of 0.69% (consisting of an administrative fee of 0.05%, among other fees), whereas it receives a subadvisory fee of only 0.5% from the external fund that it manages. The fund industry is aware of this potential conflict of interest, which is why some management companies set specific conditions on the outsourcing arrangements between principal advisors and

external subadvisors that restrict the latter to managing only their subadvised funds and not the funds of others.³

Now that we understand this new conflict of interest, our main objective is to show that outsourcing can be efficient as a business model whenever a subadvisor is not simultaneously managing both its own funds and external funds, or under specific types of subadvisory agreements or fees that eliminate the underperformance caused by the conflict of interest discussed above. Our findings indicate that an incentive fee mechanism and different types of subadvisory agreements – such as multi-manager contracts and co-branding business models – serve to control and monitor the conflict of interest.

We first analyze the co-branding model as a mechanism to reduce the negative effects of this conflict. In a co-branding arrangement, the principal advisor partners with a subadvisor to capitalize on the reputation of the subadvisor or a specific portfolio manager employed by the subadvisor. In this case, the conflict of interest in the management company is reduced because the subadvisor could lose not only the subadvisory contract but also its own reputation or prestige. We document an improvement of 125 to 156 basis points (bps) per year for funds operating under a co-branding model in which subadvisory services are employed in cases of conflict of interest.

The second mechanism is the multi-manager arrangement, which allows management firms to hire more than one subadvisor to manage its funds. Such contracts are exempt from certain requirements of mutual funds mandated by the U.S. Securities and Exchange Commission (SEC), which allows them to terminate and appoint new unaffiliated subadvisors without shareholder approval; this exemption makes it easier and less costly to terminate the subadvisory relationship. Under this framework, subadvisors are concerned with losing contracts; thus, they focus more on fund management, which leads to a more competitive environment. Given a potential conflict of interest, we find that multi-management models improve fund performance by between 84 and 91 bps per year. Some companies recognize the usefulness of such a mechanism and include it as an exception in

³ For instance, the principal advisor of John Hancock Funds II - International Growth Equity entered into an agreement with Turner Investments, L.P. (“The Subadvisor”) in which Turner agreed that, for a five-year period, it will not act as an investment adviser of any fund with investment strategies and policies substantially similar to those of the subadvisory fund.

agreements with advisory and subadvisory firms not to manage other funds. For instance, in the example of John Hancock Funds II and Turner Investments, the subadvisor is allowed to manage other funds only in cases of multi-manager funds in which Turner is one of three or more managers of each such fund.

Third, we analyze whether incentive fees might mitigate the underperformance of subadvised mutual funds. Incentive fees are a reward structure that makes management compensation a function of investment performance. Legally, a mutual fund can only use a type of fee known as a “fulcrum fee”⁴ as an incentive fee. We find that subadvised funds governed by performance fee contracts have significantly improved performance. We also observe that subadvised funds subject to conflict of interest enjoy a performance improvement ranging from 100 to 159 bps per year when they charge a performance fee to mitigate such conflict.

The remainder of this paper is organized as follows. Section 2 describes subadvisory model contracts and formulates our research hypothesis. Section 3 describes our data and the algorithm used to merge data from SEC Form NSAR filings with the CRSP Mutual Funds database. Section 4 examines the underperformance of subadvised funds, the relationship between such underperformance and existing conflicts of interest and the mechanisms that can offset this conflict. Section 5 concludes.

2. Hypothesis Development

2.1. Subadvised Funds

The number of subadvised funds has grown considerably over the last decade. According to the Investment Company Institute (ICI), approximately 40% of funds had delegated portfolio management responsibilities to at least one subadvisor as of April 2009, by contrast to approximately 25% over the previous 10 years. Firms that provide portfolio management services can either be affiliated with the fund family (i.e., where the principal

⁴ According to the 1970 amendment of the Investment Company Act of 1940, the incentive fee must be centered on an index with increases in fees for performance above the index matched by decreases in fees for performance below the index.

advisor and subadvisor belong to the same firm) or unaffiliated (i.e., where the principal advisor delegates investment decision rights to an independent firm). The number of mutual funds with affiliated subadvisors grew from 804 funds in 1999 to 1,284 in April 2009, whereas the number of mutual funds with unaffiliated subadvisors grew faster, from 500 funds in 1999 to 1,130 funds 10 years later, which represents an increase of 126%.

We observe different types of subadvisory arrangements, depending on the types of contracts registered. Portfolio management delegation is partial when the principal advisor delegates part of a fund to a subadvisor and continues to manage the remaining portfolio assets itself. Conversely, the principal advisor may hire one or more management firms to manage the entire fund portfolio. Under this framework, the principal advisor fully delegates portfolio management and focuses on monitoring subadvisors and on sponsoring, branding and distribution.⁵

2.2. Hypothesis Development

In general, a fund family may use one or more subadvisors to manage some of their funds. These subadvisors might also manage the funds of other fund families and possibly even their own funds. In these latter cases, the subadvisory firm could focus more effort on its own funds than on others. A possible reason an advisor may favor in-house managed funds is that such funds contribute to the firm's revenues through other expenses such as 12b-1 fees, whereas the only revenues an advisor receives from outsourced funds are subadvisory fees. Therefore, we posit that outsourcing is not inefficient per se – i.e., as a result of firm boundaries (as in Chen *et al.* (2013)) – but specifically because firms that manage both internal and external funds are subject to a conflict of interest that leads to underperformance of subadvised funds compared to funds managed in-house, as shown in Duong (2010).

This conflict of interest also leads to underperformance relative to the rest of the subadvised funds. In addition, if we exclude funds with such management conflicts, outsourced funds are not inefficient and do not underperform funds managed in house.

⁵ In this research, we will not distinguish between these two forms. For more details on this classification, see Independent Directors Council: "Board Oversight of Subadvisors". Task Force Report. January 2010.

HYPOTHESIS 1: Mutual funds subadvised by firms that also manage their own funds will suffer from a conflict of interest in fund management, which indicates that outsourcing will be inefficient in this situation. However, if we consider only funds without conflicts of interest, subadvised funds do not underperform in-house managed funds.

Among the primary duties of fund management companies is to hire portfolio managers and allocate them across funds. Sometimes this allocation of human capital must be made among both internal (in-house) and external (outsourced) funds. Previous studies have shown that management firms tend to favor their own funds to the detriment of funds managed in their capacity as subadvisors through preferential treatment in IPO allocations and other unobserved actions (Chen *et al.* 2013). However, it is not clear whether management companies treat in-house funds preferentially through unfair allocation of portfolio management responsibilities among their employees.

HYPOTHESIS 2: Management companies give their own funds preferential treatment by transferring relatively poorly performing portfolio managers with relatively less tenure to outsourced funds.

For firms that manage both internal and external funds, we present a mechanism to monitor conflicts of interest. First, we discuss co-branding as a subadvisory arrangement in which the principal advisor partners with a subadvisor to capitalize on the subadvisor's reputation. In many cases, the fund includes the name of the subadvisor in the fund's name to attract new investors. In this case, the conflict of interest identified above is mitigated because the subadvisor is concerned not only about the fees it receives but also about the fund's performance that is now linked to its reputation. Therefore, we hypothesize that:

HYPOTHESIS 3: In cases of conflict of interest, co-branding of subadvisory arrangements positively affects the performance of outsourced funds.

The strategic choice of management structure is associated with differences in performance depending on whether funds are managed by individual managers or by teams of managers (Bar *et al.* (2005)). We also expect differences in fund performance between multi-manager and single-manager subadvised funds, where multi-manager refers to a subadvisory arrangement made by the principal advisor and more than one subadvisor. Each subadvisor manages a fraction of the fund's portfolio. The principal advisor monitors the subadvisors, allocates the assets of the portfolio among them, and keeps the distribution up to date by making periodic allocation adjustments. Pursuant to Release No. 33-8312, the SEC exempts certain multi-manager funds from having to obtain shareholder approval to terminate subadvisory contracts.⁶ This exemption makes it easier and cheaper to terminate contracts with subadvisors that have poor performance records and to generate increased competition among subadvisors managing the fund. This competition might even generate an incentive that deviates from the benchmark to improve performance.

HYPOTHESIS 4: Outsourced funds with potential conflicts of interest do not underperform if the funds are under multi-manager subadvisory arrangements.

In a typical outsourcing arrangement by investment companies, the principal advisor receives marketing and distribution fees, and the subadvisor receives management fees. Although fees most commonly depend on the value of the assets under management, fees can also depend on income, performance, performance of other funds in the family or a combination of the foregoing. Performance-based fees might have an important role in outsourced funds because they can be used to control and motivate independent advisors regarding fund management.

HYPOTHESIS 5: Performance-based fee contracts mitigate conflicts of interest and improve the performance of subadvised funds, in general, and those with a potential conflict of interest, in particular.

⁶ See SEC Release Nos. 33-8312, 34-48683, IC-26230, available at <http://www.sec.gov/rules.shtml>.

3. Data Description and Summary Statistics

3.1. Data Sources

We examine actively managed U.S. equity mutual funds during the 1996-2011 period. The data come from two main sources: SEC filings and the Center for Research in Security Prices (CRSP) mutual funds database. Data on subadvisors, advisory arrangements, fund investment style and types of fees come from the Form NSAR filings. Fund returns, total net assets, turnover, expenses and other available fund characteristics come from CRSP.

Under the Investment Act of 1940, every investment company must register with the Securities and Exchange Commission (SEC). All U.S. mutual funds and other regulated investment management companies are required to file Form NSAR (along with other documents) on a semi-annual basis. Form NSAR-A covers the first six months of the fiscal year for an individual investment management company, and Form NSAR-B covers the full year. A mutual fund family, also known as a family complex, is composed of several mutual fund series, each of which (also known as a fund trust) may consist of several mutual funds. Each mutual fund series is legally formed as an investment company. Thus, each family complex may file several distinct NSAR forms for each of its fund trusts along with detailed information about each of the mutual funds.

To create our database, we first downloaded and parsed all NSAR-B filings available from the SEC's EDGAR database – a total of 55,315 files. Although certain funds voluntarily filed their reports prior to the mandatory disclosure period (there were filings available from 1993), the data began to appear consistently in 1996. To mitigate any selection bias, our sample begins with 1996. Our initial dataset is the entire population of the U.S. open-ended mutual fund market from 1996 to 2011.⁷

The NSAR filings allow us to extract a substantial amount of information that is unavailable in other databases, such as subadvisor names, advisory fees and advisory contracts. A limited number of previous studies have used much smaller subsets of these

⁷ From the initial 55,315 filings, we drop the corresponding filings for 1994 and 1995 and filings where no names for the trust appear, obtaining a sum of 43,537 filings. In addition, we do not consider index funds or those missing an advisor name.

data to examine various issues related to advisory contracts. For example, Cashman and Deli (2009) studied locating decision rights only for 2002. Duong (2009) examined outsourcing in the mutual fund industry for a subsample of the 50 largest fund families and certain smaller families. Deli (2002) and Warner and Wu (2011) performed more detailed studies on advisory contracts. Almazan *et al.* (2004) examined investment constraints, and Dass and Sundaram (2002) examined the use of performance-based compensation.

Mutual fund returns and characteristics are obtained from the CRSP Survival-Bias-Free U.S. mutual fund database for the same period (1996-2011). The CRSP database has information about multiple fund classes issued by a particular fund. These classes, typically denoted A, B and C, have the same underlying portfolio. The main difference between them is the fee structure. Our observations are made at the class level. We group data by observation at the fund level, following the literature (e.g., Gaspar *et al.* (2006) or Nanda *et al.* (2004)). We aggregate returns, weighting each class by total net assets (TNA).

We compute the volatility of fund returns as the standard deviation of returns during the prior 12 months. If the fund has multiple classes, the TNA of the fund is the sum of all TNA over all the classes. Turnover and expenses are aggregated at the fund level by weighting each class by its total net assets; for fund age, we select the oldest among all classes. To merge the CRSP and NSAR data, we use a fuzzy match procedure that utilizes Weighted Jaccard Distances, which is discussed in the technical appendix.

3.2. Summary Statistics

Panel A of Table 1 reports the number of subadvised funds affiliated or unaffiliated with the fund family.⁸ The affiliation data among investment management firms (in our case, between advisor and subadvisor) come from different sources. The main source is the SEC website, where the firm name, the last filing date, issuer relationships, owner relationships, affiliate relationships, group members, and filing-agent relationships can be

⁸ Although our analysis concentrates on U.S. equity funds, we will consider in this first table all U.S. mutual funds to better compare our primary results with prior research. For the following tables, we will focus only on equity mutual funds, as defined in the NSAR-B filings.

searched.⁹ The literature on outsourcing of mutual funds does not consider affiliated subadvised funds as outsourced funds per se but as in-house funds. We will follow this approach and will refer to subadvised funds as unaffiliated funds hereinafter. The results show that the proportion of unaffiliated funds has grown from approximately 13% five years ago to over 20% of total funds currently.

This finding is consistent with the prior literature. For example, Cashman and Deli (2009) show that 13.6% of subadvised funds in 2002 were unaffiliated, whereas Del Guercio *et al.* (2010) find that it is 18%. A report from the Independent Directors Council, “Board Oversight of Subadvisors” (2010), states, “as of April 2009, nearly 40% of mutual funds use at least one subadvisor to manage the fund’s portfolio, compared to 25%, 10 years ago”. Our data are also consistent with this statement, as we observe that, by the end of 2009, subadvised funds, both affiliated and unaffiliated, accounted for 41.9% of total funds in our sample. In 1999, that figure was 25.6%.

Panel B of Table 1 focuses only on funds with unaffiliated subadvisors and reports the percentages of funds classified according to whether they use performance-based fees, a co-branding model or a multi-manager arrangement.¹⁰ Performance-based fees have been carefully applied in the industry, and their use ranges from approximately 2% to 7%. Among unaffiliated subadvised funds, hiring more than one subadvisor is a common management approach, as multi-management¹¹ arrangements account for between 11% and 33% of such funds over the last 15 years. Co-branded funds represent approximately 20% of all unaffiliated subadvised funds. Finally, Panel C shows that subadvised funds with a potential conflict of interest (when the subadvisor is also the principal advisor of other funds in its family) represent nearly half of all unaffiliated subadvised funds.

[Insert Table 1 here]

⁹ Firms’ affiliations have been accurately cross-checked, using firm websites, financial news and company annual reports.

¹⁰ Although these categories are not legally mutually exclusive, we observe that less than 1% of our sample combines two or more of these mechanisms.

¹¹ We consider mutual funds managed by more than one firm as those that have multi-manager subadvisory arrangements (i.e., the principal advisor has hired more than one unaffiliated subadvisor). We do not consider as multi-managed funds that are partially managed by a principal advisor and jointly managed with one subadvisor.

Because one of the objectives of this paper is to examine whether management companies unfairly allocate portfolio managers in ways that favor in-house managed funds over subadvised funds, Table 2 includes summary information regarding the 1,074 U.S. equity mutual funds in our database for the 1996-2011 period that are managed by individual portfolio managers. Among these funds, we observe that the total number of managers ranges from 541 in 2011 to a maximum of 940 in 2002. During the sample period, 723 portfolio managers have been managing an average of more than one fund each.¹² Of these multi-fund managers, 86% are in-house managers and 14% manage subadvised funds. The total number of management companies is 262, and these, on average, have approximately 4 funds each. In addition, we observe that there are on average more than 30 transfers of portfolio managers per year, which represents 4% of all individual managers in our sample. Thus, we have evidence of some shifting of portfolio managers within management companies.

[Insert Table 2 here]

Finally, Table 3 reports fund-level summary statistics for all U.S. equity mutual funds in our sample, categorized by management status. We find that subadvised funds are smaller and younger than most funds and come from relatively small families that offer similar numbers of products. Additionally, we find that flow and turnover are unrelated to management status. These results are consistent with Chen *et al.* (2013), who find similar results for a different period and include fixed-income and balanced funds in their analysis. We also find, as in Duong (2010), that subadvised funds are relatively expensive. In the final row, we observe that U.S. equity subadvised funds represent approximately 20% of all equity funds, on average.

[Insert Table3 here]

¹² We do not consider portfolio managers who manage both in-house and subadvised funds simultaneously. This set of managers accounts for roughly 4% of our primary dataset. Table 2 already excludes these funds.

4. Methodology and Empirical Results

In this section, we compare the performances of subadvised funds and in-house managed funds to determine whether there are differences in performance due to conflicts of interest in management firms. We then examine whether such conflicts can be mitigated through different types of subadvisory arrangements such as co-branding, multi-manager systems or performance-based fees.

Because our main variables of interest from CRSP have a monthly frequency, we convert all variables extracted from the NSAR-B filings from yearly to monthly frequencies. For each mutual fund, we compute risk-adjusted returns (α_i) before expenses¹³ with three different models: the Capital Asset Pricing Model (CAPM), Carhart's (1997) four-factor model (FF4), and an international five-factor model (FF5), which adds the MSCI World Index return factor to the FF4 model.¹⁴

4.1. Subadvised Funds: Potential Conflict of Interest

We now turn to our empirical results. To test for subadvised fund efficiency, we estimate differences in performance due to management status from the following panel regression at monthly frequency:

$$Performance_{it} = \beta_0 + \beta_1 SubAdvised_{it} + \beta_2 X_{it-12} + \varepsilon_{it} \quad [1]$$

where *Performance* is the risk-adjusted return of fund *i* in month *t*, β_0 is the intercept, *SubAdvised_{it}* is a dummy variable indicating whether fund “*i*” was subadvised in month *t*, and X_{it-12} is a set of control variables.

As observed in the descriptive statistics, certain characteristics may be correlated with the status of outsourcing and might predict performance. For example, small funds with

¹³ The CRSP value-weighted stock index net of the one-month Treasury rate (R_m) is used as the market factor. The SMB (size factor), HML (book-to-market factor) and WML (momentum factor) factors are obtained from Kenneth French's website.

¹⁴ For each month, we computed the fund's risk-adjusted return using data covering the previous 24 months (with a minimum of 20 observations). In addition, alphas were computed using the previous 36 observations (with a minimum of 30), with the main conclusions unchanged.

low turnover are more likely to be outsourced, and both variables are strong predictors of fund performance, as suggested in the literature. Therefore, we must control for them. Our control variables are Fund Size, Age, Expenses, Turnover, Fund Flows, Past Performance, Foreign, Family Size and Family Funds. Fund Size is the natural logarithm of TNA under management in millions of dollars. Age is the number of years the fund has been offered. Expenses are total annual expenses and fees divided by year-end TNA. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Fund Flows is a percentage that represents new inflows of the fund over the previous year. Past Performance is the fund's cumulative risk-adjusted returns over the previous year. Foreign indicates whether more than 50% of a fund's assets are in foreign equity markets, as reported in the NSAR-B forms. Family Size is the logarithm of TNA of all funds in the family, excluding the fund itself. Family Funds is the natural logarithm of the number of funds within the fund family.

Table 4 reports the estimated coefficients for equation [1]. We include the time and fund-investment-style dummies to exclude concerns that the results are driven by a correlation between a given time period or fund style with fund performance.¹⁵ We also cluster the standard errors at the fund level. Columns 1 to 3 show that outsourced funds underperform in-house funds. The coefficients are negative for all performance measures (-0.0681, -0.0393 and -0.0437 for Columns 1 to 3, respectively), which indicates that underperformance ranges from 47.1 (using the FF4) to 81.7 (in the CAPM) bps per year. These results are consistent with those of Chen *et al.* (2013) who find – using a different dataset –, that outsourced funds underperform in-house funds by between 50.4 and 72 bps per year.

In columns 4 to 6, we repeat the analysis, adding fixed effects for the principal advisor, which allows us to compare differences in performance between in-house and outsourced funds with the same principal advisor. In this case, the coefficient of the *Subadvised* variable captures differences in performance between funds managed in house (by the principal advisor) and funds outsourced. The subadvisory coefficient remains negative and

¹⁵ The investment styles in our sample are defined according to information in the NSAR-B filings. We have four different categories: Capital Appreciation, Growth, Growth and Income and Total Return.

statistically significant across all three performance measures, showing annual underperformance that ranges from 10.1 bps to 46.8 bps annually.

In the last three columns of Table 4, we add subadvisor fixed effects.¹⁶ *Subadvised* compares the performance of funds that the subadvisor manages for other companies with that of funds that the subadvisor manages for its own account (managed in house). Thus, the coefficients should be higher as a result of adding these fixed effects because their inclusion allows us to select funds subject to conflict of interest (subadvisors with in-house funds that also manage external funds). We observe that the subadvised coefficients are certainly more negative and statistically significant for all performance measures. The underperformance of subadvised mutual funds ranges from 56.6 bps to 100 bps, depending on the performance measure.¹⁷

[Insert Table 4 here]

Our results and those reported in the previous literature suggest that outsourcing portfolio management of a mutual fund is not efficient because it undermines fund performance. However, because a substantial proportion of subadvised funds in our database are externally managed by firms that also manage their own funds, we believe that we are in a conflict of interest framework that must be carefully examined. In other words, management firms can manage their own funds and simultaneously offer advisory services to the funds of fund families that may be their competitors. For example, Chen *et al.* (2013) analyze differences in performance between outsourced funds and funds managed in house but do not indicate whether the outsourced funds are subject to conflicts of interest. Chuprinin *et al.* (2011) study outsourced funds that are subject to conflict of interest (called outsourced funds in mixed management companies) but only examine funds subject to

¹⁶ The subadvisor-fixed effect is actually a fixed effect of the management company in charge of portfolio management. In other words, it will be the subadvisor, if the fund is subadvised, or the principal advisor, if the fund is managed in-house.

¹⁷ As Table 3 shows, although there are no critical differences between the results from the three measures of risk-adjusted returns, measuring performance by the CAPM is the least suitable approach to evaluating mutual funds that might allocate a portion of the fund to foreign markets. For this reason and to save space, we will report only the FF4 and FF5 measures hereinafter. We can also observe how the foreign variable loses its significance with respect to performance when the risk-adjusted return includes the international risk factor.

conflict versus in-house funds, concluding that the performance of funds in mixed management companies is poorer because of a transfer of wealth from one group to the other. Our hypothesis is that outsourcing portfolio management is not inefficient per se but is inefficient when there is a conflict of interest.

To study this issue more deeply, we estimate equation [1] in Table 5 for two samples of subadvised funds, sorted by whether they are subject to conflict of interest. In Panel A, we consider all in-house funds and those outsourced funds that are subject to conflict of interest. In Panel B, we include all in-house funds and outsourced funds that are not subject to conflict of interest (when the subadvisor does not manage its own funds or is a specialist subadvisor that only subadvisees). In Panel A, we control for performance variations across subadvisors to capture differences in performance between in-house and external funds managed within the same subadvisory company. From Panel A, we can observe, using FF4 (FF5), that outsourced mutual funds managed by subadvisors with potential conflicts of interest underperform their in-house counterparts by 6.5 bps (6.11 bps) per month, or 0.78% (0.733%) per year. These coefficients are more negative and stronger in statistical terms than the results in Table 4, where we pooled all subadvised funds against in-house managed funds. This provides a first indication of what might be driving the underperformance of subadvised funds. In Panel B, where we have excluded subadvisors with conflicts of interest, the coefficient on the *Subadvised* variable is not statistically significant in any case, indicating that outsourcing when there is no potential conflict of interest does not negatively affect mutual fund performance and is not, therefore, an inefficient activity.

[Insert Table 5 here]

This finding has implications for selecting mutual funds because previous studies, had indicated that investors should avoid mutual funds whose portfolio management is outsourced to a subadvisor. In addition, this result is also significant for mutual fund companies with respect to their choices of subadvisor companies to manage their funds.

4.2. Portfolio manager allocation

In most cases, the principal advisor is the management company in charge of portfolio management, and their own employees are the portfolio managers of their in-house funds. In other cases, the principal advisor hires an external management company to manage some of their funds, and therefore the portfolio managers are external to the principal advisor, and internal employees are only responsible for activities such as distribution, marketing and record keeping, among others. In the CRSP mutual fund database, we can find the actual portfolio managers of funds.¹⁸

We have previously documented a conflict of interest among management companies that simultaneously manage their own funds and the funds of their competitors, which may incentivize inefficient actions by such management companies. We now go beyond these actions and focus on human capital allocation and how the portfolio managers are transferred themselves among in-house and subadvised funds within the same fund family; such transfers might also help explain the underperformance observed in outsourced funds that are subject to conflict of interest.

To test for managerial transfers among management firms, we restrict our sample to funds that meet the following three conditions in each period: 1) the fund is managed by a single portfolio manager; 2) the fund belongs to a family that has both in-house and subadvised funds; and 3) during the given period, its portfolio manager manages either only in-house or only subadvised funds (we believe that the economics that drive decisions to allocate one or more portfolio managers to funds are likely to differ from those that drive decisions to shift managers among in-house and outsourced funds).¹⁹

We estimate the following logistic model:

$$\text{Prob}(y_{i,t} = 1) = \frac{\exp(\beta_j z_i)}{1 + \exp(\beta_j z_i)} \quad [2]$$

¹⁸ If the fund is subadvised, the management company shown in the CRSP database is the principal advisor, but the portfolio manager is from the subadvisory firm.

¹⁹ Consistent with prior studies, our sample shows that the percentage of funds managed by single portfolio managers is approximately 44% (Bliss et al. (2008) show that the percentage of individual portfolio manager funds ranges from 62% in 1996 to 44% in 2003).

where $\beta_j z_i = (\beta_0 + \beta_1 \text{Skills}_{i,t} + \beta_2 \text{Tenure}_{i,t} + \beta_3 x_{i,t} + \varepsilon_{it})$. The dependent variable ($y_{i,t}$) is a dummy variable that accounts for the event of a portfolio manager transfer from management of in-house funds to management of outsourced funds, or vice versa. To more accurately determine what is affecting such events, we separate our dependent variable according to the direction of the transfer. We define “In to Sub” as a dummy variable that equals 1 if a fund is managed externally by a portfolio manager that, in the current period “t,” manages only subadvised funds and, in the previous period “t-1,” managed only in-house funds. Our second dependent variable, “Sub to In,” goes in the opposite direction, taking a value of 1 if an in-house fund is managed by a portfolio manager that currently only manages in-house funds and in the prior period managed only subadvised funds.

We define the “Skills” variable as Poor manager, Good manager and Top manager, depending on whether a portfolio manager in a given month has a cumulative 18-month past performance (alpha from FF5) below the median, above the median or above the 90th percentile, respectively, among funds of the same investment style. The “Tenure” variable measures the business experience of a portfolio manager within a given management company and equals the number of years the manager has managed funds for the family. “X” is a set of control variables that were previously defined.

Table 6 shows the estimation results for regression specification [2]. We can observe that being a poor manager increases the likelihood of being transferred from an in-house to an outsourced fund, whereas being a good manager is not sufficient for a manager to be incorporated into the management company’s own funds. Indeed, even being among the top managers of external funds does not improve a portfolio manager’s chances of being shifted to management of in-house funds. However, managerial tenure with the family does have an important role in such transfers and is positively related to transfers to managing in-house funds and negatively related to transfers to external funds. These results may suggest that management companies could base their promotion decisions (transfers from external to internal funds) on manager tenure at the firm rather than past performance, while even though poor past performance is highly related to relegation decisions (transfers from internal to external funds). Consequently, managers from internal firms have a strong incentive to outperform to remain in a position to manage internal funds and not be

relegated, whereas young managers at the external firms have different incentives to be promoted, namely simply gaining tenure at the company rather than outperforming. Overall, these results show a suboptimal portfolio manager allocation for investors in subadvised funds, which confirms that there is a conflict of interest in cases in which a management company manages not only the funds it offers its clients but also funds of other management companies.

[Insert Table 6 here]

4.3. Co-Branding Model on Subadvised Funds

Chen *et al.* (2013) suggest that outsourced funds are more difficult to monitor and control because external management firms are independent companies with their own employees, and the fund family cannot oversee them. In the previous section, we showed how underperformance of outsourced funds is related to a conflict of interest in the management of in-house versus external funds. In this subsection, we test whether this underperformance is mitigated when subadvisors' reputations are at stake. This will occur when the principal advisor associates with a subadvisor to take advantage of a subadvisor's reputation, thus including the name of the subadvisor in the mutual fund's name to attract new investors. In this circumstance, the subadvisor should care not only about fees received but also about fund performance because it will be linked to its own industry reputation.

To test whether a co-branding model can positively influence the management of subadvised funds subject to conflict of interest, we run the following regression:

$$Performance_{j,t} = \beta_1 Conflict_{j,t} + \beta_2 CoBranding_{j,t} + \beta_3 Conflict_{j,t} * CoBranding_{j,t} + \beta_4 X_{j,t-12} + u_{j,t} \quad [3]$$

where $Conflict_{j,t}$ is a dummy variable that equals 1 if the fund is subadvised by a management company that also has its own funds, $CoBranding_{j,t}$ is a dummy variable that equals 1 if the fund uses a co-branding model of subadvising and $Conflict_{j,t} * CoBranding_{j,t}$ is an interaction term.²⁰

²⁰ One might argue that even though an external fund is managed by the same company that manages its own funds, these are not really subject to a conflict unless funds belong to the same investment objective. As a

Table 7 presents the estimated parameters for equation (2). We confirm again that there is a conflict of interest previously identified. The coefficient for the variable Conflict is negative in all columns and statistically significant in general. We also observe that a co-branding model does not improve performance when there is no conflict of interest (the coefficient for Co-branding is not statistically significant). However, when co-branding is utilized with subadvisors that have a conflict of interest, it positively affects performance, offsetting this conflict. We have added time and investment-style-fixed effects in the last two columns, and in addition, we control for performance variation across subadvisors. Whereas the conflict of interest has a negative impact on performance of between 38.3 and 58.4 bps per year, companies subject to conflict of interest that utilize a co-branding model witness an increase in fund performance of between 125 to 156 bps per year. Thus, when the subadvisor has recognized status in the industry, the fund family can use a co-branding model to capitalize on the subadvisor's reputation. In this case, although the subadvisor faces a conflict of interest, it will try to outperform to maintain its reputation in the industry.

[Insert Table 7 here]

Our hypothesis that co-branding mitigates underperformance in cases in which there is a conflict of interest is based on the idea that managing external funds can affect the reputation of the subadvisor. If this is true, the effect should be stronger for the most important management companies. In Table 8, we redefine the co-branding variable, using only the most prestigious subadvisors in terms of size and past performance. Panel A presents the results obtained for the top 20% of management companies in terms of size (TNA), and Panel B presents the results obtained for the top 20% of management companies in terms of performance. The coefficient on the interaction term *Cobranding*Conflict* is again positive and statistically significant. The marginal improvement in performance for the largest subadvisors is between 173 and 181 bps per year, whereas in Table 7, the marginal improvement is between 127 and 138 bps. For the

robustness check, the conflict variable was refined to only those that share the same investment objective, and the results remained unchanged. We will not report those tables here to save space but they are available upon request.

top performing funds, the marginal improvement is between 137 and 150 bps, which is also larger than the improvements for co-branding funds in general.

[Insert Table 8 here]

4.4. Multi-Advisors Fund Outsourcing

To test whether having more than one subadvisor can reduce or eliminate underperformance observed in outsourced mutual funds that are subject to conflict of interest, we estimate the following model:

$$Performance_{j,t} = \alpha_j + \beta_1 Conflict_{j,t} + \beta_2 Multiple_{j,t} + \beta_3 Conflict_{j,t} * Multiple_{j,t} + \beta_4 X_{j,t-12} + u_{j,t} \quad [4]$$

where $Conflict_{j,t}$ indicates whether subadvised funds have a potential conflict of interest, $Multiple_{j,t}$ is a dummy variable that equals 1 if the fund uses a multi-manager model of subadvising and $Conflict_{j,t} * Multiple_{j,t}$ is an interaction term. We include a new control variable, *Num Subs*, that represents the number of subadvisors managing the fund. The model also includes principal advisor fixed effects.²¹

Table 9 presents the parameter estimates for regression equation [4]. We observe that having more than one subadvisor does not significantly affect performance because the coefficient on the variable *Multiple* is not statistically significant. However, such subadvisory arrangements are clearly relevant to mutual funds that are subject to conflict of interest. Thus, the variable measuring the interaction between multi-managers and conflict is always positive and statistically significant, even after controlling for principal advisors. We find that using multiple subadvisors to manage a mutual fund with a potential conflict of interest improves performance by between 84 and 91 bps per year.

[Insert Table 9 here]

This finding is consistent with prior literature related to general firm theory. For example, Bone *et al.* (1999) and Cooper *et al.* (2005) support the idea that groups are more efficient, act more rationally and achieve better performance than individuals. In addition,

²¹ We consider it more appropriate to compare the performance among funds with the same principal advisor rather than within the same subadvisor because there is no single subadvisor per fund but several.

the management literature explains that group decisions might be beneficial for different reasons. For example, team members can correct other team members' errors (e.g., Sharpe, 1981), and groups whose members have different capabilities and knowledge (integrated into teams) positively affect the overall outlook of the firm.

With respect to mutual funds, we provide an additional reason why group decisions may be beneficial that is based on an increased risk of replacement of subadvisors. Multi-manager funds have received an exemption from the SEC regulations that permits them to terminate and appoint new unaffiliated subadvisors without shareholder approval, provided certain conditions (such as notice to shareholders within a specified period) are met.²² This exemptive relief substantially reduces the time and cost of obtaining shareholder approval for each change of subadvisors, which makes it easier to replace management firms. Such power could enable funds to monitor and control poor performance through threats of replacement, which might mitigate problems in the outsourcing contract. Our expectation is that this exemptive relief generates a high degree of competition across subadvisors to improve fund performance. Subadvisors are incentivized to engage in active strategies to achieve the improvements in performance presented in Table 9, such as by changing the level of diversification of the fund or by deviating from the benchmark.

To test for this effect, we estimate the following regression specification:

$$FundRisk_{j,t} = \alpha_j + \beta_1 Multiple_{j,t} + \beta_2 Conflict + \beta_3 Conflict * Multiple_{j,t} + \beta_4 X_{j,t} + u_{j,t} \quad [5]$$

where *FundRisk* is a measure based on three variables. The first two measures are the total-risk and specific-risk measures of a mutual fund. Total Risk is the standard deviation of monthly returns for each year, and Specific Risk is the standard deviation of a fund's residuals, in this case using the five-factor model.

Finally, we will use a change in beta as a proxy for active management, which is defined as the absolute value of the deviation of beta from the average beta for the mutual fund's investment style.

²² See exemption from Shareholder Approval for Certain Subadvisory Contracts, SEC Release Nos. 33-8312, 34-48683, IC-26230.

Table 10 presents the regression results for equation [5]. We observe that subadvised funds that are subject to conflict of interest show negative and statistically significant coefficients, with total and idiosyncratic risk as the dependent variables (-0.1259 and -0.182, respectively). Moreover, funds with more than one subadvisor also show lower risk (total and specific risk), in accordance with Bar *et al.* (2005), who find that returns for team-managed funds are less volatile than returns for funds with individual managers. Both in Bar *et al.* (2005) and in our paper, mutual funds are managed by multiple managers. The main difference is that in Bar *et al.* (2005), all the managers belong to the same management company.

Table 10 also shows that the effect of multiple advisors on funds subject to conflict of interest occurs through increased competition among the different management companies managing the fund. We observe that all of the coefficients for the interaction variable are positive and statistically significant, which reflects the higher levels of risk assumed. In particular, if we focus on the last column, we observe a deviation (0.0391) in the average systematic risk for mutual fund style, which confirms our notion that, spurred by competition, different managers try to specialize and differentiate themselves from the benchmark to improve performance. Moreover, the most specialized strategies most likely correspond with less diversified portfolios, which explains the increased idiosyncratic risk.

[Insert Table 10 here]

4.5. Performance Based Fees on Subadvised Funds

Chen *et al.* (2013) document that subadvised mutual funds are relatively difficult to monitor, which results in underperformance. Other studies have shown that funds with performance-based fee contracts have superior performance – because of the monitoring effect that this fee structure requires – over funds with fees based solely on assets under management (Elton *et al.*, 2003). We wish to examine the effect of performance-based fees on funds managed by external firms (subadvised funds) and whether this incentive mechanism mitigates the management monitoring issue. In Table 11, we present estimations of the following regression equation:

$$Performance_{j,t} = \beta_1 Subadvised_{j,t} + \beta_2 Perf_Fee_{j,t} + \beta_3 Subadvised_{j,t} * Perf_Fee_{j,t} + \beta_4 X_{j,t-12} + u_{j,t} \quad [6]$$

where $Subadvised_{j,t}$ is a variable that equals 1 if the mutual fund is subadvised and 0 otherwise, $Subadvised_{j,t} * Perf_Fee_{j,t}$ is an interaction term that takes a value of 1 if fund j is subadvised under a performance fee and 0 otherwise and $X_{j,t-12}$ are the control variables previously defined. The subscript j corresponds to all U.S. equity funds in our sample.

From Table 11, we can conclude that, in general, outsourcing generates poorer performance because the *Subadvised* coefficient is again negative and statistically significant. Although performance-based fee arrangements do not appear to significantly improve the performance of mutual funds as a general matter (the *Perf_Fee* coefficient is not statistically significant), it appears to be quite relevant for subadvised funds (being positive for all specifications and statistically significant in 3 of 4 cases). Using the five-factor model to measure performance, we observe that the performance of subadvised funds under a performance fee compensation arrangement improve by 0.0832% monthly (1% annually).

In the final two columns, we go further in examining how this fee structure affects subadvised funds subject to conflict of interest by adding in fixed effects for the subadvisor. This enables us to control for any unobserved effects or characteristics that depend on the actual management company charged with portfolio management (a subadvisor for outsourced funds and a principal advisor for in-house funds). Under this control structure, we find that the performance fee structure improves risk-adjusted performance by approximately 0.1325% monthly (1.59% annually). These last findings support our hypothesis that a performance-based fee contract is an effective system for monitoring external advisors and thereby improving fund performance.

[Insert Table 11 here]

5. Conclusions

In this paper, we contribute to the emerging literature on subadvised mutual funds by providing empirical evidence regarding the effects of managerial outsourcing on performance and studying the effects of mechanisms used to monitor and control the activities of subadvised funds. In building our database, we extract information from NSAR-B forms filed with the SEC between 1996 and 2011. Consistent with Chen *et al.* (2013), we find that U.S. equity subadvised mutual funds underperform funds that are managed in-house, on average. However, such underperformance is due to a conflict of interest in subadvised arrangements because nearly 50% of subadvised funds are managed by firms that also manage their own funds, where both types of funds compete in the same market. We find that subadvised funds subject to conflict of interest underperform not only in-house managed funds of the subadvisors (as in Duong (2010)) but also the remaining subadvised funds that do not have a conflict of interest. Thus, when we exclude funds that are subject to conflict of interest, subadvised funds no longer underperform the in-house managed funds, which has notable implications for investors selecting mutual funds and for management companies' selection of subadvisor portfolio management companies.

We find evidence of strategic allocation of managers based on their historical performance. Portfolio managers that manage poorly performing in-house funds are more likely to be transferred to outsourced funds, whereas manager tenure at the fund family is negatively related to the likelihood of being transferred to an outsourced fund and positively related to the likelihood of being transferred to an internal fund. This observation may help explain the underperformance observed in outsourced funds from a different perspective than has been found in the prior literature.

In addition, we propose an incentive mechanism and various subadvisory arrangements that might serve to monitor and control subadvisor firms and thereby offset the underperformance observed in outsourced funds. By contrast to previous studies, we do not consider subadvised funds as a single group but analyze them in terms of the following three different models: co-branded funds, multi-manager (subadvisor) funds and funds that utilize performance-based fee contracts.

We show that co-branded models of subadvisory agreements serve to mitigate such conflicts of interest. After incorporating this model into our regressions, the performance of outsourced funds subject to conflict of interest was found to improve by between 125 to 156 bps per year – depending on the model – because the reputation of the subadvisor became a key factor in performance.

The multi-manager model of subadvising is an efficient way of subadvising the management of a mutual fund because it mitigates the conflict of interest problem and is found to improve fund performance by between 84 and 91 bps per year. This result is consistent with prior literature that suggests that groups of portfolio managers perform better than individual portfolio managers and, in particular, that teams or groups can correct the errors of individuals and thereby move a fund in the right direction. In addition, we find that multi-advisor funds take on higher risk as a result of the increased competition among multiple subadvisors managing a given portfolio (and the simpler subadvisor termination procedures under SEC rules). Subadvisory managers show a tendency to deviate from the average risk characteristic of their style of investment and to create less diversified funds.

Regarding our third mechanism, although subadvisor funds underperform in-house managed funds due to conflicts of interest, when the subadvisor fund includes a performance-based fee, fund performance improves (by 1% to 1.59% per year). This suggests that the extra reward obtained from variable management fees linked to performance encourages portfolio managers to focus more on subadvised funds than they otherwise would.

In short, our main contribution to the extant literature on outsourcing and mutual funds is that outsourcing, as a business model, can be efficient when the outsourcing firm does not manage its own funds. We demonstrate that when an outsourced subadvisor does manage its own funds, an incentive fee mechanism and/or different types of subadvisory agreements (such as multi-manager contracts and co-branding business models) can serve to control and monitor conflicts of interest. Under these conditions, outsourcing can be efficient, with positive effects on fund performance of nearly 1.5% per year.

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Table 1. Type of Outsourcing over Time

Table 1 displays three panels with the numbers of subadvised funds based on affiliation, subadvisory agreement and conflict of interest for the period 1996-2011 for all U.S open-end funds. Panel A shows the percentages of total funds with the subadvisor affiliated and not affiliated with the fund company. Panel B shows the percentage of unaffiliated subadvised funds ("subadvised funds") that represent each mechanism. "Co-branding" refers to funds that use subadvisor reputation and therefore include the subadvisor's name in the fund's name. "Multi-manager" refers to funds subadvised by more than one subadvisor. "Performance fee" applies when the subadvised fund charges a floating fee that depends on prior fund performance. Panel C shows the percentage of subadvised funds that potentially suffer from conflict of interest (i.e., in which the subadvisor is also the principal advisor for its own funds).

Year	PANEL A			PANEL B			PANEL C
	Total	Sub No aff	Sub aff	Co-branding	Multi-manager	Performance Fee	Conflict of Interest
1996	2684	12.9%	9.7%	8.4%	10.7%	2.89%	36.7%
1997	3006	12.5%	11.4%	12.5%	11.1%	3.19%	35.0%
1998	3493	13.0%	10.7%	15.6%	17.6%	2.14%	28.2%
1999	3458	13.2%	12.4%	18.2%	17.4%	2.43%	34.9%
2000	5119	14.3%	11.9%	16.5%	19.3%	3.22%	36.5%
2001	5073	13.8%	10.8%	14.3%	18.3%	3.55%	38.7%
2002	5764	15.8%	11.7%	13.1%	23.7%	4.64%	44.6%
2003	5940	17.6%	10.7%	16.7%	33.2%	5.02%	46.6%
2004	5906	17.5%	11.8%	19.8%	28.4%	6.19%	45.7%
2005	5770	17.6%	13.6%	16.0%	20.7%	4.26%	51.7%
2006	5535	18.2%	14.1%	17.2%	24.5%	5.86%	54.5%
2007	5710	20.5%	13.5%	14.0%	19.3%	5.38%	51.5%
2008	6668	21.7%	16.5%	15.0%	18.8%	6.46%	50.1%
2009	8268	25.8%	16.1%	18.8%	16.3%	4.78%	49.6%
2010	7819	25.2%	16.8%	20.1%	17.7%	4.15%	49.0%
2011	5335	22.6%	20.5%	16.4%	17.6%	4.58%	41.7%

Table 2. Summary Statistics (Portfolio Managers)

Table 2 presents a year-end total count of portfolio managers of U.S. equity mutual funds managed by individuals from 1996 to 2011. The first column indicates the sum of individual portfolio managers by year, whereas the second and third columns summarize the number of funds managed in house and funds subadvised, respectively. The fourth and fifth columns indicate the number of times a manager was switched from in-house to subadvised funds, and vice versa. The last two columns report the total management companies and total funds managed by individual portfolio managers, and the last row indicates the yearly average for each of the group categories.

	# Individual Managers	# Managers in house	# Managers Subadvised	Changes In to Sub	Changes Sub to In	# Management Companies	# Total Funds
1996	665	573	92	4	8	216	819
1997	659	564	95	8	8	231	833
1998	825	692	133	16	16	266	1026
1999	817	697	120	17	27	263	1028
2000	905	758	147	22	23	359	1326
2001	900	760	140	19	18	336	1283
2002	940	776	164	32	34	332	1362
2003	811	650	161	43	19	292	1202
2004	741	607	134	25	34	280	1141
2005	622	525	97	24	15	237	984
2006	608	515	93	20	14	224	973
2007	608	521	87	16	10	221	1003
2008	643	593	50	10	13	232	1112
2009	652	618	34	4	13	239	1161
2010	633	594	39	9	3	243	1056
2011	541	478	63	9	5	215	873
Total	723	620	103	17	16	262	1074

Table 3. Descriptive Statistics

This table presents the means (standard deviation) of fund characteristics across the entire sample of funds, including in-house managed funds and subadvised funds. The sample period is from January 1996 to December 2011. Fund Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Family Size is the logarithm of TNA for all funds in the family, excluding the fund itself. The Family Fund variable indicates the logarithm of the number of funds in the family, excluding the fund itself. Advisor Size indicates the logarithm of TNA for all funds of the principal advisor, excluding the fund itself. The Advisor Funds variable is the logarithm of the number of funds of the principal, excluding the fund itself. Fund Expenses are total annual expenses and fees divided by year-end TNA. Age is the number of years since inception. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Flow is a percentage that represents new inflows into the fund over the previous year.

	All Funds	Managed In House	Subadvised Funds
Fund Size (log fund TNA)	3.96 (2.4)	4.07 (2.4)	3.52 (2.2)
Family Size (log family TNA)	8.42 (2.8)	8.53 (3.1)	8.0 (2.0)
Family Funds (log funds per family)	3.24 (1.3)	3.26 (1.4)	3.18 (1.04)
Advisor Size (log advisor TNA)	7.30 (3.4)	7.83 (3.2)	5.21 (3.6)
Advisor Funds (log funds per advisor)	2.59 (1.4)	2.83 (1.4)	1.65 (1.3)
Fund Expenses (% per year)	1.39 (0.63)	1.36 (0.60)	1.53 (0.61)
Age (years)	8.61 (9.0)	8.96 (9.5)	7.26 (6.9)
Turnover (% per year)	101.6 (202)	103.0 (209)	96.35 (119)
Flow (% per year)	58.1 (367)	58.4 (359)	57.0 (383)
Yearly Average of Funds	2735	2174	561

Table 4. In-house Managed Funds vs. Subadvised Funds

This table presents results for monthly panel regressions of risk-adjusted returns on fund characteristics. The sample contains all U.S. equity mutual funds from 1996 to 2011. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, which is measured by alpha, as given by CAPM and Carhart's four-factor (FF4) model, including an international index factor (FF5). Subadvised is a dummy variable that equals 1 if the fund is subadvised by an unaffiliated firm and 0 otherwise. Fund Size is the natural logarithm of total net assets (TNA) under management in millions of dollars. Age is the number of years since the fund's inception. Expenses are total annual expenses and fees divided by year-end TNA. Turnover is the minimum of aggregate purchases and sales of securities divided by average TNA over the calendar year. Fund Flows is a percentage that represents new inflows into a fund over the previous year. Past Performance is a fund's past year's risk-adjusted return. Foreign is a dummy variable that indicates whether the fund primarily invests in international markets. Family Funds is the natural logarithm of the number of funds in a fund family. Family Size is the logarithm of TNA of all funds in a fund family, excluding the fund itself. Control variables are lagged 12 months. Time and Investment Style dummies are included but not reported; and the constant term has been omitted. Standard errors are clustered at fund level; t-statistics are reported in parentheses. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	CAPM	FF4	FF5	CAPM	FF4	FF5	CAPM	FF4	FF5
Subadvised	-0.0681*** (-4.70)	-0.0393*** (-3.55)	-0.0437*** (-3.63)	-0.0390*** (-7.86)	-0.0084* (-1.95)	-0.0141*** (-3.08)	-0.0837*** (-15.15)	-0.0472*** (-3.07)	-0.0478*** (-2.85)
Fund Size	-0.0020 (-0.61)	0.0025 (0.99)	0.0021 (0.79)	-0.0053*** (-5.78)	0.0021*** (2.64)	0.0014* (1.68)	-0.0092*** (-10.05)	-0.0004 (-0.14)	-0.0002 (-0.08)
Age	0.0007 (1.11)	0.0004 (0.99)	0.0005 (1.12)	-0.0002 (-1.56)	-0.0003** (-2.25)	-0.0002* (-1.77)	0.0002 (1.21)	-0.0001 (-0.20)	-0.0002 (-0.33)
Expenses	0.0905*** (5.25)	0.0650*** (4.95)	0.0733*** (5.40)	0.1497*** (33.09)	0.1089*** (26.63)	0.1136*** (27.04)	0.1143*** (26.27)	0.0878*** (6.09)	0.0940*** (6.23)
Turnover	-0.0001 (-1.94)	-0.0001** (-3.65)	-0.0001*** (-3.59)	-0.0001*** (-4.38)	-0.0001*** (-10.19)	-0.0001*** (-10.80)	-0.0001*** (-4.55)	-0.0001** (-2.53)	-0.0001*** (-2.86)
Fund Flows	0.0199*** (8.11)	0.0130*** (7.17)	0.0130*** (7.09)	0.0193*** (20.63)	0.0124*** (16.87)	0.0126*** (16.38)	0.0186*** (20.09)	0.0118*** (6.64)	0.0119*** (6.46)
Past Performance	0.0188*** (13.99)	0.0135*** (11.09)	0.0140*** (11.22)	0.0157*** (41.51)	0.0100*** (27.27)	0.0102*** (26.87)	0.0145*** (37.77)	0.0086*** (6.50)	0.0090*** (6.82)
Foreign	0.2776*** (13.98)	0.0912*** (5.90)	0.0129 (0.73)	0.2413*** (53.48)	0.0575*** (13.84)	-0.0256*** (-5.89)	0.2635*** (49.64)	0.0836*** (4.23)	0.0069 (0.32)
Family Funds	-0.0576*** (-5.00)	-0.0274** (-3.07)	-0.0305** (-3.20)	0.0014 (0.22)	-0.0121** (-2.23)	-0.0084 (-1.45)	-0.0163*** (-3.48)	-0.0149 (-1.17)	-0.0087 (-0.65)
Family Size	0.0310*** (5.74)	0.0194*** (4.51)	0.0201*** (4.34)	-0.0116*** (-3.95)	-0.0025 (-1.01)	-0.0054** (-1.99)	0.0015 (0.72)	0.0026 (0.45)	0.0007 (0.12)
Observations	206493	206493	206493	206493	206493	206493	206493	206493	206493
Adjusted R ²	0.094	0.088	0.097	0.213	0.192	0.194	0.235	0.205	0.212
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Invest Style dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Principal advisor F.E.	No	No	No	Yes	Yes	Yes	No	No	No
Subadvisor F.E.	No	No	No	No	No	No	Yes	Yes	Yes

Table 5. Subadvised Funds: Potential Conflict of Interest

This table presents monthly panel regressions of risk-adjusted returns on fund characteristics. Panel A includes all funds managed in house and funds outsourced with potential conflict of interest (i.e., are managed by a subadvisor that also manages its own funds). Panel B includes all funds managed in-house and funds outsourced without a potential conflict of interest (i.e., are managed by a subadvisor that only manages external funds). The dependent variable is fund performance, which is measured by alpha, given by Carhart's four-factor (FF4) model, which includes an international index factor (FF5). Control variables are lagged 12 months. The sample contains all U.S. equity mutual funds from 1996 to 2011. Time and investment-style dummies are included, but not reported; t-statistics are reported in parentheses, and the constant term has been omitted. Standard errors are clustered. Time dummies are included but not reported. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Panel A: In house and outsourced with conflict of interest		Panel B: In house and outsourced without conflict of interest	
	FF4	FF5	FF4	FF5
Subadvised	-0.0650*** (-3.23)	-0.0611*** (-2.85)	-0.0123 (-0.61)	-0.0215 (-0.99)
Fund Size	-0.0015 (-0.48)	-0.0015 (-0.43)	0.0022 (0.65)	0.0012 (0.34)
Age	-0.0002 (-0.32)	-0.0002 (-0.38)	-0.0003 (-0.52)	-0.0002 (-0.37)
Expenses	0.0817*** (5.22)	0.0874*** (5.45)	0.1095*** (5.43)	0.1164*** (5.89)
Turnover	-0.0001*** (-4.56)	-0.0001*** (-4.55)	-0.0001*** (-4.33)	-0.0001*** (-3.62)
Fund Flows	0.0122*** (5.13)	0.0125*** (4.81)	0.0124*** (5.53)	0.0125*** (5.05)
Past Performance	0.0089*** (6.19)	0.0095*** (7.27)	0.0098*** (7.16)	0.0097*** (6.89)
Foreign	0.0873*** (4.19)	0.0084 (0.38)	0.0628** (2.81)	-0.0193 (-0.94)
Observations	185332	185332	187715	187715
Adjusted R^2	0.063	0.072	0.061	0.071
Time dummies	Yes	Yes	Yes	Yes
Invest Style dummies	Yes	Yes	Yes	Yes
Subadvisor F.E.	Yes	Yes	No	No
Principal advisor F.E.	No	No	Yes	Yes

Table 6. Portfolio Manager Allocation among In-house and Subadvised funds

This table presents the monthly logistic regressions of portfolio manager transfers on manager skill and tenure, controlling for other fund and family characteristics. The sample contains all U.S. equity mutual funds managed by a single portfolio manager from 1996 to 2011 that belong to fund families that have both in-house and subadvised funds in each period. Excluded from the sample are funds with managers that are in charge of an in-house and a subadvised fund in the same period. Column 1 contains only the subadvised funds. The dependent variable is a dummy that takes a value of 1 if the subadvised fund is managed by a portfolio manager who managed an in-house fund in the previous period. Poor Manager is a dummy variable equal to 1 if the manager of the fund has a past 18 months performance record track below the median of the fund style and zero otherwise. Manager Tenure counts the number of years the portfolio manager has worked within the fund family. Columns 2 and 3 contain only in-house managed funds. The dependent variable is a dummy equal to 1 if the in-house fund is managed by a manager who, in the previous period, managed a subadvised fund and 0 otherwise. Good and Top Manager are dummies equal to 1 if the portfolio manager has a past performance above the median or on in the 90th percentile, respectively, and 0 otherwise. The remaining variables are previously defined. Time and investment-style dummies are included but not reported; t-statistics are reported in parentheses, and the constant term has been omitted. Standard errors are clustered at the fund level. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	In to Sub	Sub to In	Sub to In
Poor Manager	1.2504** (2.22)		
Good Manager		0.2732 (0.59)	
Top Manager			-0.8251 (-0.74)
Manager Tenure	-0.2107** (-2.57)	0.0955** (2.04)	0.0946** (2.13)
Fund Size	-0.1189 (-0.62)	-0.0604 (-0.32)	-0.0892 (-0.50)
Family Funds	0.2747 (0.47)	-0.6264* (-1.95)	-0.6496* (-1.91)
Family Size	-0.1724 (-0.64)	0.2405 (1.63)	0.2578* (1.70)
Age	0.0049 (0.17)	-0.1461** (-2.23)	-0.1450** (-2.29)
Expenses	-0.8614** (-1.97)	0.0614 (0.10)	-0.0632 (-0.12)
Turnover	-0.0083 (-1.49)	0.0003 (0.32)	0.0001 (0.15)
Fund flows	-0.0361 (-0.33)	-0.8225* (-1.91)	-0.6957 (-1.52)
Baseline predicted probability	0.041	0.002	0.002
Observations	1522	9738	9738
Pseudo R ²	0.162	0.077	0.076
Time dummies	Yes	Yes	Yes
Invest Style dummies	Yes	Yes	Yes

Table 7. Co-Branding and Performance

This table presents the results of monthly panel regressions of risk-adjusted returns on fund characteristics. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, measured by alpha, as given by Carhart's four-factor (FF4) model, which includes an international index factor (FF5). Conflict is a dummy variable that equals 1 if the fund is subadvised by an unaffiliated firm with a conflict of interest (i.e., the subadvisor is managing in house and external funds) and 0 otherwise. Co-branding is a dummy variable that equals 1 if the fund is subadvised under a co-branding arrangement and 0 otherwise. The remaining variables are a set of control variables previously defined. Control variables are lagged 12 months. The sample contains all U.S. equity mutual funds from 1996 to 2011. Time and investment-style dummies are included but not reported; t-statistics are reported in parentheses, and the constant term has been omitted. Standard errors are clustered. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	FF4	FF5	FF4	FF5
Conflict	-0.0437*** (-3.18)	-0.0487*** (-3.21)	-0.0319 (-1.52)	-0.0389* (-1.67)
Co-branding	0.0054 (0.16)	0.0090 (0.25)	0.0335 (0.95)	0.0231 (0.51)
Co-branding*Conflict	0.1150** (2.42)	0.1061** (2.16)	0.1044* (1.71)	0.1298* (1.80)
Fund Size	0.0031 (1.22)	0.0028 (1.05)	0.0010 (0.33)	0.0013 (0.39)
Family Size	0.0182*** (4.07)	0.0188*** (3.92)	0.0011 (0.14)	-0.0024 (-0.28)
Family Funds	-0.0254*** (-2.75)	-0.0281*** (-2.85)	-0.0160 (-0.84)	-0.0067 (-0.34)
Age	0.0004 (0.78)	0.0004 (0.80)	-0.0002 (-0.46)	-0.0004 (-0.70)
Fund fees	0.0631*** (4.64)	0.0712*** (5.10)	0.0869*** (5.05)	0.0946*** (5.42)
Turnover	-0.0001*** (-3.54)	-0.0001*** (-3.48)	-0.0001*** (-4.57)	-0.0001*** (-4.65)
Fund Flows	0.0152*** (7.79)	0.0153*** (7.66)	0.0138*** (5.97)	0.0139*** (5.78)
Past Performance	0.0143*** (11.49)	0.0150*** (11.83)	0.0095*** (6.95)	0.0100*** (7.97)
Foreign	0.0924*** (5.86)	0.0126 (0.70)	0.0828*** (4.00)	0.0044 (0.21)
Observations	193455	193455	193455	193455
Adjusted R ²	0.092	0.101	0.067	0.076
Time dummies	Yes	Yes	Yes	Yes
Invest Style dummies	Yes	Yes	Yes	Yes
Subadvisor F.E.	No	No	Yes	Yes

Table 8. Robustness Analysis of Co-Branding for Top Companies

This table presents the results of the monthly panel regressions of risk-adjusted returns on fund characteristic, employing a more restricted definition of the co-branding mechanism. In Panel A, the Co-branding variable equals 1 if the subadvisor is among the largest management companies (the largest quintile in terms of TNA), and in Panel B, this variable equals 1 only if the subadvisor is among the top past performers (the highest quintile of accumulated alpha in the past 12 months). The remaining variables are a set of control variables previously defined. Control variables are lagged 12 months. The sample contains all U.S. equity mutual funds from 1996 to 2011. Time and investment-style dummies are included but not reported; t-statistics are reported in parenthesis, and the constant term has been omitted. Standard errors are clustered. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Panel A: Co-branding only by largest subadvisors		Panel B: Co-branding only by subadvisor with top performance	
	FF4	FF5	FF4	FF5
Conflict	-0.0405*** (-3.00)	-0.0447*** (-3.04)	-0.0447*** (-3.30)	-0.0499*** (-3.35)
Co-branding	0.0624 (0.95)	0.0447 (0.72)	0.0564 (1.36)	0.0635 (1.38)
Co-branding*Conflict	0.1509* (1.96)	0.1439* (1.92)	0.1251** (2.26)	0.1143** (2.00)
Fund Size	0.0031 (1.21)	0.0028 (1.04)	0.0031 (1.22)	0.0028 (1.04)
Family Size	0.0182*** (4.06)	0.0187*** (3.90)	0.0183*** (4.10)	0.0189*** (3.94)
Family Funds	-0.0254*** (-2.74)	-0.0281*** (-2.83)	-0.0257*** (-2.77)	-0.0284*** (-2.87)
Age	0.0004 (0.77)	0.0004 (0.79)	0.0004 (0.81)	0.0004 (0.83)
Fund fees	0.0632** (4.64)	0.0714*** (5.10)	0.0626*** (4.59)	0.0707*** (5.05)
Turnover	-0.0001*** (-3.55)	-0.0001*** (-3.48)	-0.0001*** (-3.54)	-0.0001*** (-3.48)
Fund Flows	0.0152*** (7.79)	0.0153*** (7.66)	0.0151*** (7.77)	0.0152*** (7.63)
Past Performance	0.0143*** (11.48)	0.0150*** (11.82)	0.0143*** (11.44)	0.0150*** (11.77)
Foreign	0.0927*** (5.88)	0.0126 (0.71)	0.0936*** (5.94)	0.0138 (0.77)
Observations	193455	193455	193455	193455
Adjusted R^2	0.092	0.101	0.093	0.101
Time dummies	Yes	Yes	Yes	Yes
Invest Style dummies	Yes	Yes	Yes	Yes

Table 9. Multi-Manager Subadvisors and Performance

This table presents the results of the monthly panel regressions of risk-adjusted returns on fund characteristics. The dependent variable is fund performance as measured by alpha, given by Carhart's four-factor (FF4) model, which includes an international index factor (FF5). Conflict is a dummy variable that equals 1 if the fund is subadvised by an unaffiliated firm with a conflict of interest and 0 otherwise. Multiple is a dummy variable that equals 1 if the fund is subadvised by more than one subadvisor and 0 otherwise. Num Subs is the number of subadvisors managing the fund. The remaining variables are a set of control variables previously defined. Control variables are lagged 12 months. The sample contains all U.S. equity mutual funds from 1996 to 2011. Time and investment-style dummies are included but not reported; t-statistics are reported in parentheses, and the constant term has been omitted. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	FF4	FF5	FF4	FF5
Conflict	-0.0313*	-0.0368**	-0.0060	-0.0070
	(-1.82)	(-1.98)	(-0.29)	(-0.32)
Multiple	-0.0495	-0.0571*	0.0174	0.0189
	(-1.46)	(-1.66)	(0.49)	(0.52)
Multiple*Conflict	0.0739**	0.0701*	0.0698*	0.0759**
	(2.13)	(1.92)	(1.88)	(2.09)
Num Subs	-0.0066	-0.0034	-0.0147***	-0.0158***
	(-1.15)	(-0.69)	(-3.82)	(-3.61)
Fund Size	0.0033	0.0030	0.0028	0.0022
	(1.30)	(1.10)	(0.86)	(0.66)
Family Size	-0.0254***	-0.0282***	-0.0004	-0.0004
	(-2.74)	(-2.85)	(-0.73)	(-0.82)
Family Funds	0.0182***	0.0188***	0.1114***	0.1162***
	(4.06)	(3.91)	(5.88)	(6.21)
Age	0.0003	0.0004	-0.0001***	-0.0001***
	(0.69)	(0.73)	(-4.44)	(-3.81)
Fund fees	0.0640***	0.0721***	0.0151***	0.0153***
	(4.70)	(5.16)	(6.24)	(5.82)
Turnover	-0.0001***	-0.0001***	-0.0092	-0.0076
	(-3.55)	(-3.48)	(-0.82)	(-0.66)
Fund Flows	0.0153***	0.0154***	0.0038	0.0028
	(7.80)	(7.66)	(0.79)	(0.57)
Past Performance	0.0143***	0.0151***	0.0109***	0.0112***
	(11.50)	(11.84)	(7.90)	(7.65)
Foreign	0.0904***	0.0108	0.0565***	-0.0298
	(5.75)	(0.61)	(2.70)	(-1.54)
Observations	193455	193455	193455	193455
Adjusted R^2	0.092	0.101	0.067	0.079
Time dummies	Yes	Yes	Yes	Yes
Invest Style dummies	Yes	Yes	Yes	Yes
Principal advisor F.E.	No	No	Yes	Yes

Table 10. Multi-Manager Subadvisors: Total Fund, Beta and Idiosyncratic Risk

This table presents the results of monthly panel regressions of total fund risk, beta risk and specific risk on whether the fund is subadvised to more than one firm and fund characteristics. The dependent variable in column 1 is total fund risk measured as the standard deviation of monthly returns for a full year, whereas column 2 (*beta deviation*), the dependent variable, is the absolute value of beta risk deviation from the average beta of its style (this variable measures deviations from the average funds). In column 3 (*specific risk*), the dependent variable is the standard deviation of the fund's residual fund return, which is estimated using the five-factor model. Multiple is a dummy variable that equals 1 if the fund is subadvised by more than one subadvisor and 0 otherwise. Conflict is a dummy variable that equals 1 if the fund is subadvised to an unaffiliated firm subject to conflict of interest and 0 otherwise. Multiple*Conflict is a variable constructed as the product of Multiple and Conflict. The remaining variables are a set of control variables previously defined. The sample covers all U.S. equity mutual funds from 1996 to 2011. Standard errors are clustered by fund and time, and investment-style dummies are included but not reported; t-statistics are reported in brackets. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	Total Risk	Specific Risk	Beta Deviation
Multiple	-0.1542* (-1.94)	-0.3457*** (-4.97)	0.0101 (0.70)
Multiple*Conflict	0.2632** (2.29)	0.1960** (2.07)	0.0391* (1.89)
Conflict	-0.1259** (-2.00)	-0.1820*** (-3.97)	-0.0024 (-0.22)
Fund Size	0.0687*** (6.14)	0.0180** (2.12)	0.0106*** (4.71)
Family Funds	-0.0909** (-2.28)	-0.1425*** (-4.26)	0.0091 (1.45)
Family Size	0.0626*** (3.39)	0.0832*** (5.42)	0.0014 (0.46)
Age	-0.0057*** (-2.71)	-0.0024 (-1.20)	-0.0002 (-0.50)
Expenses	0.5821*** (14.77)	0.6418*** (18.42)	0.0529*** (7.27)
Turnover	0.0006*** (3.85)	0.0006*** (5.55)	0.0000 (0.99)
Fund Flows	0.0140*** (3.51)	0.0124*** (4.38)	-0.0010** (-2.10)
Observations	261188	261188	261188
Adjusted R2	0.491	0.254	0.091
Time dummies	Yes	Yes	Yes
Invest Style dummies	Yes	Yes	Yes

Table 11. Performance Fees to Monitor Subadvisors

This table presents the results of monthly panel regressions of risk-adjusted returns on fund characteristics. Fund returns are calculated before deducting fees and expenses (gross return). The dependent variable is fund performance, measured by using Carhart's four-factor (FF4) model and a model that includes an international index factor (FF5). Subadvised is a dummy variable that equals 1 if the fund is subadvised by an unaffiliated firm and 0 otherwise. Perf_Fee is a dummy variable that equals 1 if the fund charges a performance fee and 0 otherwise. Subadvised*Perf_Fee is a variable constructed as the product of Subadvised and a dummy variable that equals 1 if the fund charges fees based on prior performance. The remaining variables are a set of control variables previously defined. Control variables are lagged 12 months. The sample contains all U.S. equity mutual funds from 1996 to 2011. Time and investment-style dummies are included but not reported; t-statistics are reported in parentheses, and the constant term has been omitted. * denotes significance at the 10% level, ** denotes significance at the 5% level and *** denotes significance at the 1% level.

	FF4	FF5	FF4	FF5
Subadvised	-0.0419*** (-3.67)	-0.0479*** (-3.85)	-0.0533*** (-2.79)	-0.0560*** (-2.74)
Perf_Fee	-0.0299 (-1.02)	-0.0388 (-1.30)	-0.0538 (-0.94)	-0.0780 (-1.37)
Subadvised*Perf_Fee	0.0534 (1.52)	0.0832** (2.01)	0.0993* (1.70)	0.1325** (2.15)
Fund Size	0.0027 (1.07)	0.0023 (0.89)	0.0000 (0.02)	0.0004 (0.11)
Family Size	0.0195*** (4.55)	0.0203*** (4.38)	-0.0152 (-0.90)	-0.0092 (-0.52)
Family Funds	-0.0270*** (-3.01)	-0.0300*** (-3.14)	0.0030 (0.40)	0.0014 (0.18)
Age	0.0005 (1.03)	0.0006 (1.16)	-0.0001 (-0.18)	-0.0002 (-0.31)
Fund Fees	0.0641*** (4.78)	0.0722*** (5.24)	0.0861*** (5.27)	0.0914*** (5.44)
Turnover	-0.0001*** (-3.64)	-0.0001*** (-3.58)	-0.0001*** (-4.56)	-0.0001*** (-4.59)
Fund Flows	0.0129*** (7.16)	0.0130*** (7.08)	0.0118*** (5.57)	0.0119*** (5.21)
Past Performance	0.0134*** (11.10)	0.0140*** (11.23)	0.0085*** (6.40)	0.0089*** (7.09)
Observations	206493	206493	206493	206493
Adjusted R ²	0.088	0.097	0.064	0.073
Time dummies	Yes	Yes	Yes	Yes
Invest Style dummies	Yes	Yes	Yes	Yes
Subadvisor F.E.	No	No	Yes	Yes

TECHNICAL APPENDIX: JACCARD SIMILARITY FOR FUZZY MATCH

Also known as the Jaccard Index, the Jaccard similarity coefficient is a statistical measure of similarity between sample sets; for two sets, it is defined as the cardinality of their intersection divided by the cardinality of their union. For example, the sets {a, b, c} and {a, c, d} have a Jaccard similarity of $2/4=0.5$ because the cardinality of their intersection is 2 {a, c} and that of their union is 4 {a, b, c, d}. The maximum obtainable index is one, in which case the sets are identical; therefore, the higher the index is, the greater the similarity between the sets.

A more sophisticated way to proceed with this algorithm is to use the Weighted Jaccard Index, which enables us to assign weights to each item in a set and define the weighted Jaccard similarity index as the total weight of the intersection divided by the total weight of the union. Imagine the previous example with the following weights: {(a, 25), (b, 35), (c, 13)}, {(a, 25), (c, 13), (d, 27)}. The weighted Jaccard similarity is then $(25+ 13)/(25 +35 + 13 +27) = 38/100 = .38$.

Because Jaccard similarity is defined over sets, our fuzzy match algorithm must convert data records to sets before calculating the Jaccard similarity. We can convert the data into sets of words, using spaces to separate the sets (trust and fund name). For example, the record {"Pacific Select Fund", "Fidelity Series"} will be structured into the set {"Pacific", "Select", "Fund", "Fidelity", "Series"}. Then, a weight is assigned to each word because not all the words are of equal importance. Words are assigned high weights if they occur infrequently in a sample of records and low weights if they occur frequently. For example, frequent words, such as "Fund," might be given a low weight, whereas less frequent words, such as "Vanguard," might be given a high weight. We also include some words that were repeated in the sample but were considered to be of high importance and so were manually assigned high weights.

Finally, transforming the sample can greatly increase the power of the Jaccard Index. For example, if we allow for an abbreviation such as "U.S." to represent "U.S.A.," "EEUU" or "United States", we obtain better results. This also occurs with misspelled words. For

example, “Fidelity” is not a different word from “Pidelity” but a typographic error made by the register. Therefore, Weighted Jaccard Index similarity under transformation is the maximum weighted Jaccard similarity across all pairs of transformed sets.

Thus, fuzzy match and Jaccard similarity are used together to find the pair of inputs with the highest Jaccard Index.

We proceeded with a fuzzy match as follows:

1. The name of the fund in CRSP is written as “trust name: fund name, class”. Once we aggregate the class level information to the fund level, we eliminate the class; thus, we have, for each observation, the trust name and the fund name. We collect identical information for each observation in the NSAR database (trust and fund name).
2. When we have trust and fund names in both databases, we conduct a fuzzy match by names using weighted Jaccard similarity (the details of this process are provided above).
3. For each pair of trust and fund names in both databases, we have an index from 0 to 1, which indicates the degree of similarity between the two. We first drop all outputs with index values below 0.5 and directly accept as valid outputs with index values of 1.
4. For outputs between 0.5 to 0.85, we double-check them manually, one by one, assigning 0 to those belonging to different funds and 1 to those identified as identical. We again drop those with values of 0 and accept those with values of 1.
5. If the output is between 0.85 to 1, we undertake another filtering process. We extract “key words” pertaining to investment style such as “equity”, “bond”, “small”, “cap”, etc., and all possible combinations among them. Both outputs must exactly coincide with these words. Thus, at this point, the fund names have a Jaccard similarity above 0.85 and, additionally, are characterized by the same investment style. Those that differ in investment style are dropped from the sample.

To ensure the accuracy of the process, we then manually double-check a random set of matches representing 5% of the final dataset.