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MUTUAL FUND INDUSTRY: AN
INCOMPLETE CONTRACTING
PERSPECTIVE**

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***INTERNATIONAL TRADE AND
REGIONAL ECONOMICS***



Centre for Economic Policy Research

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OUTSOURCING VS. INTEGRATION IN THE MUTUAL FUND INDUSTRY: AN INCOMPLETE CONTRACTING PERSPECTIVE[†]

Abstract

With detailed product- and firm-level data for mutual funds, we study why mutual fund families relinquish control of fund management (advising) and outsource to non-affiliated entities and why those entities agree to manage for the fund family. Fund families and fund advisors cannot write enforceable contracts over the return earned by the fund (task of the advisor) and the size of the fund to be raised (task of the fund family). Our empirics confirm key tenets of the incomplete contracting view of the firm's boundaries. Expertise drives the fund family's decision to manage funds internally or not. The closer the fund is to its core expertise, the more critical the fund family is for the operation of the fund, and the more likely the fund is managed internally. Access to investors drives the advisor's decision to manage assets for an unaffiliated fund family. Consistent with sharing marginal revenue under outsourcing, outsourced funds on average are smaller and also have lower returns than internally managed funds. At the same time, from the perspective of the fund family and the advisor, once the selection bias of the family of fund's decision to outsource and the advisor's decision to agree to that outsourced arrangement are controlled for, the difference in size and returns between internally and externally managed funds disappear. In other words, because of their lack of expertise, the fund family would not be able to earn a higher return by managing the outsourced funds internally and because of their lack of access to investors, the advisor could not raise a larger fund.

JEL Classification: F2 and G2

Keywords: boundaries of the firm and outsourcing

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1. Introduction

The US mutual fund industry consists of over 7,000 funds managing over \$13 trillion in assets. The majority of these funds belong to a “fund family”¹ within which funds share marketing, distribution and investment advisory resources. Although all of the funds in a fund family may have similar branding, a pervasive but less well known feature of the industry is that many fund families offer self-branded mutual fund products to investors but outsource the management of those funds to third parties. For example, the Vanguard International Growth, Vanguard International Explorer, Vanguard Windsor II and Vanguard Precious Metals and Mining funds are all managed by unaffiliated investment advisors. Figure 1A shows that on average 32% of all funds were sub-advised or outsourced from 1996 to 2011. Figure 2A shows that the percentage of sub-advising is even higher if one considers new funds that a fund family offers in investment categories in which it was not active before and in which it did not have any previous expertise. In spite of the public debate about outsourcing, a wave of studies on outsourcing and its complement vertical integration,² and in spite of the growing interest in understanding how firms “slice the value chain,” these stylized facts have received relatively little notice in finance and in other fields.³

¹ The top 25 fund families manage over 70% of the mutual fund industry assets (Investment Company Institute, 2013 Mutual Fund Factbook).

² There is a sizeable literature on outsourcing. For empirical evidence of the importance of outsourcing in an international and domestic context, see among others, Feenstra and Hanson (1996), Campa and Goldberg (1997), Yeats (2001) and Antras (2003), Hubbard (2008), *The Economist* (1991), Bamford (1994), and Abraham and Taylor (1996)

³ Notable exceptions in the literature are Chen, Hong, Jiang and Kubik (2013), Del Guercio, Reuter and Tkac (2010), Cashman and Deli (2009) and Kuhnen (2009). The paper whose analysis is most closely tied to ours is Chen et al. (2013). While Chen et al (2013) provide evidence on the underperformance of sub-advised funds that is especially important from an investor perspective, we focus on mutual fund families as profit maximizing firms. We offer a framework that is consistent with incomplete contracts that exploits the product-level characteristics of funds. Our setup can rationalize return differences as well as other observed systematic differences between outsourced and internally managed funds.

In this paper, we investigate empirically when and why mutual fund families outsource funds and relinquish control of the management of those funds to non-affiliated investment advisors and why these investment advisors agree to sub-advise these funds. In the analysis we focus specifically on the outsourcing or integration decision as it relates to new funds that are being offered. We make use of both the publicly available and comprehensive Morningstar database as well as of proprietary databases of annual fund N-SAR filings and investment advisor form ADV filings from the Securities and Exchange Commission (SEC) for the period 1996 to 2011.⁴ Studying outsourcing and vertical integration in the context of the mutual fund industry offers the distinct advantage of very rich product- and firm-level data, which should enrich our understanding of outsourcing and integration beyond the mutual fund industry. The data's unique level of detail lets us extend the empirical analysis into the context of the multi-product firm. We are able to study which particular products are being outsourced as firms launch new funds and which ones are not, or alternatively, which new funds are being managed internally and which ones are not.⁵

The two primary agents in our analysis are the fund family and the investment advisor with whom the fund family contracts. It is hard for fund families and advisors to write a contract that is enforceable in a court of law over the two essential elements of their cooperation when they set up a new fund: the fund's performance, which is a metric to evaluate how well the advisor fulfills his responsibility of managing the fund, and the size of the fund or the success in attracting investor assets, which is the responsibility of the fund family through its marketing and distribution efforts. Because fees are based on total assets under management, the fund's size is key to its profitability

⁴ The annual snapshots of the form ADV filings begin in 2004 and continue through the end of the sample. Unfortunately, historical snapshots of this data were not available before 2004. See Section 3 for additional information about the form ADV filings.

⁵ Our empirical study falls in between two extremes of the empirical literature on in- versus outsourcing: Our analysis with product-level data has more detail than recent empirical work of outsourcing and integration in international trade that is often operates at the sector or firm level. At the same time, our analysis is more generalizable than the very detailed industry-level studies, see Hubbard (2008)

for both the fund family and the advisor. The family of fund's responsibility is to attract investor assets for the funds. However, its contribution to the success of the fund does not end there. Our analysis identifies the fund family's investment expertise, or lack thereof, across its in-house investment advisors as a central factor in its outsourcing decision. Human capital is a central component of mutual fund management and our empirical analysis suggests that fund families are more likely to outsource the management of new funds if the management of these funds requires expertise that is further removed from their own core competence. Conversely, new funds closer to their core expertise, are more likely to be managed in-house. In other words, the more critical the contribution of the family of fund's expertise to the success of the fund is, the more likely the fund will be managed internally. Conversely, the more critical the contribution of the sub-advisor's expertise, the more likely the fund will be outsourced. This finding is in line with a basic tenet of theories about the boundaries of the firm that, following Grossman and Hart (1986) and Hart and Moore (1990), focus on incomplete contracts: ownership should go to the party whose marginal investment is more productive.⁶ Put differently, the integrating party, in our case the fund family, protects its larger stake in the joint enterprise between advisor and family of funds by keeping management in-house.

Note that our analysis from the perspective of the investment advisors, complements the findings for the family of funds. Indeed, a comparison of advisor characteristics reveals that the less an advisor has ex ante access to mutual fund investment dollars through marketing and distribution channels, the more likely the advisor will agree to sub-advise an unaffiliated family's fund instead of opening their own fund. If an investment advisor who manages money primarily for institutional clients opened a new mutual fund, for example, it may have difficulty attracting

⁶ Aghion and Holden (2011)

retail investors, which is why the advisor will be eager to attract funds through sub-advising for a fund family.⁷ Similarly, the concentration of assets in fund families (i.e. according to the Investment Company Institute, the top 25 fund families manage over 70% of investor assets) suggests that the marketing and distribution resources of a fund family may be an important factor in attracting assets in the retail investor space.

We extend our analysis beyond the decision to sub-advise or integrate, to the two performance variables at the heart of the unenforceable contract: the size and risk-adjusted return of the outsourced funds compared to internally managed funds. We find that outsourced funds are systematically smaller than those that are managed internally, and consistent with Chen, Hong, Jiang and Kubik (2013), have systematically lower returns. These results might seem puzzling at first and give way to the question why the fund family would continue to sub-advise, if it gets a lower return, and, similarly, why the investment advisor would continue to sub-advise given the smaller size of these funds.⁸ These findings, however, are consistent with insights from the growing literature on incomplete contracts. The profit-maximizing fund families *as well as* the sub-advising investment advisory firm do not get the full marginal return from their marketing and distribution or investment efforts when funds are outsourced.⁹ Therefore, it should not be surprising that fund families will attract fewer financial resources for outsourced funds compared to internally managed funds and the performance of those funds will not be as high. Additional empirical analysis confirms that it is rational for fund families to keep outsourcing investment advisory responsibilities and for investment advisors to keep agreeing to sub-advise, even though

⁷ One way to interpret this finding is that less access to resources makes subadvising more attractive for the fund family as it decreases the bargaining power of the subadvisor.

⁸ The subpar performance, and in particular the lower returns of outsourced funds raises questions from the investor's perspective.

⁹ Antras (2013) emphasizes this point.

fund performance is subpar and fund size is below average. Our results show that the smaller size and lower returns of outsourced funds can largely be explained by taking into accounting the drivers of fund family's decision to outsource or not: advisory expertise and marketing/distribution network. Without the investment advisory expertise necessary to manage the new fund, families could not generate better fund performance internally and without marketing/distribution capability, the sub-advisor could not attract more investment dollars for the fund internally than the performance and size outcomes, respectively, achieved through the outsourcing agreement, which is why sub-advising persists.

For the empirical analysis that relates the size and the returns of funds to the decision to integrate or outsource a new fund, we apply an augmented inverse probability weighting framework (AIPW). In order to correct the size and return differences between outsourced and internally managed funds for the possible selection bias associated with choosing to outsource or not in the first place. Econometric approaches to correcting selection bias range broadly from those that model the outcome variable (i.e. fund performance or fund size) separately for the treated and control groups, to those that model directly the treatment probability (i.e. sub-advising a fund). AIPW incorporates both approaches and one of its attractive features is its "double-robustness". If either the outcome model or the treatment model is properly specified, the estimates are consistent, even if the other model is misspecified (Tan (2010); Wooldridge (2010)). Using AIPW to correct for the selection bias associated with the sub-advising decision, we find that once the two sources of incompleteness identified in this paper, namely the fund family's lack of investment expertise and the sub-advisors lack of marketing/distribution capability, are accounted for, there is no discernible difference in return or size between sub-advised and internally managed funds. We infer from this that while returns of the sub-advised funds may in general be below those of the

fund families' own funds, fund families would not be able to generate better returns in the funds they choose to sub-advise. Similarly, even though the size of the sub-advised fund is smaller than the average fund, the sub-advisor could not generate a larger fund if they marketed and distributed the fund themselves.

The structure of the paper is as follows: Section 2 describes the theoretical background that motivates the tests of the paper; Section 3 describes the data; Section 4 describes the empirical frameworks used and the results produced from those analyses; and Section 5 concludes.

2. Theoretical background

One of the key organizational decisions that firms have to make is to decide the extent to which they want to control all aspects of their operations. In our case, why do some fund families decide to keep some fund activities in-house, whereas others choose to manage comparable funds at arms' length? To study which funds are managed in-house and which ones are outsourced is a laboratory in which to investigate broader questions about the borders of the firm. Since Coase (1937) first raised the question, the topic has attracted much attention in the academic literature. To investigate outsourcing versus integration in the context of mutual funds, we draw on the property rights theories of Grossman and Hart (1986), Hart and Moore (1990), and their extensions in the work of Antras (2003, 2013), Antras and Helpman (2004), and Grossman and Helpman (2002) who stylized the approach and applied it in an international context.¹⁰ Those theories all argue that the optimal ownership decisions will hinge upon the contracting environment. The nature of the incomplete contracts will determine when it is most profitable to manage a new fund within the

¹⁰ Our discussion follows especially Antras (2013) overview of the literature. Aghion and Holden (2011) also provide an insightful survey.

fund family, as opposed to sub-advising the management services for it to a third-party outside the fund family.

The basic logic of incomplete contracts is well understood. As Aghion and Holden (2011) summarize, wherever it is hard to write ex ante a contract that covers all contingencies between two or more parties involved in a project or transaction, incomplete contracting emerges. This incomplete nature of the contract has an adverse effect on the incentives of the participating parties, especially when the common project requires ex ante some cost/investment that is specific to the particular project and that has to be sunk, irrespective of whether the joint undertaking will be successful or not. The latter gives rise to a hold-up problem and a tendency on all sides to underinvest in the project. A way out of the dilemma that alleviates some of the incentive problems is to determine the ownership structure ex ante. The central tenet of the incomplete contracting approach is that ownership (and residual rights) go to the party whose initial investment or contribution to the project is most critical to the project. At the same time, a common feature of incomplete contracting is that the parties involved will not get the full marginal products of their efforts when they cooperate for example through outsourcing, which is why both parties will tend to underperform.

Applied to the mutual fund industry, the two relevant parties involved in setting up a successful new fund are the fund family and the investment advisor. The fund family provides access to investors through the marketing and distribution resources of the firm. Through their marketing efforts, the fund family may increase investor awareness of the fund family thereby attracting investor assets. The family may also employ a network of brokers (e.g. Waddell & Reed Financial Advisors) or they may develop direct distribution technologies (e.g. Fidelity FundsNetwork website) which enable them to access retail fund investors. The fund family generates income by

charging fees to these investors as their money is invested. Altogether, the fund family's fund raising ability is an important contribution to the fund's success. However, critical for the outsourcing decision is whether the fund family's contribution goes beyond fund raising and this relates to its investment advisory capabilities. Indeed, the second essential component of setting up a successful fund relates to the management of a specific fund that is set up in a particular investment category. It involves hiring and employing competent managers and analysts to manage the specific fund. Since setting up a new fund requires new analysts and managers, which are expensive, in the absence of any incomplete markets friction, it would seem optimal for fund families to only outsource new funds, rather than to start these new funds themselves. What limits the proliferation of sub-advising, however, is the incomplete nature of contracting over funds.

It is not possible to fully contract over all aspects of running a fund. Neither the effort expended on investment advisory tasks¹¹ nor the effort expended in marketing and distributing¹² the fund can be fully independently verified and thus enforced in a court of law. While one can, for example, objectively determine the return obtained for the fund or the amount of funds raised by a fund family, there is room to dispute what is responsible for it: e.g., Was it lack of effort, excessive risk taking or just bad luck?. Because of the lack of enforceability and the impossibility to contract over all contingencies ex ante, this will give way to suboptimal relationship-specific investments by all parties. There will be a tendency on the part of the family to not raise enough funds, in the same way that there will be a tendency for managers to underinvest in effort to effectively manage

¹¹ For example, for an internally managed fund, a fund family executive attending the daily or weekly meeting between managers and analysts could hear the ex ante rationale for buy and sell decisions, which stock pitches the fund manager acts on and which one are ignored, all of which could help the executive to distinguish between luck and skill in the performance achieved by the fund. For an externally managed fund, this information is less likely to be available.

¹² For example, if an investor spoke to a broker in the fund family's distribution network and requested the sub-advised fund, the advisor might recommend an alternative internally managed fund in its place.

the fund, and the relationship will be subject to renegotiations. The ownership structure emerges to address some of those adverse incentives.

We predict that fund families will decide to integrate and perform the management of funds in-house for funds in those investment objectives that are closest to fund family's existing internally managed funds and overall expertise, since these are the funds where the family's contribution will be highest. Given the family's expertise in the investment objective, their ability to attribute performance to manager luck or skill is enhanced. When the investment management is undertaken internally, the fund family has finer tools for monitoring and managing fund managers and analysts as it can directly tailor their incentives and, in case of underperformance fire them. Moreover, even if the fund performs poorly, the institutional knowledge gained from the experience would help in the management of other similar funds in the family. As far as monitoring the performance of third party services are concerned, few other option but terminating the third party management contract are left at the fund family's disposal. For funds in investment objectives that more removed from the family's core, we would expect a proliferation of sub-advising, since the fund family's expertise will be less of a contributing factor to the success of the fund.

The incomplete contracting framework suggests a few testable implications: 1) Does the distance between the investment expertise required to manage the new fund and the family's overall expertise play a role in determining whether a fund will be integrated within the family or outsourced? In other words, do fund families run funds in-house in investment objectives close to their own expertise and outsource for more peripheral funds? 2) Similarly, is the sub-advisor's ability to attract investor dollars from retail investors related to their decision to sub-advise? 3) Is there evidence of underinvestment on the side of both family (measured by fund size) and the sub-

advisor (measured by fund performance) in the case of outsourcing? In our empirical approach to investigate outsourcing in the mutual fund industry, we focus on these questions.

3. Data and Methodology

We create our sample by merging three databases: the Morningstar database of open-end mutual funds and proprietary databases of annual N-SAR fund filings¹³ and form ADV filings from the SEC. The sample period runs from January 1996 through December 2011 and below we describe these three databases and the variables used in our analysis.¹⁴

3.1. Morningstar Data

Widely used in the academic literature¹⁵, the Morningstar database consists of share-class level mutual fund information including monthly fund returns, total net assets (TNA), expense ratios, portfolio turnover, fund investment objective categories and many other variables. To avoid double-counting, we aggregate all share classes for a given fund and remove observations that are missing return, TNA, expense, turnover or other relevant data. Because we focus our analysis on actively managed funds, we remove both index funds and those funds classified as belonging to the “Target Date” investment objective category. In an effort to ensure a reasonable fit with our performance measurement models, we also remove funds in those investment objectives that are

¹³Studies that combine N-SAR with CRSP or Morningstar data include Reuter (2006), Edelen, Evans and Kadlec (2012) and Christoffersen, Evans and Musto (2013).

¹⁴ Unfortunately, the data we use from the form ADVs is not readily available for the entire time period. We have snapshots of this data from November of 2004, December of 2005, and October of 2006, 2007, 2008, 2009 and 2010. For each filing, we assume the information is accurate from the filing date until the date of the next filing. For the sample period before November of 2004, we assume that the November 2004 information is correct for all earlier periods in our sample.

¹⁵ Studies that use Morningstar data include Chevalier and Ellison (1999), Elton, Gruber and Blake (2001), and Evans and Fahlenbrach (2012)

not easily characterized as either equity, fixed income or a combination of both.¹⁶ After applying these filters and merging the Morningstar database with the N-SAR database described below, the sample consists of 4,674 unique funds belonging to 41 different investment objectives.¹⁷

While many of the Morningstar variables that we employ in the analysis are commonly used in the literature, we construct a novel variable to aid in our exploration of sub-advising. In their relative performance analysis of mutual fund managers, Cohen, Coval, and Pastor (2005) use the similarity in the holdings of a given manager to other fund managers in the sample to create a dynamic benchmark used in assessing the performance of the manager of interest. Similar to their approach, we use portfolio allocation data of in-house managed funds to compare the similarity of a fund family's investments or expertise to that of the investment objective in which they are opening a new fund. Specifically, we calculate the TNA-weighted aggregate portfolio allocation of all in-house advised funds in a fund family (i.e. sub-advised funds are removed) based on the region/country¹⁸ of the securities in the portfolio. We then calculate the TNA-weighted aggregate portfolio country/region weights for all funds in a given Morningstar investment objective. An end-of-December annual snapshot of the fund-level geographic region data is taken from the Morningstar database to generate these aggregate measures. As a measure of a fund family's

¹⁶ We remove those funds with any of the following Morningstar investment objectives: "US OE Bear Market", "US OE Commodities Broad Basket", "US OE Convertibles", "US OE Global Real Estate", "US OE Managed Futures", "US OE Natural Res", "US OE Real Estate", "US OE Muni", or "US OE Currency".

¹⁷ The remaining investment objectives include: US OE Allocation, US OE Bond, US OE China Region, US OE Communications, US OE Consumer, US OE Diversified Emerging Mkts, US OE Diversified Pacific/Asia, US OE Emerging Markets Bond, US OE Equity Energy, US OE Equity Precious Metals, US OE Europe Stock, US OE Financial, US OE Foreign Large Blend, US OE Foreign Large Growth, US OE Foreign Large Value, US OE Foreign Small/Mid Growth, US OE Foreign Small/Mid Value, US OE Health, US OE Industrials, US OE Japan Stock, US OE Large Blend, US OE Large Growth, US OE Large Value, US OE Latin America Stock, US OE Long/Short Equity, US OE Market Neutral, US OE Mid-Cap Blend, US OE Mid-Cap Growth, US OE Mid-Cap Value, US OE Miscellaneous Sector, US OE Multialternative, US OE Pacific/Asia ex-Japan Stk, US OE Retirement Income, US OE Small Blend, US OE Small Growth, US OE Small Value, US OE Technology, US OE Utilities, US OE World Allocation, US OE World Bond and US OE World Stock.

¹⁸ The geographic region/country allocation is separated into ten areas: Africa/Middle East, Developed Asia, Emerging Asia, Australia, Latin America, North America, Eastern Europe, Western Europe, Japan, North America, and United Kingdom.

experience or expertise in managing a particular style of investment, we calculate the sum of the squared differences in the family’s region/country weight relative to the investment objective’s region/country weights:

$$RegionExpertise_t^{Family,InvObj} = \sum_{r=1}^{10} (w_{r,t}^{Family} - w_{r,t}^{InvObj})^2$$

For a given time t , fund family and investment objective, the squared differences are summed over the 10 geographic regions r , discussed above. A large value of this measure suggests that the family’s current in-house managed investments have little or no regional overlap with the investment objective of interest.

3.2. N-SAR and Form ADV Data

In addition to the Morningstar, we use the form N-SAR and form ADV SEC filings to designate each fund as advised or sub-advised and to provide data about each investment advisor. Mutual funds are required by the Investment Company Act of 1940 to file the semi-annual N-SAR report form with the SEC. This filing contains 133 numbered questions, the responses to which give detailed information on a wide variety of fund characteristics.¹⁹ Question 8 of the form requires each fund to list the name, address and file number²⁰ for the investment advisors employed by the fund. In part B of question 8, it also requires the fund to designate each investment advisor as an advisor or a sub-advisor. Form ADV, on the other hand, is a required investment advisor registration and disclosure form. The form includes information about the advisor’s place of business, investment practices, employees, clients, assets under management, and affiliations.²¹

¹⁹ A list of the questions and sub-questions can be found at <http://www.sec.gov/info/edgar/forms/N-SARdoc.htm>. In the description of the variables below we identify the N-SAR question and sub-question (e.g., 72.X is the Xth sub-question under question 72) from which the data is collected in parentheses.

²⁰ The file number is an internal identifier assigned to each entity named in the filing when that entity registers with the SEC.

²¹ Form ADV and the data contained therein is described in Dimmock and Gerken (2012).

To connect the N-SAR and form ADV filings, we match the SEC identification number from form ADV (Item 1.D from Part 1A) to the same identification number given for each investment advisor listed in the N-SAR filings (question 8.C). Once the databases are connected, we use the combined N-SAR and ADV databases for two purposes. First, although the advisor information from form N-SAR allows us to classify investment advisors as advisors or sub-advisors, some sub-advisors are affiliated with the fund family for whom they are managing a fund. This combined database enables us to identify which sub-advisors are affiliated with the fund family or management company for whom they sub-advise. This affiliation better aligns their incentives with the fund family and given our focus on the possible incompleteness in the contract between the fund family and the investment advisor, we reclassify these sub-advised funds as advised.

To ascertain whether or not a sub-advisor is affiliated with the fund family or management company, we examine the SEC's form ADV filings. Specifically, in Item 10 of part II of the form ADV, each registered investment advisor is required to disclose control persons, which for an affiliated sub-advisor would include the management company or fund family that controls the sub-advisor. Using this information, we designate any affiliated sub-advisors as advisors.

Second, we use the database to characterize the investment advisor decision to sub-advise. The form ADV data contains information on whether or not the advisor is based in the U.S., the total discretionary assets (\$) managed by the advisor, the average account size (\$) of clients of the advisor, the percentage of total assets managed by the advisor for which they have investment discretion and the percentage of the advisors employees who have direct investment responsibilities. Also included is the percentage of the advisor's clients who are mutual funds, individual investors, charitable organizations, state or municipal government entities, hedge funds or other pooled investment vehicles and pension or profit sharing plans with the 'other' category

being omitted. Given the evidence that the market for investment products is segmented (e.g. Del Guercio, Reuter and Tkac (2010)) and the anecdotal evidence that advisors agree to sub-advise because they lack access to a given investment clientele²², this characterization of the existing clients of the investment advisor may be an important determinant of the decision of investment advisors to sub-advise instead of opening their own investment product.

3.3. Performance Measurement

Fund performance is an important variable in our analysis, but our sample includes a wide variety of fund types ranging from domestic fixed income to international equity and much in between. To estimate the risk-adjusted performance of these funds we employ a risk-adjusted performance measurement methodology similar to Chen et al (2013).²³ Specifically, using the previous 36 months of returns for each fund, we estimate fund-specific factor loadings for 1-, 4-, 6-, and 10-factor performance models. The 1-factor model (Jensen (1968)) uses the excess market return as the sole factor and the 4-factor model expands on this by adding size, value and momentum factors (Carhart (1997)). The return data for these two models comes from Ken French's website. We also use the 6-factor and 10-factor models proposed by Chen et al (2013) and Elton, Gruber and Blake (1993) respectively to estimate risk-adjusted fund performance. The 6-factor model augments the 4-factor model by including a fixed income factor (the Barclays US

²² For example, the following quotation suggests that the investment advisor, Money, does not have access to the investment clientele (retail investors) in which the fund family, Virtus Investment Partners, primarily operates: "Virtus Investment Partners...which operates a multi-manager asset management business, has selected HIM Money...to subadvise the Virtus High Yield Income Fund...Money, a subsidiary of Harris Investments, is a boutique investment management firm specializing in managing credit risk assets...." "The decision to work with Money supports our overall strategy of offering institutional-quality managers to retail clients who typically don't have access to them," said Frank Waltman, executive vice president, product management, at Virtus. "Money has an impressive track record as a proven high-yield manager, and we look forward to leveraging their expertise for the shareholders of the Virtus High Yield Income Fund." (PRNewswire, 5/25/10).

²³ In an earlier version of the paper, we estimated the performance regressions using the 20 value-weighted fund portfolio returns approach described in Chen et al (2013) with similar results.

Aggregate Bond index) and an international factor (the Morgan Stanley MSCI EAFE index return) both in excess of the 1-month Treasury bill return. The 10-factor model augments the 4-factor model by including six different fixed income factors proxied for by six Barclays fixed income indices, each in excess of the 1-month Treasury bill return: the Barclays GNMA Index, US Corporate High Yield Index, US Corporate Investment Grade Index, and the US Short, Intermediate and Long Treasury Bills Indices. In each examination of performance we show the results for these four different performance models in addition to a simple investment objective alpha where we subtract the TNA-weighted return of all other funds in a given investment objective.

3.4. Sample Fund Characteristics

Panel A of Table 1 provides descriptive statistics for the sample of advised and sub-advised fund-year observations. Comparing the two, we see that advised funds are larger on average, come from larger fund families, and are younger. We also see that sub-advised funds have higher expense ratios than advised funds. To ensure that the observed differences in expense ratios are not driving the performance results tautologically, we deviate from much of the prior literature in our use of gross returns for all performance calculations. Even when estimating the performance measures using gross returns, the summary statistics show, consistent with the results of Del Guercio et al (2010) and Chen et al (2013), that advised funds have higher average annualized gross risk-adjusted alphas than sub-advised funds. While the observed smaller fund size, which would translate to a lower payment to sub-advisors, and the lower sub-advised fund performance are consistent with the prior literature, these two empirical observations are perhaps surprising if not considered in light of the other factors that contribute to the sub-advisory decision.

Panel B of Table 1 breaks down the fund-year observations by Morningstar investment objective. While there are fund-year observations from 41 different objectives, the allocation, bond and standard US domestic large/mid/small and growth/blend/value equity categories account for the majority of observations. Given the wide variety of fund investment objective types and the potential for the various factor models to poorly measure performance for some of the more esoteric investment objectives, we provide investment objective alphas as a robustness check throughout our performance analyses. The investment objective alpha is simply the difference between the fund's performance and the value-weighted performance of all other funds in the same investment objective.

4. Results

Before turning to our multivariate analyses, Figures 1, 2 and 3 provide a useful picture of the prevalence and importance of sub-advising in the US mutual fund industry. Panel A and B of Figure 1 show the percentage of funds and TNA that is sub-advised from January of 1996 to December of 2011. Approximately 32% of funds and 24% of TNA are sub-advised over that time period, with little systematic variation.

In Figures 2 and 3, we repeat that same analysis, but for a subset of funds. Specifically, for each fund family, the investment objectives in which they had never managed a fund before 1996 are identified. We then examine the prevalence of sub-advising for funds in investment objectives that are new (old) to the fund family in Figure 2 (Figure 3). For this subset of funds in new investment objectives in Figure 2, we find that approximately 47% of funds and 51% of TNA is managed by sub-advisors. This greater prevalence of sub-advising in investment objectives for which the fund family does not have prior experience suggests indeed that

expertise may play a role in the sub-advisory decision. In Figure 3, however, when we focus on funds from investment objectives in which the fund family already has expertise, only 16.5% of funds and 13.6% of TNA are sub-advised. Panel A of Figure 2 also displays an interesting temporal pattern. A high percentage of sub-advised funds seems to decline steadily over the sample period. Because the subset is defined as only those funds in investment objectives where the fund family have never invested prior to 1996, this decline is consistent with fund families initiating their foray into an investment objective via a sub-advisory relationship, but after learning from that experience, continuing their foray by opening in-house advised funds.

4.1 The Determinants of the Investment Advisor's Decision to Sub-advise

To examine the determinants of the investment advisor's decision to sub-advise, we look at the incidence of sub-advising across all investment advisors who advise or sub-advise at least one mutual fund. Table 2 gives the regression estimates for a logit model of the determinants of sub-advising by each investment advisor. The dependent variable is whether or not an investment advisor solely sub-advices in the mutual fund space in a given year relative to only advising or a combination of advising and sub-advising. The independent variables include an indicator variable of whether the investment advisor is based in the US, the natural log of the assets managed by the investment advisor over which they have discretion, the log of the average account size, the percentage of discretionary assets and the percentage of employees at the firm that have investment expertise. Given the evidence in Del Guercio et al (2010) regarding the segmentation of mutual fund investor clientele, we also include the percentage of the investment advisors clients that are mutual funds, individual investors, charitable organizations,

state/municipal government entities, hedge funds/other investment vehicles and pension/profit sharing plans, with the 'Other' category of clients omitted.

After matching the 2004 to 2011 form ADV data to our database of advised and sub-advised N-SAR filing funds using the SEC identification number, we find that of the initial sample of 98,006 annual filings from 18,912 investment advisors, there are 89,381 filings for which the registered investment advisor does not manage any mutual fund assets. Of the remaining observations, 1,945 of them appear in the N-SAR database only as sub-advisors, 3,776 appear only as advisors and 2,904 appear as both advisors and sub-advisors in the same year. Using the subset of investment advisors that manage mutual fund assets with non-missing independent variables (8,515 investment advisor-year observations), we compare those advisors that only sub-advise mutual fund assets with those that either only advise or both advise and sub-advise mutual fund assets. The logistic regression estimates of the probability of only sub-advising mutual fund assets are given in Table 2.

The results show that larger, US based investment advisors are less likely to sub-advise. Also, when the advisor has a larger average account size and a higher percentage of employees at the firm with investment expertise, both consistent with managing assets primarily for institutional and not retail clients, the advisor is more likely to sub-advise. Looking at the clientele results, those investment advisors with a higher percentage of mutual fund and individual investor (retail) clients are less likely to sub-advise. Those advisors with more state/municipal government, hedge fund and pension/profit sharing plan clients (institutional) are more likely to sub-advise. This evidence supports the idea that the market for investment products is segmented and that investment advisors who operate in the institutional client space are less likely to have access to a retail investor marketing or distribution channel (i.e. ability to

attract retail investor assets). Without such access, an investment advisor would be more likely to sub-advise these assets for a fund family that does have this distribution capability.

4.2 The Determinants of the Fund Family's Decision to Outsource to a Sub-advisor

To examine the determinants of the fund family's decision to outsource investment advisory responsibility to a sub-advisor, we look to the issue of new fund creation. Table 3 gives the regression estimates for a Heckman selection model of the determinants of sub-advising. The selection model (whether or not a fund family creates a new fund in a given investment objective each year) and the regression model (whether that new fund is advised or sub-advised) are jointly estimated via maximum likelihood. The selection model examines the decision of whether or not a fund family creates a new fund in each investment objective each year so the dependent variable has the units of fund family-year-investment objective, where the set of investment objectives considered in a given year is determined by the set of investment objectives listed in the Morningstar database that year. For those fund families that create a new fund in a given investment objective in a given year, the decision of whether or not to use internal managers to advise the fund or to outsource the advisory services to a sub-advisor is analyzed. If a family opens multiple funds in a given investment objective in a given year, each observation is included separately in the analysis.

We follow Khorana and Servaes (1999) in our choice of the independent variables for the new fund creation selection equation. We include the natural log of the total assets managed in the investment objective (Log Inv Obj Size), by the fund family (Log Family Size) and by the family in the investment objective of interest (Log Fam-Obj Size). Net flows as a percentage of TNA are also included for the investment objective, the family overall and family's assets in the

investment objective of interest all lagged one year. The previous year's value-weighted return for all funds in the investment objective is included as are the percentage of the fund family's assets that are distributed via brokers (as measured by the presence of a front or rear load) and the natural log of the total number of new funds created by the fund family in the previous year are also included. The inclusion of the net inflows of resources into an investment objective as a determinant of opening a new fund is of particular interest for our analysis. Attracting resources is a primary objective of the fund family, and the ebb and flow of resources in and out of investment objectives are a key factor behind the very dynamic nature of the mutual fund industry. As the fund family tries to attract those incoming resources and open a fund, it has to decide whether it will run this fund in-house or not.

Looking at the determinants of sub-advising, after accounting for the family's selection of whether or not to create a new fund, the importance of expertise, or the lack thereof, begins to become clear. The positive coefficient on the percentage of the fund family's TNA in all investment objectives other than the one of interest (Fam Expert (% Family TNA outside Inv Obj) shows that the probability of hiring a sub-advisor to run the fund increases when you manage less assets in the same investment objective. The positive coefficient on the Region distance measure shows that the more the fund's core competency differs from other funds in the investment objective of the newly opened fund in terms of their geographic expertise, the family is more likely to sub-advise as well. We also see that families with a diversified product offering strategy as measured by a lower family investment objective Herfindahl, are more likely to sub-advise and families that have previously sub-advised are more to sub-advise again.

4.3 Sub-advising and Fund Size

We turn from the determinants of sub-advising for both family and investment advisor, to our analysis of fund size. Because the management fees charged by the investment advisor are calculated as a percentage of fund size, the assets under management in a given fund are a direct proxy for the revenue earned by an investment advisor or sub-advisor. When an investment advisor agrees to sub-advise a fund, they rely on the distribution and marketing efforts of another fund family to attract the assets. The determinants of the investment advisor's decision to agree to sub-advise in Table 2 suggest that advisers often sub-advise when they have limited or no access to retail investors. In such a case, sub-advising would eliminate the need for the advisor to invest resources into distribution and marketing for a new investor clientele. At the same time, because the sub-advisor's revenue would be proportional to the assets of the fund, the profitability of such a venture would be dependent on the efforts of their unaffiliated fund family partner to attract investors to the fund.

In Table 4, we examine the determinants of fund size in a simple OLS regression with standard errors clustered by fund. Consistent with previous examinations, there is a strong positive relationship between fund size and the fund family size, fund performance relative to other funds in the same investment objective (Fund Inv Obj Alpha), lagged fund flows and fund age. There is also a very strong relationship between fund size and lagged fund size consistent with a highly persistent variable. Expenses, however, are negatively related to fund size. After controlling for those features of a fund that would be salient to investors, however, we see that sub-advised funds are smaller than advised funds. Given the primary reason for an investment advisor to sub-advise is to access assets from a different investor clientele, the result that the size of the assets they access are smaller than they would be given the other features of the fund that matter to investors (e.g. fund performance) may at first seem somewhat surprising.

In Table 5, we model the outcome variable, fund size, as in Table 4, but controlling for the selection bias we identify in our sub-advisory determinants analysis. Specifically, Table 5 gives the regression estimates for the regression of annual fund size on lagged fund characteristics, including whether or not a fund is sub-advised. In contrast to the OLS regression results in Table 4, the sub-advised treatment effect is estimated via doubly-robust augmented inverse propensity weighting (AIPW) model (Tan (2010); Woolridge (2010)). AIPW jointly estimates both an outcome model (i.e. the determinants of fund size) and a treatment model (i.e. the determinants of the sub-advisory decision) to estimate the average treatment effect of sub-advising on fund size. The output from the AIPW estimation include separate coefficients from the performance or outcome regression for advised and sub-advised funds as well as the probit estimates from the sub-advisory or treatment regression. A particular advantage of AIPW over a regression adjustment, Heckman model or other selection method is the double-robustness property. Specifically, if the outcome regression model is properly specified but the treatment model is not, we obtain consistent estimates. Similarly, if the treatment model is correctly specified, but the outcome model is not, we still obtain consistent estimates.

Using AIPW to model the selection and treatment regressions brings to light several important differences. First, comparing the outcome regression coefficients on annual fund investment objective alpha for sub-advised to advised funds, there is a much stronger relationship between fund size and past fund alpha for advised funds than for sub-advised funds. Second, both proxies for investment advisor access to retail investors (i.e. Advisor MF Clients and Log Advisor Discret TNA) are strongly negatively related to the decision to sub-advice, consistent with investment advisors with limited access to retail investors agreeing to sub-advice. Third, the results from both expertise measures suggest that the greater the family's expertise, the

less likely they are to outsource management to a sub-advisor. The positive coefficient on ‘Fam Expert(Region)’ shows that the farther the distance of the family’s core regional or country expertise from the investment objective, the more likely they are to sub-advise. Similarly, the negative coefficient on ‘Fam Expert(% Fam TNA in Inv Obj)’ shows that those families with greater expertise in a given investment objective, as measured by the percentage of the family’s TNA in the objective, are less likely to sub-advise. Fourth, and most importantly, once we control for the treatment effect, we see no statistically significant difference in fund size between sub-advised or advised funds. Put another way, while sub-advised funds are smaller than other advised funds, if we take into account the lack of access to retail investors which contributes to the investment advisor’s decision to agree to sub-advise in the first place, the investment advisor could not have attracted more investor assets or generated a larger fund if they opened, marketed and distributed the fund themselves.

4.4 Sub-advising and Fund Performance

Similar to our examination of fund size in section 4.3, here we examine the determinants of fund performance. In Table 6, we revisit the prior literature on sub-advised fund underperformance in a simple OLS regression with standard errors clustered by fund. We measure performance using investment objective alpha and 1-, 4-, 6-, 10-factor model alphas. Although the time period covered and the sample composition differs somewhat from these previous studies, we confirm their result that sub-advised funds underperform using all five measures of performance.²⁴ Given the evidence from Table 3 that fund families are more likely

²⁴ In unreported results we repeat this analysis in a Fama-Macbeth framework and using monthly fund returns with investment objective X time fixed effects with similar results. These estimates are available upon request.

to hire sub-advisors for funds in objectives where they lack investment expertise, this result is somewhat surprising: the sub-advisor hired for performance seems to underperform.

As with fund size, we repeat the analysis of fund performance, but controlling for the selection bias we identified in our sub-advisory determinants analysis. The results of this analysis are shown in Table 7. The output from the AIPW estimation includes separate coefficients from the performance or outcome regression for advised and sub-advised funds as well as the probit estimates from the sub-advisory or treatment regression.

After controlling for the treatment effect, we see no statistically significant difference in performance between sub-advised funds or advised funds. While sub-advised funds underperform other advised funds, if we take into account the lack of expertise which contributes to the fund family's decision to hire a sub-advisor in the first place, the fund family could not have obtained better performance if they managed the fund in-house.

Looking at the coefficients from the outcome regression, we see that while the coefficient on the broker-sold indicator variable for advised funds is negative and statistically significant, there is no performance difference for broker-sold sub-advised funds. As for the treatment regression, similar to the fund size analysis, we find that investment advisors with less access to retail investors and more likely to sub-advise and fund families with greater expertise in the investment objective of interest are less likely to outsource management to a sub-advisor.

5. Conclusion

There are at least two different ways in which one can interpret the findings of this paper about integration and outsourcing in the mutual fund industry.

On the one hand, our analysis addresses a few key questions, and in some instances even a few puzzles that are specific to the mutual fund industry. For one, we explain why it is the case that one should not be surprised that sub-advising has been such a pervasive phenomenon among mutual funds over time and also across investment categories. As we have documented, the mutual fund industry is dynamic in nature, with new investment categories arising over time and substantial variation in investor flows into or out of the existing investment objectives. If a fund family wants to maximize cash flows, that is, if it wants to continue to attract investors and their assets to its funds, thereby generating fees, it will find its expertise constantly stretched by investor's demands for investment opportunities that are outside its competence or expertise. Sub-advising provides a way for a fund family to attract investor funds outside the range of its own expertise. And indeed, our empirical analysis indicates that the decision to outsource the management of a fund is a function of the particular expertise of the fund family. For those funds that are relatively far removed from a fund family's expertise, the fund family will outsource the investment management responsibility. On the other hand, funds that are closer to the fund family's own competence will be managed internally.

A second central question that is specific to mutual funds is the puzzle of the poor performance of sub-advised funds when compared to the returns of fund families' in-house managed funds that Chen et al (2013) emphasized and the puzzle we identify of smaller fund size. Why would fund families continue to offer sub-advised funds if they underperform and why would sub-advisors continue to agree to manage these funds if they are smaller, and therefore less profitable for the sub-advisor, than they should be given the fund's observable characteristics (e.g. performance)? A careful econometric analysis accounting for treatment effects indicates that the stylized observation about returns is to a large extent a function of

selection bias that ignores the particular factors (including expertise and access to investors) that are driving the decision to outsource a fund and agree to manage that fund in the first place.

There is a growing interest in understanding the particular organizational structure of the firm and its boundaries, and also the changing organization of firms --One need only think about the vivid public discussion about outsourcing. In addition to the insights regarding the asset management industry, in this paper we exploit the detailed mutual fund industry data to study outsourcing vs. integration at the product level. More in particular, in the paper we provide empirical support for a few key tenets of the theories of incomplete contracting that have been developed by Grossman and Hart and that are directly applicable to the human-capital intensive mutual fund industry whose outcomes (funds raised, and returns generated) are hard to write enforceable contracts over. Those theories of incomplete contracts shed light on the changing organization of firms, and the results here illuminate some of those broader questions.

For one, the observed ownership structure that coincides with managing funds internally that are close to one's own expertise, while outsourcing those funds that are far removed from it, is consistent with a key insight of incomplete contract theories. The entity whose contribution is more critical to the outcome of the project will own the project. Not surprisingly, expert knowledge or expertise inside the fund family therefore coincides with the in-house management of those funds that might benefit most from that expert knowledge.

In addition, in an environment of incomplete contracts, it is very hard to write a contract over the efforts and investments of the contracting parties (the fund management and the fund family). Because of this, there will be a tendency on all parts of the collaborators to underinvest in relationship-specific investment. Therefore, one should not be surprised to find that family of funds will underinvest in attracting funds, making those funds smaller than the ones managed

internally. Similarly, the observed lower return of sub-advised funds is consistent with this observation.

Finally, our results indicate that from the perspective of individual fund families who have to decide on whether to outsource or to integrate, it may be rational to continue to run smaller funds and to attract low- performing sub-advised funds (that are essential to attract investor funds). Indeed, our findings indicate that those fund families would not be able to generate any better returns themselves.

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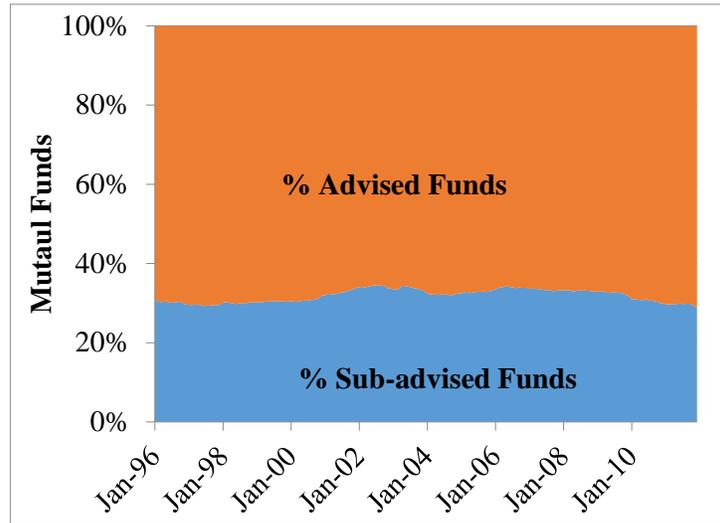
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Figure 1 – Sub-advising Over Time

Figure 1 shows percentage of funds and assets managed by sub-advisors over time for the broader sample.

Panel A. The Percentage of Mutual Funds Advised and Sub-advised Over Time



Panel B. The Percentage of Fund TNA Advised and Sub-advised Over Time

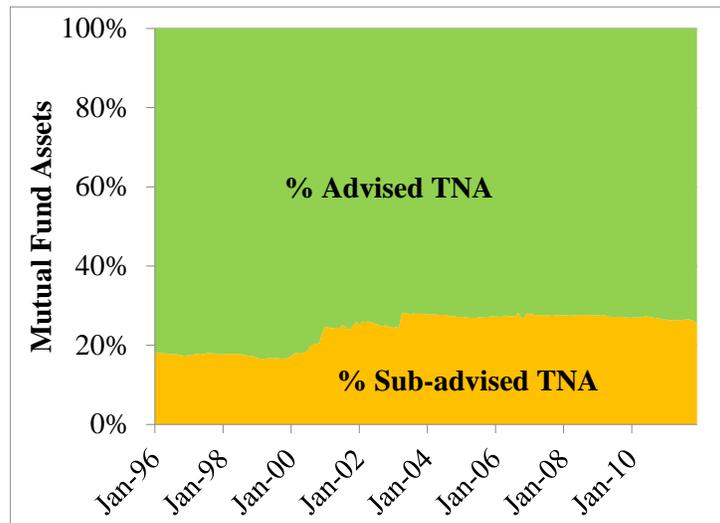
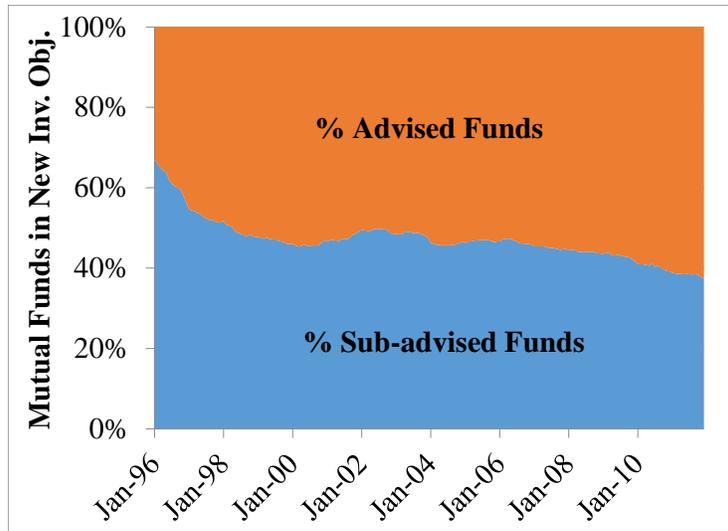


Figure 2 – Sub-advising Over Time in *New* Investment Objectives

Figure 2 shows percentage of funds and assets managed by sub-advisors over time in *new* investment objectives. For each fund family, the investment objectives in which they had currently or previously managed a fund before 1996 are identified. The figure depicts advising and sub-advising patterns for all funds created after 1996 in an investment objective in which a given fund family had never managed a fund before.

Panel A. The Percentage of Mutual Funds Advised and Sub-advised Over Time



Panel B. The Percentage of Fund TNA Advised and Sub-advised Over Time

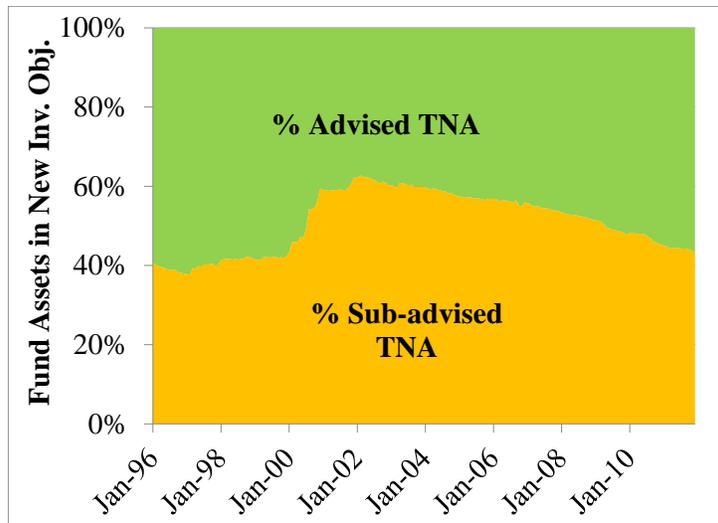
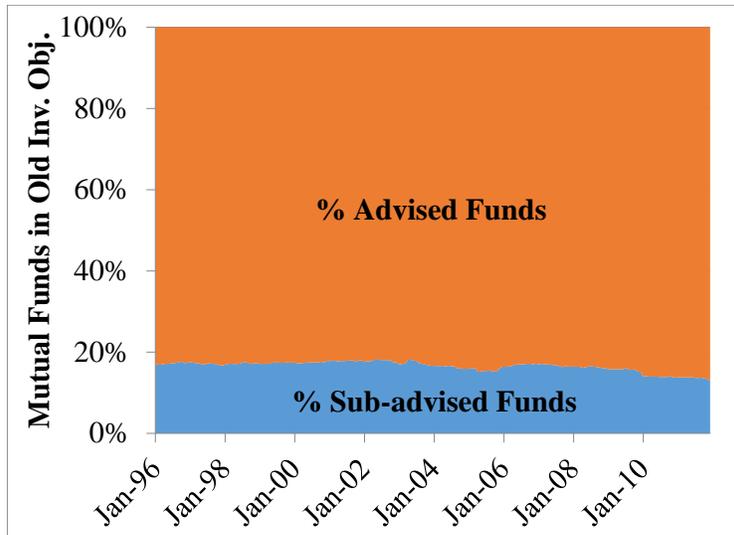


Figure 3 – Sub-advising Over Time in Old Investment Objectives

Figure 3 shows percentage of funds and assets managed by sub-advisors over time in *old* investment objectives. For each fund family, the investment objectives in which they had currently or previously managed a fund before 1996 are identified. The figure depicts advising and sub-advising patterns for all funds created after 1996 in an investment objective in which a given fund family had already managed a fund before.

Panel A. The Percentage of Mutual Funds Advised and Sub-advised Over Time



Panel B. The Percentage of Fund TNA Advised and Sub-advised Over Time

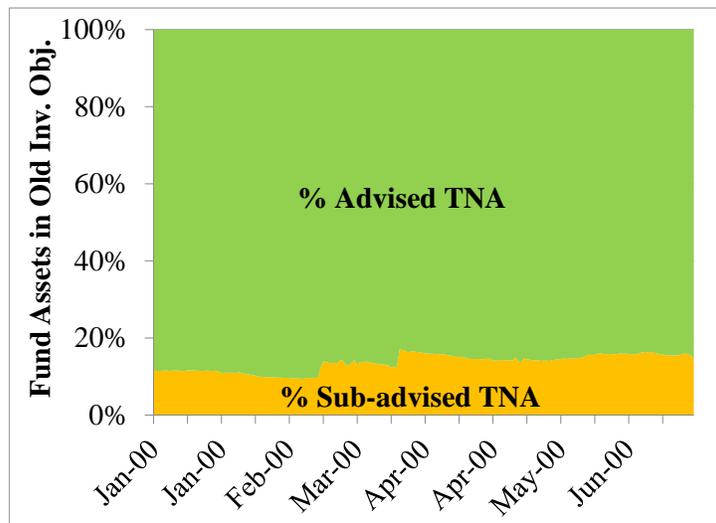


Table 1 – Sample Descriptive Statistics

Table 1 presents descriptive statistics (mean, median and standard deviation) for the sample of mutual funds from Morningstar with matched N-SAR filings and non-missing values of all variables in the analysis over the period January 1996 through December 2011 (22,660 fund-year observations). The sample is divided into the advised and sub-advised fund samples. The variables fund TNA (\$millions), family TNA (\$billions), annual expense ratio, annual turnover (the minimum of fund purchases and sales divided by TNA), fund age in years, annual net fund flows as a percentage of fund TNA, the percentage of funds sold by brokers as indicated by the existence of either a front or back load. The table also includes annualized performance estimates calculated from gross fund returns including an investment objective alpha calculated by subtracting the value-weighted average gross return of all funds in the same Morningstar investment objective from the fund's return over the same time period and annualized 1-, 4-, 6-, and 10-factor alphas calculated using the previous 36 months of returns from each fund to estimate the factor loadings for the return factors described in Chen et al (2013). Panel B reports the number of fund-year observations by Morningstar's investment objective.

Panel A. Univariate Statistics

Variable	Advised Funds (17,752 Fund-Year Obs.)			Sub-advised Funds (4,908 Fund-Year Obs.)		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Fund Size (\$ Millions)	\$1,808	\$313	\$6,295	\$884	\$256	\$5,217
Family Size (\$ Billions)	\$127	\$25	\$238	\$55	\$19	\$104
Expense Ratio (% TNA)	1.18%	1.17%	0.51%	1.25%	1.19%	0.51%
Fund Turnover (% TNA)	106%	65%	186%	116%	78%	137%
Fund Age (Years)	14.3	11.0	12.5	10.5	8.8	7.6
Annual Net Fund Flows (% TNA)	1.8%	-2.8%	39.9%	2.0%	-2.6%	40.8%
Broker-Sold (=Yes)	54.2%	-	-	56.8%	-	-
Annualized Gross Returns						
Inv. Obj. Alpha	5.00%	-2.25%	110.12%	1.49%	-2.60%	94.58%
1-Factor Alpha	2.53%	1.85%	10.97%	1.86%	1.56%	9.89%
4-Factor Alpha	0.74%	0.62%	10.73%	0.25%	0.31%	9.48%
6-Factor Alpha	0.83%	0.43%	9.62%	0.34%	0.24%	8.13%
10-Factor Alpha	1.15%	0.59%	11.36%	0.67%	0.65%	10.11%

Table 1 – Sample Descriptive Statistics (Continued)

Panel B. Investment Objective Frequency

Morningstar Inv. Obj.	Fund-Year Obs.	% Sample	Morningstar Inv. Obj.	Fund-Year Obs.	% Sample
Allocation	2,251	9.9%	Large Growth	2,487	11.0%
Bond	4,101	18.1%	Large Value	1,456	6.4%
China Region	71	0.3%	Latin America Stock	39	0.2%
Communications	120	0.5%	Long/Short Equity	80	0.4%
Consumer	87	0.4%	Market Neutral	57	0.3%
Diversified Emerging Mkts	296	1.3%	Mid-Cap Blend	526	2.3%
Diversified Pacific/Asia	81	0.4%	Mid-Cap Growth	1,210	5.3%
Emerging Markets Bond	79	0.4%	Mid-Cap Value	404	1.8%
Equity Energy	111	0.5%	Miscellaneous Sector	63	0.3%
Equity Precious Metals	172	0.8%	Multialternative	22	0.1%
Europe Stock	187	0.8%	Pacific/Asia ex-Japan Stk	94	0.4%
Financial	252	1.1%	Retirement Income	70	0.3%
Foreign Large Blend	797	3.5%	Small Blend	769	3.4%
Foreign Large Growth	347	1.5%	Small Growth	1,102	4.9%
Foreign Large Value	294	1.3%	Small Value	393	1.7%
Foreign Small/Mid Growth	160	0.7%	Technology	429	1.9%
Foreign Small/Mid Value	110	0.5%	Utilities	133	0.6%
Health	336	1.5%	World Allocation	222	1.0%
Industrials	82	0.4%	World Bond	284	1.3%
Japan Stock	74	0.3%	World Stock	839	3.7%
Large Blend	1,973	8.7%			
			Total	22,660	100%

Table 2 – Determinants of Investment Advisor’s Decision to Sub-advise

Table 2 gives the regression estimates for a logit model of the determinants of sub-advising by each investment advisor. The dependent variable is whether or not an investment advisor solely sub-advises in the mutual fund space in a given year relative to only advising or a combination of advising and sub-advising. The set of investment advisors is constructed from annual SEC form ADV filings from 2004 through 2011. We first match the form ADV filings to our database of advised and sub-advised N-SAR filing funds. This is done by matching the SEC identification number from form ADV (Item 1.D from Part 1A) to the same identification number given for each investment advisor listed in the N-SAR filings (question 8.C). From the initial sample of 98,006 filings from 18,912 investment advisors, we find that 89,381 of them do not match with any mutual fund advisor, 1,945 of them appear in the N-SAR database only as sub-advisors, 3,776 appear only as advisors and 2,904 appear as both advisors and sub-advisors in the same year. Using the subset of investment advisors that manage mutual fund assets (8,515 investment advisor-year observations), we compare those advisors that only sub-advise mutual fund assets with those that either only advise or both advise and sub-advise mutual fund assets. The logit estimates the probability of only sub-advising mutual fund assets. The independent variables for each investment advisor come from the form ADV filing for each year. These variables include an indicator variable if the advisor is based in the U.S. (Inv Advisor US Based), the natural log of the discretionary assets of the advisor (Log Advisor Discret TNA), the natural log of the average account size in dollars (Log Account Size), the percentage of total assets managed by the advisor for which they have investment discretion (% Discretionary Assets), and the percentage of the advisor’s employees who have direct investment responsibilities (% Investment Employees). Also included is the percentage of the advisors’ clients who are mutual funds, individual investors, charitable organizations, state or municipal government entities, hedge funds or other pooled investment vehicles and pension or profit sharing plans with the ‘other’ category being omitted. Yearly fixed effects are also included and the standard errors are clustered by investment advisor (SEC identification number).

Variables		Subadvise (=Yes)	
		Coef.	t-Stat.
Inv Advisor US Based (=Yes)		-0.510	(-2.46)
Log Advisor Discret TNA		-0.187	(-5.17)
Log Account Size		0.102	(2.96)
% Discretionary Assets		0.001	(.01)
% Investment Employees		0.312	(2.2)
% of Clients	Mutual Funds	-0.023	(-7.43)
	Individual Investors	-0.009	(-2.05)
	Charitable Organizations	-0.007	(-.82)
	State/Municipal Gov't Entities	0.024	(3.23)
	Hedge Funds/Other Investment Vehicles	0.009	(2.32)
	Pension/Profit Sharing Plans	0.007	(1.59)
Constant		1.899	(3.27)
Time Fixed Effects		Yes	
Pseudo R ²		0.090	
Observations		8,515	

Table 3 – Determinants of The Fund Family’s Decision to Outsource to a Sub-advisor

Table 3 gives the regression estimates for a Heckman selection model of the determinants of sub-advising for each fund family. The selection model (whether or not a fund family creates a new fund in a given investment objective each year) and the regression model (whether that new fund is advised or sub-advised) are jointly estimated via maximum likelihood. The selection model examines the decision of whether or not a fund family creates a new fund in each investment objective each year so the dependent variable has the units of fund family-year-investment objective, where the set of investment objectives considered in a given year is determined by the set of investment objectives listed in the Morningstar database that year. For those fund families that create a new fund in a given investment objective in a given year, the decision of whether or not to use internal managers to advise the fund or to outsource the advisory services to a sub-advisor is analyzed. If a family opens multiple funds in a given investment objective in a given year, each observation is included separately in the analysis. The independent variables for the new fund creation selection equation are all lagged one year and include the natural log of the total assets managed in the investment objective (Log Inv Obj Size), by the fund family (Log Family Size) and by the family in the investment objective of interest (Log Fam-Obj Size). Net flows as a percentage of TNA are also included for the investment objective, the family overall and family’s assets in the investment objective of interest. The previous year’s value-weighted return for all funds in the investment objective is included as are the percentage of the fund family’s assets that are distributed via brokers (as measured by the presence of a front or rear load) and the natural log of the total number of new funds created by the fund family in the previous year are also included. The independent variables in the regression model include the percentage of the family’s assets that were sub-advised in the previous year as well as an investment objective Herfindahl, a measure of the families concentration of total net assets (TNA) managed across all Morningstar investment objective, in addition to two different measures of family expertise, or the lack thereof: the percentage of the fund family’s TNA in all investment objective other than the one of interest, and the distance measure of the family’s region/country asset allocation relative to the aggregate of all funds in a given investment objective. The standard errors are clustered by fund family.

Variables	(1)		(2)	
	Coef.	t-Stat.	Coef.	t-Stat.
Selection Model - Determinants of Fund Creation				
Log Inv Obj Size	0.145	(18.25)	0.140	(15.73)
Log Family Size	0.036	(5.48)	0.061	(8.50)
Log Fam-Obj Size	0.051	(28.84)	0.046	(24.82)
Annual Inv Obj Flows	3.933	(17.36)	4.280	(19.19)
Annual Family Flows	1.720	(4.69)	2.175	(4.82)
Annual Fam-Obj Flows	1.095	(3.27)	1.471	(3.70)
Annual Inv Obj Return	0.009	(1.60)	-0.004	(-0.55)
% Family Broker-Sold	0.083	(2.74)	0.081	(2.56)
Log Family New Funds	0.368	(16.46)	0.312	(13.62)
Constant	-7.177	(-28.33)	-7.619	(-26.02)
Regression Model - Determinants of Sub-advising				
Fam Expert(% Family TNA outside Inv Obj)	0.300	(7.01)		
Fam Expert(Region)			1.527	(4.07)
Family Inv Obj Herfindahl	-0.077	(-1.29)	-0.249	(-4.09)
% Family Subadvised	0.492	(9.84)	0.503	(8.99)
Constant	-0.037	(-0.88)	0.183	(3.46)
Observations	444,853		443,025	

Table 4 – Annual Fund Size Regression without Treatment Effects

Table 4 gives the regression estimates for an OLS regression of the natural log of fund size on lagged fund characteristics, including whether or not a fund is sub-advised. The lagged independent variables include the previous year's natural log of fund and family size, the annualized fund investment objective alpha calculated as the difference between the fund's return and the value-weighted average gross return of all funds in the same Morningstar investment objective over the same time period, the annual net fund flow, fund age in years, the expense ratio, fund turnover, and an indicator variable of whether or not a fund was distributed through the broker channel (as indicated by the presence of either a front or back load). Standard errors are clustered by fund.

	Log Fund Size	
	Coef.	t-Stat.
Subadvised (=Yes)	-0.012	(-3.05)
Log Family Size	0.008	(6.63)
Log Fund Size (t-1)	0.975	(243.45)
Annual Fund Inv Obj Alpha	0.208	(9.77)
Annual Net Fund Flows (% TNA)	1.140	(7.29)
Fund Age (Years)	0.001	(2.38)
Expense Ratio	-0.019	(-4.68)
Fund Turnover	0.000	(-0.35)
Broker-Sold (=Yes)	-0.002	(-0.55)
Constant	0.299	(5.30)
Observations	25,652	

Table 5 – Annual Fund Size Regression with Treatment Effects

Table 5 gives the regression estimates for the regression of annual fund size on lagged fund characteristics, including whether or not a fund is sub-advised. In contrast to the OLS fund size regression in Table 4, the sub-advised treatment effect is estimated via doubly-robust augmented inverse propensity weighting (AIPW) model. AIPW jointly estimates both an outcome model (i.e. the determinants of fund size) and a treatment model (i.e. the determinants of the sub-advisory decision) to estimate the average treatment effect of sub-advising on fund size. The output from the AIPW estimation include separate coefficients from the fund size or outcome regression for advised and sub-advised funds as well as the probit estimates from the sub-advisory or treatment regression. In the fund size/outcome models, the lagged independent variables include the natural log of lagged fund and family size, fund investment objective alpha, the annual net fund flow, fund age in years, the expense ratio, fund turnover, an indicator variable of whether or not a fund was distributed through the broker channel (as indicated by the presence of either a front or back load) and an indicator variable for whether or not the fund was sub-advised. For the sub-advisory/treatment model, the independent variables include key variables from the sub-advisory determinants regressions in Tables 2 and 3.

	Log Fund Size	
	Coef.	t-Stat.
Subadvised (=Yes)	-0.004	(-0.71)
Outcome Regression (Advised Funds)		
Log Family Size	0.008	(5.59)
Log Fund Size (t-1)	0.975	(206.39)
Annual Fund Inv Obj Alpha	0.243	(10.37)
Annual Net Fund Flows (% TNA)	1.125	(6.10)
Fund Age (Years)	0.001	(1.95)
Expense Ratio	-0.018	(-4.12)
Fund Turnover	0.000	(-0.57)
Broker-Sold (=Yes)	-0.003	(-0.65)
Constant	0.319	(4.83)
Outcome Regression (Sub-advised Funds)		
Log Family Size	0.010	(3.37)
Log Fund Size (t-1)	0.978	(173.72)
Annual Fund Inv Obj Alpha	0.051	(0.91)
Annual Net Fund Flows (% TNA)	1.226	(4.01)
Fund Age (Years)	0.001	(2.07)
Expense Ratio	-0.022	(-2.41)
Fund Turnover	0.000	(0.60)
Broker-Sold (=Yes)	0.007	(0.76)
Constant	0.189	(2.23)

Table 5 – Annual Fund Size Regression with Treatment Effects (Continued)

	Log Fund Size	
	Coef.	t-Stat.
Treatment Regression		
Advisor MF Clients (% Clients)	-0.012	(-26.54)
Log Advisor Discret TNA	-0.023	(-6.70)
Fam Expert(Region)	4.601	(11.01)
Fam Expert(% Fam TNA in Inv Obj)	-0.990	(-12.46)
Family Inv Obj Herfindahl	0.079	(0.98)
% Family Subadvised	3.961	(94.63)
Constant	-1.125	(-14.63)
Observations	25,444	

Table 6 – Annual Performance Regression without Treatment Effects

Table 6 gives the regression estimates for an OLS regression of annual fund performance on lagged fund characteristics, including whether or not a fund is sub-advised. The performance measures used include a 1-, 4-, 6-, and 10-factor alphas calculated using the previous 36 months of returns from each fund to estimate the factor loadings for the return factor groupings described in Chen et al (2013) and an investment objective alpha calculated as the difference between the fund’s return and the value-weighted average gross return of all funds in the same Morningstar investment objective over the same time period. All performance measures are calculated from gross fund returns and are in units of month performance, even though they are measured over an annual period. The lagged independent variables include the natural log of fund and family size, the annual net fund flow, fund age in years, the expense ratio, fund turnover, an indicator variable of whether or not a fund was distributed through the broker channel (as indicated by the presence of either a front or back load) and an indicator variable for whether or not the fund was sub-advised. Standard errors are clustered by fund.

	1-Factor Alpha		4-Factor Alpha		6-Factor Alpha		10-Factor Alpha		Inv. Obj. Alpha	
	(1)		(2)		(3)		(4)		(5)	
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Subadvised (=Yes)	-0.068	(-4.71)	-0.048	(-3.37)	-0.053	(-4.22)	-0.053	(-3.54)	-0.003	(-2.21)
Log Family Size	0.019	(6.19)	0.016	(5.39)	0.018	(6.95)	0.019	(6.11)	0.001	(4.56)
Log Fund Size	-0.027	(-6.34)	-0.035	(-8.22)	-0.020	(-5.46)	-0.015	(-3.37)	-0.002	(-5.06)
Annual Net Fund Flows (% TNA)	-0.129	(-0.72)	-0.337	(-1.92)	-0.603	(-3.88)	-0.248	(-1.34)	-0.052	(-3.55)
Fund Age (Years)	0.000	(0.52)	0.001	(1.75)	0.000	(-0.23)	0.000	(-0.75)	0.000	(-0.65)
Expense Ratio	0.157	(12.01)	0.067	(5.24)	0.156	(13.78)	0.173	(12.82)	0.011	(8.77)
Fund Turnover	0.000	(1.00)	0.000	(2.00)	0.000	(-1.33)	0.000	(-1.49)	0.000	(-3.26)
Broker-Sold (=Yes)	-0.094	(-7.20)	-0.043	(-3.32)	-0.068	(-6.01)	-0.073	(-5.35)	-0.009	(-6.98)
Constant	0.159	(1.93)	0.286	(3.54)	-0.105	(-1.46)	-0.218	(-2.54)	0.007	(0.90)
Observations	22,660		22,660		22,660		22,660		25,664	

Table 7 – Annual Performance Regression with Treatment Effects

Table 7 gives the regression estimates for the regression of annual fund performance on lagged fund characteristics, including whether or not a fund is sub-advised. In contrast to the OLS performance regression in Table 6, the sub-advised treatment effect is estimated via doubly-robust augmented inverse propensity weighting (AIPW) model. AIPW jointly estimates both an outcome model (i.e. the determinants of fund performance) and a treatment model (i.e. the determinants of the sub-advisory decision) to estimate the average treatment effect of sub-advising on fund performance. The output from the AIPW estimation include separate coefficients from the performance or outcome regression for advised and sub-advised funds as well as the probit estimates from the sub-advisory or treatment regression. As in Table 2, the performance measures include a 1-, 4-, 6-, and 10-factor alphas calculated using the previous 36 months of returns from each fund to estimate the factor loadings for the return factor groupings described in Chen et al (2013) and an investment objective alpha calculated as the difference between the fund’s return and the value-weighted average gross return of all funds in the same Morningstar investment objective over the same time period. All performance measures are calculated from gross fund returns and are in units of month performance, even though they are measured over an annual period. Specification 6 repeats the analysis but using a 4-factor alpha for the subset of funds from the following US domestic equity investment objectives: Large/Mid/Small Growth/Blend/Value. In the performance/outcome models, the lagged independent variables include the natural log of fund and family size, the annual net fund flow, fund age in years, the expense ratio, fund turnover, an indicator variable of whether or not a fund was distributed through the broker channel (as indicated by the presence of either a front or back load) and an indicator variable for whether or not the fund was sub-advised. For the sub-advisory/treatment model, the independent variables include variables from the sub-advisory determinants regressions in Tables 2 and 3.

	1-Factor Alpha		4-Factor Alpha		6-Factor Alpha		10-Factor Alpha		Inv. Obj. Alpha	
	(1)		(2)		(3)		(4)		(5)	
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Subadvised (=Yes)	0.007	(0.26)	-0.004	(-0.16)	-0.022	(-1.03)	-0.032	(-1.39)	-0.001	(-0.30)
Outcome Regression (Advised Funds)										
Log Family Size	0.022	(5.76)	0.018	(4.68)	0.020	(5.61)	0.022	(5.21)	0.001	(3.58)
Log Fund Size	-0.027	(-5.67)	-0.031	(-6.80)	-0.019	(-4.47)	-0.014	(-2.76)	-0.002	(-3.93)
Annual Net Fund Flows (% TNA)	-0.125	(-0.56)	-0.287	(-1.35)	-0.575	(-2.74)	-0.105	(-0.45)	-0.056	(-3.02)
Fund Age (Years)	0.000	(0.58)	0.001	(1.61)	0.000	(-0.54)	-0.001	(-1.31)	0.000	(-0.50)
Expense Ratio	0.186	(9.42)	0.086	(4.41)	0.173	(9.76)	0.187	(8.64)	0.014	(7.79)
Fund Turnover	0.000	(-0.71)	0.000	(0.58)	0.000	(-1.76)	0.000	(-1.76)	0.000	(-1.99)
Broker-Sold (=Yes)	-0.120	(-7.32)	-0.061	(-3.73)	-0.087	(-5.81)	-0.084	(-4.71)	-0.011	(-7.10)
Constant	0.056	(0.63)	0.172	(1.95)	-0.175	(-2.22)	-0.306	(-3.32)	0.003	(0.31)
Outcome Regression (Sub-advised Funds)										
Log Family Size	0.017	(2.17)	0.012	(1.54)	0.021	(3.10)	0.011	(1.29)	0.002	(2.51)
Log Fund Size	-0.042	(-4.57)	-0.055	(-6.22)	-0.034	(-4.52)	-0.032	(-3.29)	-0.003	(-2.62)
Annual Net Fund Flows (% TNA)	-0.235	(-0.68)	-0.415	(-1.36)	-0.563	(-2.18)	-0.718	(-1.92)	-0.035	(-0.80)
Fund Age (Years)	0.000	(0.07)	0.002	(1.25)	0.001	(0.96)	0.001	(1.01)	0.000	(-0.95)
Expense Ratio	0.087	(2.93)	0.016	(0.54)	0.116	(4.57)	0.142	(4.77)	0.000	(0.06)
Fund Turnover	0.000	(5.25)	0.000	(4.46)	0.000	(1.17)	0.000	(1.19)	0.000	(-1.38)
Broker-Sold (=Yes)	-0.033	(-1.36)	0.006	(0.25)	-0.022	(-1.20)	-0.041	(-1.70)	0.000	(0.17)
Constant	0.427	(2.12)	0.727	(3.66)	0.061	(0.36)	0.233	(1.14)	0.006	(0.31)

Table 7 – Annual Performance Regression with Treatment Effects (Continued)

	1-Factor Alpha		4-Factor Alpha		6-Factor Alpha		10-Factor Alpha		Inv. Obj. Alpha	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.	Coef.	t-Stat.
Treatment Regression										
Advisor MF Clients (% Clients)	-0.012	(-24.13)	-0.012	(-24.13)	-0.012	(-24.13)	-0.012	(-24.13)	-0.012	(-26.54)
Log Advisor Discret TNA	-0.026	(-6.92)	-0.026	(-6.92)	-0.026	(-6.92)	-0.026	(-6.92)	-0.023	(-6.72)
Fam Expert(Region)	4.974	(10.96)	4.974	(10.96)	4.974	(10.96)	4.974	(10.96)	4.610	(11.04)
Fam Expert(% Fam TNA in Inv Obj)	-1.008	(-11.56)	-1.008	(-11.56)	-1.008	(-11.56)	-1.008	(-11.56)	-0.990	(-12.46)
Family Inv Obj Herfindahl	0.139	(1.56)	0.139	(1.56)	0.139	(1.56)	0.139	(1.56)	0.079	(0.98)
% Family Subadvised	3.968	(87.95)	3.968	(87.95)	3.968	(87.95)	3.968	(87.95)	3.961	(94.64)
Constant	-1.103	(-13.42)	-1.103	(-13.42)	-1.103	(-13.42)	-1.103	(-13.42)	-1.124	(-14.62)
Observations	22,462		22,462		22,462		22,462		25,456	