How have passive portfolio managers fared in the era of the dramatic rise of passive investing?

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Abstract:

Despite the tremendous recent growth in the assets and the number of passively managed mutual funds and ETFs, we find that there has not been a commensurate increase in the number of passive portfolio managers. This has resulted in large increases in the scope of duties for the typical passive manager, as measured by the number of funds, styles, and assets they simultaneously manage. As a result, the fee revenue each passive manager generates has increased substantially over time. Using various proxies for the status of passive managers among their peers in the fund industry, we find results consistent with the view that passive managers have a low prestige job, a stark contrast to their increasing mandates and revenue generation during the era of soaring demand for passive products.

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1. Introduction

The passively managed sector of the mutual fund and exchange traded fund (ETF) industry has experienced enormous growth in recent years, both in absolute terms and relative to the actively managed sector. Within domestic equity, in every year since 2006 there have been persistent net outflows in actively-managed funds (Dannhauser and Pontiff, 2020). As a result, the share of passively managed assets within the domestic equity fund industry has approximately doubled from 18% in 2004 to 38% in 2016. The growth in passive assets has been far from evenly distributed across the industry, however, with most of the flow accruing to a small number of families. Thus, a related trend is the sharply increasing consolidation and concentration within the asset management industry. According to the 2020 Investment Company Institute Fact Book, the five largest families had a 35% market share of mutual fund and ETF assets in 2005 and a 53% market share in 2019. In particular, three families known for their dominance specifically in passive investing are commonly referred to as the "Big 3," namely BlackRock, Vanguard, and State Street Global Investors.

Big 3 families have recently received a lot of attention not only in the popular press but also in academic studies because their substantial market share gains in the asset management industry has led to concentrated trading and equity ownership in portfolio firms. As a result, passive management has in turn received more academic attention, primarily regarding the corporate governance or market efficiency implications for portfolio firms. For example, high concentration of equity ownership among a small number of families has led to a concern that product market competition will decline if the same owners have significant equity stakes in most of the competitor firms in an industry (e.g., Azar, et al (2018)). Many studies are concerned with the corporate governance and shareholder voting implications of the large percentage of votes controlled by a few institutions (e.g., Bebchuk and Hirst, 2018; Boone, et al, 2020; Heath, et al, 2019, among others). Other studies focus on the implications for stock price efficiency, volatility, and stock price fragility of a large amount of ownership and trading concentrated among a small number of market participants (Ben-David, et al, (2020); Massa et al, (2020)). Ben-David, et al (2020) provide evidence that stocks with greater ownership by the very largest institutional investors have higher volatility and noisier stock prices, as well as greater fragility in times of

crisis, and that these effects are much stronger among stocks held by large passive funds than among stocks held by large active funds.

Unlike these papers that focus on the implications of asset management industry concentration, we are interested in better understanding the fund operations of large families. In particular, little attention has been given to the labor market side of managing passive portfolios. Most studies of mutual funds and mutual fund managers focus exclusively on active management and delete index funds altogether. As a result, we know little about passively-managed funds and how passive managers might systematically differ from active managers in the nature and scope of their duties and their status among their peer managers, as well as how this might have changed over time with the growth in demand for passive products. Our study is a first step toward better understanding who have been the winners and losers resulting from these massive industry trends.

Our approach is to focus our analysis at the portfolio manager level, an understudied unit of observation in the mutual fund literature. Specifically, for the Top 35 fund families in CRSP ranked by 2005 domestic equity mutual fund and ETF assets, we collect manager level information directly from SEC filings. We use the CRSP and the Morningstar Direct mutual fund databases for a variety of mutual fund, ETF, manager, and family data from 2005 to 2016. Using detailed data on over 2000 unique managers who manage both active and passive mutual funds or ETFs on behalf of the Top 35 largest families in the industry, we explore how the job of a passive manager differs from that of an active manager, and how passive managers have fared over this period using a variety of measures, including some new to the literature.

One view of passive management is that an index fund is a commodity product, priced like a commodity, with managers treated like replaceable and interchangeable parts. This implies that passive management is a low prestige job that does not require skill, and that the substantial rise in indexing has primarily benefited the firms that employ these managers, especially the Big 3 families. Under these assumptions, one might expect families to hire the most prestigious managers with undergraduate and advanced degrees from top-ranked universities only for active funds and find the cheapest managers possible for index funds. This view suggests that managing index funds requires neither much skill nor the network that fellow alumni from prestigious schools can offer.[4]

[4] The networks of fund managers examined in the literature such as corporate board members for stock picks (Cohen et al 2008) and underwriters for IPO allocations (Hwang et al 2018) aren't helpful to an index manager.

This would keep costs down at index funds, resulting in greater firm profits, but few benefits or status for passive managers.

An alternative view is that passive indexing does require skill and that there is measurable cross-sectional variation in index "abnormal" performance (Crane and Crotty, 2018). In addition, indexing has regularly benefitted from innovations like smart beta funds (Indexing 2.0) and investable indexes based on big data with dynamic weights (Indexing 3.0), which imply that this sector contains more than commodity-like products.[5] Easley et al (2020) and Cheng et al (2019) argue that passive ETFs are actually managed quite actively in terms of active share and portfolio tilts like smart beta. Easley et al describe smart beta funds that track a passive index as "active in function meaning they are used by investors as building blocks of active portfolios." Thus, it is possible that skilled passive managers look like, and are rewarded very much like, skilled active managers. In addition, a small fee on very large assets can add up to large rewards. Because assets in the passive sector are orders of magnitude larger than the active sector, manager compensation for passive managers can potentially be as large or larger than that for skilled active managers. In short, managers can enjoy a high status and be compensated well in this sector due to the massive economies of scale inherent in passive investing, the rapid pace of innovations, and the skill required to execute index replications that minimize tracking error effectively.

Overall, through a variety of measures, we find evidence consistent with the first view of passive managers as the low-cost blue-collar equivalents of the fund industry. We begin our analysis by confirming that our sample reflects the dramatic growth in the passive sector in terms of assets under management (AUM) and the number of funds, and the significant market share gains by the Big 3 families, by using the full CRSP sample of domestic equity mutual funds and ETFs from 2005 to 2016. On average over this period, the Top 35 (Big 3) families in our sample have a 68% (7%) market share in active assets and an 89% (73%) market share in passive assets, suggesting our analysis captures a large amount of industry activity overall, and especially within the passive segment.

Despite passive sector AUM growth of over 300% over this period, we find that the number of passive managers employed by the Top 35 families did not increase commensurately, and

[5] See Julie Segal's "The R&D Hustle" *Institutional Investor* March 2018 page 23.

actually decreased for the Big 3 families. The massive growth in the passive sector did not lead to additional labor market opportunities for passive managers. We also uncover some generalities about managers in each sector. We find that active and passive managers tend to invest either exclusively actively or exclusively passively over their entire careers as a portfolio manager, suggesting that they possess different skill sets. However, we find that about 5% of managers in the Top 35, and 10% within the Big 3, are a hybrid type of manager who invest in both active and passive assets simultaneously. We provide some evidence that these hybrid managers fit a description of what is commonly described as "quant" or "systematic" managers.

Consistent with large AUM growth combined with little change in the number of managers across the passive sector, we find evidence that the scope of a typical passive manager's duties increased significantly in the era of passive indexing. We find the most striking differences in the scope of duties between active and passive managers when we use the Morningstar Direct database and SEC filings to comprehensively measure the number of funds, the number of styles, and total AUM that a manager simultaneously manages across all asset classes and clienteles. Through mandatory disclosures in SEC filings, we collect the reported AUM for each manager in our sample across all of their account types, including those outside the mutual fund and ETF industry, such as hedge funds or separate accounts intended for large institutional clients. We find economically and statistically significant increases in AUM per passive manager, revenue per passive manager, and funds per passive manager, suggesting that their families responded to the increased demand by allocating more assets and funds to the same managers.

While average total AUM per manager and revenue per manager grew 100% or more for passive and hybrid managers, they grew 6.3% or less for active managers in the Top 35, and the cross-sectional differences in scope across manager types are large. For example, we find that in 2011-2016 the average active manager managed a total of $5.2 billion and generated revenue of $35.2 million on a per manager basis, while the analog for the average passive manager is $69.4 billion and $98.7 million. Over this same period, the average active manager managed 4.6 funds with 2.9 distinct prospectus benchmarks in the full universe, while the average passive manager managed 33.6 funds with 30.6 distinct prospectus benchmarks. This implies that the typical passive manager is tracking almost as many unique benchmarks as funds, many of which fall outside of the domestic equity universe.

Given that the typical passive manager is tracking over 30 different indexes simultaneously, we explore what this implies for how the work is organized across a team. We find that the growth in team size previously documented in the literature for active managers is more pronounced for passive managers. For example, by 2016, 42% of passive funds have large teams of 4 or more managers, compared to 27% of active funds. Similarly, only 4.3% of passive funds have a single manager in 2016 versus 23% of active funds. Using a measure of how many unique team members a manager interacts with across all of their funds, we find that passive managers interact with 2.4 unique other team members on average, while active managers interact with 5.7 unique team members, significantly different at the 1% level. Together, this suggests that passive managers tend to be in stable teams that collectively manage a large number of portfolios together.

While the job of a passive manager clearly does not require advantages in IPO allocations or private information, trading skills and operational efficiency on a large scale might require high-ability managers, as the findings of Crane and Crotty (2018) that some index funds are better than others suggest. However, consistent with the view that index funds are produced in teams where each member has a relatively narrow task or skill set, we find that a standard proxy in the literature for unobserved manager ability, the average SAT score of the university the manager attended, is predictive of fund performance in active funds, but not in passive funds. Given this finding that a traditional measure of an individual manager's contribution to fund performance does not reliably contribute to performance, and given the commodity-like pricing within the passive sector, we might expect to find that families staff their index fund teams with "cheaper" managers. Using traditional measures of manager characteristics from the literature, we find support for this. Specifically, we find large differences in the attainment of graduate degrees or education from elite universities that signal high ability and advantageous connections to fellow alumni on Wall Street and Main Street. For example, we find that the percentage of active managers who have an MBA degree, or attended either an elite undergraduate or graduate university, is 57.1% and 26.7% respectively, close to previous estimates for active managers in the literature. In contrast, only 40.6% of passive managers have an MBA and only 6.9% graduated from an elite institution. We also find a statistically significantly higher proportion of women and ethnic minorities among passive managers relative to active managers, especially within the Big 3 families, on the order of nearly 20 percentage points.

To test whether the status of passive managers improved in the era where the demand for passive products is strong and average revenue per passive manager has doubled relative to the first half of our sample, we use two measures new to the fund literature. First, using official job titles from SEC filings that place managers within the hierarchy of their fund family, we show that active managers are associated with higher-status titles compared to passive managers, controlling for AUM, industry experience, education, and other variables. Moreover, there is no evidence of improved status in the high-growth era. Second, using estimates of manager income from data obtained from fund managers' mortgage applications, we find that active managers are paid as much as 53% higher compared to passive and hybrid managers, controlling for their titles, experience, and other characteristics. The evidence consistently supports the view that passive managers have a low prestige job, despite their increasing mandates and revenue generation.

Through the use of novel data and measures, we make several contributions to the literature. We are among the first studies to examine labor market implications for passive managers, especially considering the enormous growth in demand for passively managed assets. We show that inferences on the scope of a typical manager's duties change if one considers only the domestic equity universe and only the mutual fund or ETF industry. The change in inferences is especially dramatic for passive and hybrid managers relative to active managers because of their tendency to manage many products and assets outside of domestic equity or beyond a retail clientele. Overall, our evidence suggests that passive managers are not benefitting from the dramatic rise of passive management in a way that we can measure. This suggests that benefits are accruing to fund families and possibly even to the active managers within those families. Given that family profits are a major determinant of manager compensation (Ibert, et al (2018); Ma, et al (2019)), it is certainly possible that active managers within families with large passive assets have benefitted from this growth.

2. Data and the industry setting

2.1. Data collection

To construct our sample, we include all domestic equity mutual funds and exchange-traded funds available in the *Center for Research in Security Prices (CRSP) Survivor-Bias-Free U.S. Mutual Fund Database* from 2005 to 2016 that are offered by the Top 35 fund families, ranked by

total assets of domestic equity funds under management, as of March 31, 2005. We identify domestic equity funds by relying on Lipper objective codes (CA, EI, G, GI, I, MC, MR, SG, and SP) in CRSP. We merge this sample with *Morningstar Direct.*[6] We add funds as these 35 families start new funds or acquire existing funds from other families during the sample period, and retain funds until they liquidate or are acquired by a family outside of our sample. Within the Top 35 families, we are interested in the three families commonly referred to as the "Big 3", namely Blackrock, State Street Global Advisors, and Vanguard, and thus break them out separately in several sub-sample analyses. We include both Blackrock and Barclays Global Investors in this category throughout the sample period even though they were separate entities prior to 2009. As we will later show, the Top 35 families account for about 70% of domestic equity industry assets, and nearly 90% of passive domestic equity industry assets.

We primarily use filters in the CRSP Mutual Fund Database and in Morningstar Direct to classify all domestic equity funds as either mutual funds or ETFs, and also to classify each fund or ETF as either passively-managed or actively-managed. Appendix A contains finer details on the classifications we use in the paper. We classify a fund as an ETF if the CRSP variable et_flag is equal to 'F'. We classify a mutual fund or ETF as passively-managed if the CRSP index_fund_flag is equal to 'D' or if the Morningstar index_fund flag is equal to 'Yes,' indicating a "pure index fund". In cases where the CRSP index_fund_flag is equal to 'B', where CRSP and Morningstar disagree, or where the fund name contains strings associated with benchmark indices (e.g., S&P), we classify the fund by manually checking the description in the prospectus and question 69 in the N-SAR filing where funds self-identify as an index fund. We identify enhanced index funds, using the CRSP index_fund_flag equal to 'E' and the Morningstar enhanced_index equal to 'Yes'. This category indicates that the fund or ETF is allowed to hold only a subset of the index they track, or that their goal is to opportunistically deviate from the index to enhance performance. However, due to the very small number and small aggregate asset size of enhanced index funds, we pool them together with pure index funds and label them both as passive. We have

[6] We first use fund cusip and then fund ticker to merge the two datasets. For the remaining unmatched share classes, we use fund names, TNA, and return series to find viable matches.

1484 unique mutual funds and 170 ETFs in our sample, 278 of which are classified as passive and 1356 as active.[7]

Since our primary interest is in portfolio managers, we obtain various data on fund managers from the Statement of Additional Information, which is a required supplementary document to the fund's prospectus filed with the SEC (form N-1A with form type 485BPOS or 485APOS). The SEC requires all funds to report this information every fiscal year starting with filings after February 28, 2005. In order to match CRSP mutual funds to their corresponding SEC filings, we obtain the links to fund prospectuses through quarterly indexes provided by the SEC. The matches are implemented based on exact name or ticker matches.[8] For any remaining unmatched funds, we identify close name matches and manually verify accuracy. We successfully match 97% of the CRSP funds in our sample.

For each fund-year observation, we hand collect the names of all portfolio managers "responsible for the day-to-day management of the fund" as required by the SEC and reported in the filings. We provide a sample filing in Appendix B. For each manager-fund-year observation, we record the number and assets under management of other accounts concurrently managed, both of which are required by the SEC to be put in one of three categories: registered investment companies, pooled investment vehicles, or separate accounts.[9] We also record the effective date at which the information on accounts managed is applicable, which corresponds to the fund's fiscal year-end. Due to the non-standardized nature of the account disclosures within mutual fund regulatory filings, we can most accurately collect data by fund family.[10] Registered investment companies typically mean mutual funds or ETFs, but they could be funds managed for the fund

[7] 20 Vanguard funds are classified as both mutual fund and ETF because they have share-classes structured as both ETF and open-end mutual funds.

[8] Available at https://www.sec.gov/Archives/edgar/full-index/. Since February 6, 2006, the SEC requires mutual funds to include tickers in their filings. We use a computer script to obtain tickers directly from the SEC Edgar website. Note that even though the SEC provides a listing of fund tickers on its website, this listing does not contain historical data.

[9] The exact wording used by the SEC is "other accounts," but we call them "separate accounts" to better define the nature of these other accounts and differentiate them from the other categories of assets used by the SEC, i.e., registered investment companies and pooled investment vehicles.

[10] Hand-collection by family results in the most accurate data due to differences across families in reporting conventions. For example, some families report information on a manager's "other assets" in easy-to-collect tabular form, while other families report this information in text form, including in footnotes. In addition, some families include the fund itself in asset totals, while other families exclude the fund's TNA. Collecting the data by family minimizes omissions and errors due to families' tendencies to use the same format for all of their funds. We also employ numerous data checks that give us a high degree of confidence in the integrity of the data.

family or managed on behalf of another family through a sub-advisory contract, or as the underlying funds in variable annuity contracts. Pooled investment vehicles include hedge funds, but can also include commingled trusts or funds managed for sale to investors outside the U.S. Separate accounts are typically managed on behalf of large institutional clients such as pension plans, insurance companies, and foundations. The SEC-required categories allow us to paint a comprehensive picture as to the nature of the assets each manager controls (possibly jointly with other managers as part of a team). We use this information to measure a manager's scope of duties, which we describe in more detail in Section 3.2. To our knowledge, we are the first study to have a reasonably accurate measure of all of a manager's AUM across all clientele account types. For additional details on the types of manager assets disclosed in these filings see Del Guercio, Genc, and Tran (2018).

2.2. The rise of passive index management: Industry trends

We begin by comparing our sample of the top 35 families, and within those, the Big 3 families, to the aggregate numbers in CRSP for diversified domestic equity funds from 2004 to 2016. Table 1 lists the total assets under management at each year-end for both mutual funds and ETFs, disaggregated into passively-managed and actively-managed assets using the fund-level definitions in the previous section. The aggregate CRSP numbers are very close to those reported in Table 1 of Ben-David et al (2017), and the strong trends noted there and elsewhere are evident in the table. For example, the sharp rise in passive assets and the relative decline in active assets is confirmed given that passive mutual funds and ETFs represent 18% of industry assets in 2004 and more than double to 38% of industry assets in 2016. This pattern is consistent with actively-managed funds' persistent net outflows in every year from 2006 onward (Dannhauser and Pontiff, 2020; 2020 ICI Fact Book p. 46). Passive ETFs grew seven-fold over this period to $1.2 trillion in 2016, and begin to rival the assets in passive mutual funds ($1.98 trillion). In contrast, active ETFs have remained a small segment of the market throughout the period.

The aggregate trends are generally mirrored in the Top 35 and Big 3 families, except that the Big 3 families have larger growth rates in assets in both the passive and active segments than either the Top 35 families as a group or the industry as a whole, as reported at the bottom of Table 1. The relative success of the Big 3 families is consistent with both increased industry concentration and potential flow spillovers from passive to active assets within families (i.e.,

passive assets as a loss leader). For example, in 2018 Fidelity introduced four passive index funds with zero management fees. News reports suggest that offering free passive funds was a strategy to reach new investors flocking to the index funds of Fidelity's competitors, with hopes that they would invest in higher-margin active products as well.[11] Various editions of the ICI Fact Book report that industry concentration, especially among the largest families, was stable since 1985 but began to trend upward around 2009. For example, the market share of the top five families was no higher than 37% between 1985 and 2005, but is 53% in 2019 (2020 ICI Fact Book p. 46). Within the passive universe, increased industry concentration is even starker. Figure 1 shows that on average from 2004 to 2016, the Top 35 (Big 3) families in our sample have a 68% (7%) market share in active assets and an 89% (73%) market share in passive assets. This also suggests that our analysis is capturing a large amount of industry activity overall, and especially within the passive segment.

The success of the Big 3 in attracting both passive and active assets is evident in the change in overall market share from 2004 to 2016. Figure 2 reports Big 3 shares as a percentage of industry AUM (market share) and as a percentage of industry aggregate revenue (revenue share). Revenue is defined as the percentage annual expense ratio times fund total net assets, aggregated across all domestic equity funds and ETFs. It is well known that expense ratios tend to be very low for passive products, so it is not obvious that a high market share translates to a high revenue share for families with very large passive assets. Indeed, the average expense ratio across passive funds or ETFs of the Big 3 equal 20 basis points. Consistent with the ICI Factbook data on increased industry concentration, the Big 3 domestic equity overall market share increased from 16.7% in 2004 to 34.1% in 2016, while revenue share doubled from 4.3% to 9.9%. Thus, by any measure the Big 3 families successfully gained significant market share over competitors over this period.

Given the focus of this paper on the labor market, Table 2 provides the number of active and passive managers in the Top 35 and Big 3 families over time. Note that we include all managers who manage funds marketed to the public by the Top 35 families. This mainly includes managers directly employed by these families, but also includes unaffiliated subadvisers employed by other firms, who contract with the Top 35 families to provide portfolio management services.

[11] See *Financial Advisor* magazine for an interview with Abby Johnson of Fidelity by Margaret Collins and Charles Stein: https://www.fa-mag.com/news/abby-johnson-prepares-fidelity-for-a--22-trillion-shift-to-women-41957.html

While Table 2 uses the same universe of mutual funds and ETFs used to report aggregate assets for these families in Table 1, we identify each fund's managers based on SEC filings, resulting in fiscal-year end timing.[12] For example, the first row reports that 64 unique managers managed any passive fund or ETF with a fiscal-year end in 2005 (as a solo-manager or part of a team). More finely, 64 unique managers managed any passive mutual fund and 16 managed any passive ETF in 2005. Not surprisingly, the number of ETF managers increased as ETF assets increased over time. It is noteworthy that on average 22% of passive managers in the Top 35 and nearly 50% of passive managers in the Big 3 simultaneously manage passive mutual funds and passive ETFs, suggesting it is reasonably common for passive managers to manage both vehicle types. The same is not true for active managers, who rarely manage ETFs during our sample period.

Overall, we find that the Top 35 families employ 856 active managers per year on average, which represents approximately 28% of all industry active managers over this period, using manager data from Morningstar Direct for the CRSP domestic equity fund universe. Similarly, the Top 35 employ 70 passive managers per year on average (approximately 31% of all passive managers). The corresponding averages for the Big 3 is 94 active managers and 20 passive managers per year, which represents on average 3% of active managers and 8% of passive managers in the industry. Putting these numbers in perspective, in 2015 the Big 3 managed 74.1% of passive domestic equity industry assets by employing only 7.3% of passive industry managers, suggestive of large economies of scale in passive management.

Figure 3 reports growth rates in assets, number of funds, and number of managers from 2005 to 2015. When viewed side-by-side, it is clear that within either the Top 35 or the Big 3, passive assets have quadrupled and the number of passive funds or ETFs approximately doubled over this period, but the number of managers increased at most 18.8%. This pattern contrasts with the active segment, where growth in assets, funds, and number of managers is more similar across these measures. In fact, in the Big 3 families the growth in the number of active managers is much larger (59.2%) than the growth in the number of passive managers (-10%), despite the much smaller growth in active assets. This suggests that the strong growth in the passive sector did not

[12] Due to the fiscal-year end timing of the effective dates for manager data, we use, but do not separately report, the number of managers in 2004 and 2016 in the tables because these represent partial years of data. For example, a full year of filings released in 2005 would contain funds with fiscal-year ends in both 2004 and 2005, but the 2004 sample would only be those funds with FY-ends in 2004 and release dates in 2005.

result in increased labor market opportunities for passive managers. As we will show in the next section, these patterns are suggestive of economies of scale and an increase in the scope of a manager's duties in passive management, whereby assets per manager and funds per manager grow over time.

3. Characterizing the labor market environment and scope of manager duties in active versus passive management

3.1. Definitions of active versus passive managers over managers' careers

To investigate changes in the scope of a typical manager's duties over time, we need to first determine how best to quantify which type of assets they tend to manage over their careers. In Table 2, a passive manager-year is defined as a manager who manages at least one passive fund or ETF that year, and an active manager-year is defined similarly. What is not revealed in those numbers is whether there is any overlap in these types whereby some managers simultaneously manage both active and passive assets, or whether managers tend to stay within one segment over their entire career. Table 3 addresses these questions. Note that in the remainder of the paper we pool mutual funds and ETFs within passive and also within active for ease of exposition.

We define a manager as active if they *exclusively* manage active funds or ETFs in 85% or more of the years of their career as a portfolio manager during our sample, and we define a passive manager analogously using the 85% threshold. This definition is intended to capture both whether the manager narrowly manages within one asset type, and whether they tend to stay within one type over their entire careers.[13] All other managers are put into a third hybrid category, which contains managers who either tend to manage both passive and active assets simultaneously, or their career years are more evenly divided between exclusively active or exclusively passive management. Table 3 reports the distribution of the 2,060 unique managers in the Top 35 families and the 259 in the Big 3 families using these categories, as well as the average percentage of career years managing active versus passive assets. We find that 1,865 (207) managers in the Top 35 (Big 3) fit the active manager definition and 96 (26) managers fit the passive manager definition. The

[13] There are only 4 managers who exclusively manage either passive or active assets between 86% and 100% of their career years (3 passive and one active), so most managers in these two categories are at 100% of career years, indicating that asset type is stable across these managers' careers.

consistency in type of assets managed for these managers is evident for both sets of families in the table, whereby the passive managers have 99% of their career-years managing exclusively passive assets, and the active managers have 100% of career-years managing exclusively active assets.

The 99 "hybrid" managers appear to be truly hybrid in the types of assets they manage, in that they manage both active and passive asset simultaneously in the majority of their career years during our sample, and manage either active assets or passive assets exclusively in less than one-quarter of their career years. Overall, they manage active assets in about 82% of years and passive assets in about 77% of years. This group contains a small number of "switchers" who manage only passive assets in some years and only active assets in others. We show some evidence later consistent with hybrid managers tending to be what is known as "quant" or "systematic" managers who pick stocks based on algorithms, often using factor-based strategies. Overall, we find that 4.8% of Top 35 managers and 10% of Big 3 managers are classified as hybrid. This implies that the vast majority of managers exclusively manage one type, suggesting that active and passive management are two distinct segments of the industry, requiring different skill sets.

Overall, we find that these three mutually exclusive categories describe a manager's type reasonably well over their careers, as the average number of active funds that a passive manager manages, and the average number of passive funds an active manager manages is approximately zero. We arrive at the same conclusion if we measure average active AUM and average passive AUM of managers instead of funds. We will use these categories throughout the remainder of the paper, but we also conduct all of our tests using the year-by-year definitions of manager asset type for robustness. For simplicity, in the remainder of the paper we will refer to managers who exclusively manage passive assets over their careers as simply "passive managers", and similarly for "active managers".

3.2. Measuring the scope of active vs passive vs hybrid managers' duties

3.2.1. Quantitative measures of the scope of manager duties

In section 2.2, we show the dramatic growth in the passive sector of the fund industry in absolute terms and relative to the active sector, yet we did not see a commensurate growth in the number of passive managers (Figure 3). This suggests that the scope of manager duties in this sector is likely changing over time, which we investigate by dividing our sample period in half to

include the 2005 to 2010 and 2011 to 2016 sub-periods, and comparing measures of scope across these periods. As indicated in Table 1, passive sector growth was particularly strong throughout 2011 to 2016. Thus, we are interested in both differences within one manager type across the two sub-periods and differences across manager types.

We measure the scope of managers' duties using traditional measures that capture the number of funds they simultaneously manage, the number of styles or asset classes, the amount of assets they manage, and the fee revenue they generate. The top half of Table 4 Panel A reports averages across managers for these measures for the three manager categories in both sub-periods using our main domestic equity sample. We include the total number of funds and total AUM, but also report these measures broken down into active and passive funds and assets. To measure the number of distinct styles, asset classes, or objectives a typical manager manages, we report the number of distinct Morningstar categories, Lipper objective categories, and prospectus benchmarks. We report the results of two-sided t-tests comparing means across sub-periods within each manager type in Panel A.

The scope of manager duties has generally increased over time across all three manager categories. For example, the number of funds a passive manager simultaneously manages in a given year increases from 5.6 to 7.0, while it increases from 2.2 to 2.6 for active managers. Berk et al (2017) report 2.3 and 2.5 funds per active manager in 2008 and 2011, which matches our estimate quite closely. Note that the difference in means across sub-periods is not significantly different from zero for the passive managers, but the much smaller difference is significant at the 1% level for active managers, potentially due to the small sample sizes for passive managers. Measures of the number of domestic equity styles as measured by distinct Morningstar, Lipper, and prospectus benchmark categories similarly show increases for both types, but again is only significantly different between the two sub-periods for active managers.

We find large increases over time in AUM for the average passive manager that nearly triples from $10.3 billion to $30.8 billion, which is significantly different at the 5% level. Note that we measure a manager's AUM by aggregating the total net assets (TNA) of all the domestic

equity funds or ETFs offered by the Top 35 families that a manager manages in a fiscal-year.[14] To arrive at a per manager measure of AUM, we adjust for team size by first dividing the TNA of the fund by the number of managers, and then aggregating these values for each manager. Adjusted for team size, we find that the average passive manager's AUM per manager increases from $6.6 billion to $16.4 billion, an increase of 147%.We also find increases over time in AUM for the average active manager, albeit with much more modest magnitudes. The average active manager manages $7.9 billion in 2005-2010 and $11.9 billion in 2011-2016, which is significantly different at the 1% level. The AUM per active manager adjusted for team size increases 26% from $2.0 billion to $2.6 billion, statistically different at the 1% level. Thus, average AUM per manager is not only dramatically different across active and passive managers by several orders of magnitude, the difference in growth rates in average AUM per manager from the first to second period exceeds 100%.

Given the large differences in fees and expenses across active and passive funds that make AUM comparisons less informative, we also compute revenue per manager. We first compute the TNA-weighted average expense ratio reported in CRSP across all of a manager's domestic equity funds (whether as a solo manager or as part of a team), and then multiply the AUM per manager (adjusted for team size) by this expense ratio to estimate revenue per manager. We find that the average active manager's revenue per manager is similar across periods and approximately $18 million, while the average passive manager's revenue per manager increases from $11.5 million to $20.9 million, but neither is significantly different across periods. Within the domestic equity universe, we generally find that the average active and average passive manager generates a similar level of revenue per manager. The $18 million estimate of average revenue per active manager is larger than the $6.2 million average for Swedish active managers reported in Ibert et al (2018), but this is expected given that our sample contains only large families.

Despite the modest sample size, we find that hybrid managers who manage both passive and active assets increase their scope of duties across *all* measures at the 10% level or better. For example, the average number of funds per manager increases from 6.4 to 13.9, significantly different at the 1% level. Consistent with these managers' tendency to manage both asset types,

[14] Thus, we do not count funds managed by unaffiliated subadvisers on behalf of their own families (their employers) or families outside of the Top 35. However, we separately report a manager's AUM across all their funds managed for any family in the bottom half of Table 4 Panel A.

the average number of funds per manager is approximately evenly split across active funds and passive funds in both time periods. The typical hybrid manager increases the number of distinct styles they manage by approximately 2. For example, hybrid managers simultaneously manage on average 3.8 distinct Lipper categories in 2005-2010 and 5.6 in 2011-2016, which are significantly different at the 1% level.

Hybrid managers significantly increase their total AUM, passive AUM, and active AUM over time, as well as the corresponding AUM per manager and revenue per manager values, adjusted for team size. For example, total AUM increases from $10.6 billion to $44.1 billion, while total AUM per manager increases from $5.5 billion to $16.7 billion. In addition, average revenue per manager increases from $12.1 million to $22.1 million. All of these increases are significantly different at the 5% level or better, and second-period average estimates represent values two- to four-times larger than the earlier period. This suggests that hybrid managers experienced the largest increases in scope of duties over this period among all types, with exclusively passive managers right behind them. While the typical scope for hybrid managers appears quite similar to passive managers, we will explicitly test for differences across manager types later in this section.

For the same set of 2,060 unique managers in our sample, we are able to more comprehensively measure the scope of their duties through the use of the Morningstar Direct database and through SEC filings. Specifically, for these managers we can measure the number of funds and styles they manage in the full universe of mutual funds and ETFs, and not just confined to domestic equity. Additionally, SEC filings report for each fund manager their AUM across all of their registered investment companies (RICs), pooled investment vehicles (PIVs), and separate accounts (SAs), which can be summed to arrive at a manager's total AUM. Thus, an advantage of our sample is that we have a comprehensive measure of a manager's total AUM across all of their managed assets across all clienteles, as reported in audited SEC disclosures. Appendix A describes how we adjust these AUM disclosures for team size. While we are unable to break these AUM figures down between active and passive assets, we can compare across manager types. We can also use these comprehensive AUM per manager figures to compute an estimate of revenue per manager that includes all assets, including those from clientele account types outside the mutual fund industry. We label this Total (all clientele account types) revenue per manager, and describe its calculation, which involves estimating fees applicable to assets outside mutual funds, in Appendix A.

Using these more comprehensive measures of the scope of a manager's duties we also find that scope has increased over time for each manager type. However, the contrast between active and passive managers is especially stark using the full universe, presumably because it is much more common for passive managers to manage funds outside of diversified domestic equity and manage significant assets outside of mutual funds and ETFs, relative to active managers. For example, in 2011-2016 the average active manager managed 2.6 funds with 1.7 distinct prospectus benchmarks in the domestic equity universe and 4.6 funds and 2.9 distinct prospectus benchmarks in the full universe. In contrast, over this same period the average passive manager managed 7.0 funds with 6.3 distinct prospectus benchmarks in the domestic equity universe and 33.6 funds and 30.6 distinct Morningstar categories in the full universe. In each period, passive managers on average manage almost as many distinct prospectus benchmarks as funds, suggesting that the nature of a passive manager's job duties allows them to efficiently track many different specific benchmarks at once, a concept we explore in the next section. Overall, we find the scope measures for hybrid managers using the full universe of funds look quite similar to passive managers over this same time period. For example, the average hybrid manager manages 30.6 funds with 19.4 distinct prospectus benchmarks.

Using comprehensive measures of manager AUM, we find that *all* clientele account type (RIC, PIV, SAs) AUM measures, including the per manager measures, has substantially and significantly increased for passive managers over time. Moreover, this is also the case for the Total (all clientele account types) revenue per manager. Together, this suggests that inferences change when we consider all of the assets a manager manages across all asset classes and clienteles, instead of just within domestic equity. The average difference across time periods for passive managers is significantly different from zero at the 5% level or better in each of the eight AUM measures and in the revenue measure. With the exception of PIV AUM per manager and Total revenue per manager, we have the same finding for passive managers within the Big 3 families, which we report in internet appendix Table IA.1 for brevity.

The mean AUM for passive managers within the Big 3 are substantially larger than for the Top 35 across all measures in both periods. For example, RIC assets for the Top 35 (Big 3) have increased from $29.6 ($76.5) billion to $69.7 ($149.5) billion, while RIC assets per manager have increased from $17.3 ($43.6) billion to $35.2 ($87.4) billion. Comparisons of Total AUM per

manager once again reveal similarities between passive and hybrid managers, and stark contrasts with active managers, especially in the later period. Passive managers have $69.5 billion in AUM and $98.7 million in revenue, adjusted for team size in 2011-2016 and hybrid managers have $52.5 billion and $93.3 million, while the corresponding number for active managers is only $5.3 billion and $35.2 million. While average Total AUM and revenue per manager grew 100% or more for passive and hybrid managers, they grew 6.3% or less for active managers in the Top 35. We find very similar comparisons across manager types for the Big 3, albeit with larger growth for hybrid managers. In sum, passive managers experienced a large and significant increase in AUM and revenue per manager over time. In all periods, passive managers look quite different than active managers using traditional measures of the scope of duties, but seem much more similar to hybrid managers. Panel B formally tests for differences across the three manager types.

In Panel B of Table 4, we report the results of univariate regressions examining the differences between our three manager types for our measures of scope of duties. In columns (1) and (2), the regression sample includes only active and passive managers and report the coefficient estimate and t-statistics from the regression $Y_i = \alpha + \beta Passive_i + \epsilon_i$. The dependent variable, Y_i, is the corresponding scope of duties measure in each row of the panel, and $Passive_i$ is an indicator variable equal to 1 if the manager is passive. For example, the first row of columns (1) and (2) of Panel B indicates that passive managers on average have 4.5 more funds per manager than active managers, and this difference is statistically significant at the 1% level. We have an analogous set-up for the comparison of passive vs. hybrid managers in columns (3) and (4), and active vs. hybrid managers in columns (5) and (6). Overall, the results indicate that passive managers are significantly different from active managers for all measures of scope of duties, whereas the differences between passive and hybrid managers are *not* statistically significant along most of these measures. The only exceptions are that passive managers have significantly more distinct Morningstar categories and prospectus benchmarks they simultaneously manage relative to hybrid managers, and the domestic equity revenue per manager is not statistically different across passive and active managers.

In sum, it is clear from measures of scope of duties that our sample of active managers matches those in the literature, suggesting a typical active manager manages about 4 funds across even fewer styles, with about $5 billion in all clientele account types' AUM, generating about $37

million in revenue, both adjusted for team size. These measures are fairly stable across time periods. In contrast, both passive and hybrid managers have a larger scope of duties by several orders of magnitude across all of these measures. AUM measures generally show large and significant increases in scope over time for both passive and hybrid managers. Moreover, passive and hybrid managers appear to be quite similar to each other across almost all measures, suggesting that the nature of their jobs is similar. While all of these conclusions hold for both the Top 35 and Big 3 families, the magnitudes for Big 3 passive and hybrid managers in the recent period are quite large.

3.2.2. Team size and qualitative measures of active vs passive manager duties

A traditional description of a passive manager's job is to closely track the performance of a passive benchmark, while staying fully invested and minimizing the associated transactions costs. Crane and Crotty (2019) find evidence of dispersion in skill across index fund managers and find that this skill is persistent over time. Berk and van Binsbergen (2015) find that Vanguard's passive funds on average perform better than other index funds, indicating that Vanguard more efficiently provides diversification services than other providers. A natural question is what exactly do passive managers do operationally, especially the most skilled ones, to accomplish this for 33 funds or $154 billion in assets simultaneously (or 38 funds and $345 billion for the typical Big 3 passive manager)? Our approach to understanding this is a combination of measuring how passive managers are organized into teams and how they interact with other managers within their families. In addition, we examine qualitative information on manager duties from a manager's LinkedIn or Morningstar bios, SEC filings, and from fund family press releases and websites.

Recall that we obtain information on the fund managers responsible for the day-to-day management of each fund directly from SEC filings. Thus, we have precise information on team size for each fund. The literature on mutual fund team size has documented a secular decline in the percentage of active funds with a single manager (Massa et al, 2010; Bar et al, 2011; Patel and Sarkissian, 2017; Harvey et al, 2020). For example, Harvey et al report that the proportion of single-manager active funds has declined from 67% in 1992 to 22% in 2017, while the proportion of teams with four or more managers has increased from 5% to 24% over the same period. In Figure 4 we report the proportion of active and passive funds with single managers, with teams of 2 to 3 managers, and with teams of four or more managers for the Top 35 families.

Figure 4A shows the same trend reported in the literature of the decline in single-manager actively-managed funds. However, it is clear in the figure that this trend is much more dramatic among passive funds after 2011. We find that 23.2% of active funds have a single manager in 2016, compared to only 4.3% of passive funds. Similarly, as shown in Figure 4C the increase in large teams of 4 or more managers is starker in passive funds, as 27.2% of active funds and 42.3% of passive funds have large teams in 2016. We find this trend is similar and slightly more dramatic for the Big 3 families, which we report in Figure IA.1 in the internet appendix. For example, there is not a single passive fund offered by the Big 3 families with a single manager in 2016, and 44.3% of their passive funds have a large team.

Another measure of how the work of passive managers is organized is the number of other managers they serve on a team with within the year. Intuitively, if a passive manager is on the same team with three other managers for all 33 of their funds, they need only interact with these three other people. But, if they are on different teams across their funds, they will interact with a larger number of other managers. To measure the scope of a manager's interactions, we count the number of unique managers they serve on a team with across all their funds. In the 2011-2016 period, we find that passive managers interact with 2.4 unique other team members on average, while active managers interact with 5.7 unique team members, significantly different at the 1% level (not tabulated). Interestingly, the contrast between passive and active is even starker within the Big 3 families, where passive managers interact with 1.6 unique team members on average, while active managers interact with 6.8 unique team members, significantly different at the 1% level. Together, these results suggest that passive managers are much more likely to be on a large team, where the members stay constant across all of a manager's funds. In contrast, active managers are more likely to be in a smaller team, but one whose members vary across funds.

Information from various sources including LinkedIn suggests that typical duties of passive managers include consulting with index providers (e.g., Russell or Standard & Poor's) on index construction, staying abreast of corporate events of constituent stocks (e.g., share issuance, spinoffs), conducting stock trades across many regulatory regimes and account domiciles, managing daily cash flows in or out of the fund, currency trading, and derivatives trading such as index futures (several passive managers are registered members of the National Futures Association). Both Vanguard and Blackrock emphasize their global network of trading desks that

allow them to take advantage of their large scale.[15] Several passive managers list past experience as a trader on their LinkedIn page, while managers at Vanguard in particular list their current position as both portfolio manager and trader. Vanguard also states that "their people specialize in different areas" and that they "periodically rotate their index portfolio management staff across the globe in order to strengthen the breadth and depth of the firm's investment management capabilities."[16]

The picture that emerges on the passive side is that managers specialize in narrowly defined tasks (e.g., stay abreast of corporate events and order the resulting necessary trades), which can be accomplished in a similar manner across many different indexes at once. One senior passive portfolio manager in our sample described her role as "leading global cross functional teams to scale operational processes". It appears that each manager has their role, with operational tasks spread across one stable team of managers across all or most of a passive manager's funds, consistent with our team size and number of interacting managers measures. One interpretation is that passive team members have specialized and complementary skills or duties, each critical toward collectively tracking each benchmark among the many portfolios they manage together.

The explanations in the literature for the secular growth in team size resulting from increased benefits of teams in the active sector do not seem applicable to the passive sector. For example, Patel and Sarkissian (2020) show that peer monitoring within teams is effective in reducing abuses like portfolio pumping behavior, relative to single-manager funds. Fedyk et al (2020) show that team decisions display significantly less evidence of the detrimental effects of manager overconfidence bias relative to single-manager funds. Finally, Harvey et al (2020) argue that the growth in team size is a response to diseconomies of scale in active asset management. They find that teams, especially teams with members who have diverse experience with different asset classes, display decreasing returns to scale at much higher AUM levels than single-manager funds, which they attribute to the fresh investment ideas that an additional manager brings to a team. Although they do not use this measure, our result that active managers interact with a greater number of other managers than passive managers fits a story where fresh ideas from new member

[15] See for example "Day in the Life of a Vanguard Trader" (5/23/18) currently on their website: https://www.vanguardjobs.com/career-blog/2018/05/23/vanguard-trader/

[16] See the previous footnote reference and also: https://pressroom.vanguard.com/news/Press-Release-Vanguard-Appoints-New-Portfolio-Managers-To-Flagship-Index-Funds-113017.html

interactions are beneficial. While none of these explanations seem applicable to passive managers, testing for the underlying driver of the pattern for passive managers is beyond the scope of this paper. Given what we are able to discern from qualitative sources, however, our evidence is consistent with passive teams that are stable across funds and comprised of members with complementary, specialized skills that can be applied in a similar way across many portfolios.

Overall, our findings suggest large economies of scale in the assets managed by passive and hybrid managers. Families such as those in the Big 3 that have experienced large increases in demand for passive and hybrid products have responded by allocating greater assets and funds to the same managers rather than hiring more managers, and organizing these managers into stable teams. The consequence is the greatly increasing AUM and revenue per manager for both passive and hybrid managers. These patterns are consistent with operational efficiency at these firms, which likely contributed to their ability to gain significant market share over competitors during the period of increased demand for passive products.

3.3. Manager status within their families: active vs passive vs hybrid managers

Based on our results, one can view a passive or hybrid manager as playing a critical but smaller role in the management of each fund relative to active managers, with the functioning of the team potentially being more important than the individual ability of any one manager. Given the very large number of funds and AUM per manager typical in the passive sector, however, this could aggregate to a substantial and important contribution to firm revenue. Another view is that passive managers have a narrow and easily replaceable skill set that does not command much status or pay, relative to the skills in short supply and prestige commanded by active managers. In this section, we will use some traditional measures of manager characteristics in the mutual fund literature as a first step to explore this. In addition, we will also introduce some new data on official titles from SEC filings to measure a manager's status within their family, and how this differs by manager type.

3.3.1. Manager characteristics of active versus passive vs hybrid managers

Many studies in the mutual fund literature have explored manager's personal characteristics such as education or experience as proxies for either unobservable ability or valuable connections. Since Chevalier and Ellison (1999), the literature has considered the selectivity or the prestige of the university attended by a manager, as measured by average SAT

score or SAT percentile of its attendees, as a proxy for ability or skill. Several studies have reported a robust positive relation between active manager performance and the average SAT score of the university a manager attended, with the interpretation that higher ability managers perform better.[17] Other papers provide evidence that the educational networks of alumni of elite universities can also be a proxy for a manager's connection to individuals in a position to bestow advantages when it comes to IPO allocations (Hwang et al 2018) or private information (Cohen et al 2008). The job of a passive manager, however, does not require advantages in IPO allocations or private information, and also may not require an elite education. On the other hand, trading skills and operational efficiency at a massive scale are important in this sector, which may also require high-ability managers, as Crane and Crotty (2018) suggest that some index funds are better than others. We explore this in Table 5, which reports panel regressions of monthly fund performance measures on manager characteristics using a specification common in the literature. We obtain a manager's undergraduate university, graduate university, majors, and years of graduation when available from fund prospectuses, Morningstar, LinkedIn, family websites, Capital IQ, or Bloomberg. We use standard definitions used in the literature for these variables, which we describe in detail in Appendix C.

We regress gross fund performance in a month on the standardized average SAT score of the fund's managers in the previous month and its interaction with the passive fund indicator. The interaction term captures the differential impact of average SAT scores on future fund performance for passive funds in our sample. We use three different performance measures: (1) excess return of the fund, (2) four-factor alpha, and (3) DGTW-adjusted fund return. Excess return is simply the return of the fund minus the risk-free rate. To compute four-factor alphas, we first estimate factor betas using rolling regressions of 24 months. In each month, four-factor alphas are computed as the difference between a fund's excess return and the benchmark return, which is the sum of estimated betas times each factor realization. Finally, we follow the procedure of Daniel et. al. (1997) to create benchmark portfolios consisting of firms in the same size, market-to-book ratio, and momentum quintiles and adjust each stock return with the return of its assigned benchmark. DGTW-adjusted fund return is then the weighted average of the benchmark-adjusted returns of its

[17] In addition to Chevlier and Ellison (1999), see Christoffersen and Sarkissian (2009), Li et al (2011), and Chuprinin and Sosyura (2018).

holdings.[18] We include various manager and fund level control variables in our regressions. In particular, we control for the percentage of managers with MBA and PhD degrees and managers that hold an undergraduate or graduate degree from a connected university, using the definition of Hwang et al (2018). We use the logarithm of fund age and size, fund turnover, and expense ratios as fund-level controls. Finally, our regressions include time and style fixed effects with standard errors clustered at the fund level.

We find a positive and statistically significant relation between average SAT scores and future performance for active funds, consistent with the prior literature. One standard deviation increase in the average SAT score (approximately 100 points) corresponds to a 19 to 29 bps increase per year in performance. In contrast to active funds, average SAT scores are not associated with higher future performance for passive funds. The p-value for a Wald test of the sum of the coefficients for the stand-alone term *SAT score* and the interaction term *SAT score * Passive* is not statistically significant for five out of six specifications.

Given this finding that passive funds with managers who graduated from higher-tier universities do not have better performance, we might expect families to favor passive managers who come from lower-tier schools. To the extent these managers have lower ability, less extensive professional networks, or fewer outside options, they should be relatively cheap for families to hire and retain. Given the commodity-like pricing in the passive segment, it might be expected that cheaper managers are sufficient and more profitable for the families, especially if individual passive manager skill does not contribute to fund performance. Thus, we expect this sector to be staffed by "cheaper" managers.

We explore this in Table 6, which reports average time-invariant manager characteristics across our three manager types for both the Top 35 and Big 3 families, along with the results of two-sided t-tests for differences in characteristics across types. Overall, we find averages for active managers for our sample that closely match those reported in the literature, and we find significantly different characteristics for passive managers, suggestive of cheaper and lower-cost managers. For example, we find that 57.1% of active managers have an MBA degree, while Chevalier and Ellison (1999) and Chuprinin and Sosyura (2018) report a similar rate of 60%. In

[18] We obtain the fund holdings from Thomson Reuters mutual fund holdings data and match it with CRSP fund dataset using MFLINKS files available in WRDS.

contrast, only 40.6% of passive managers have an MBA, an economically significant difference from active managers that is also statistically different at the 1% level. Within the Big 3, the percentage of passive managers with an MBA is also substantially lower, but it is not significantly different from active managers. Similarly, we find 4.7% of active managers have a PhD (Chuprinin and Sosyura report a rate of 4%), while only 2.1% of passive managers do, although the difference is not statistically significant in either sample of families.

Measures of elite educations or potential connections to Wall Street or Main Street networks show a similar pattern. We find the average active manager has an undergraduate degree from an institution with an average SAT score of 1267.6 or the 82nd percentile, using the 2003 edition of the US News and World Report, which is very similar to the 82.5 percentile average for active managers reported by Chuprinin and Sosyura. In contrast, we find an average 62.5 points or 6.6 percentile points lower values for passive managers (at 1205.1 and 75th percentile), both significantly different from active managers at the 1% level. Within the Big 3, the results are similar, but the magnitudes of the SAT score and percentile differences between passive and active managers are almost twice as large and statistically significant at the 1% level. Figure 5 reports a histogram of the SAT score distributions for passive and active managers for the Top 35 and Big 3 separately. It is evident in the figure that active managers tend to come from more elite institutions. We find very similar differences if we use the 1993 edition of a different college guide to obtain SAT scores.

Table 6 also reports measures of advantageous educational networks across manager types. We report two definitions from Hwang et al (2018), who study the connections between IPO underwriting executives and portfolio managers and report the 10 universities with the greatest number of alumni connections across these two groups. They also use a measure of the top 10 elite universities as ranked by average SAT score from 2001 to 2008.[19] We find that the percentage of active managers who attended either an elite undergraduate or graduate university is 26.7% versus 6.9% for passive managers. Similarly, we find that 43.3% of active managers attended a

[19]The top 10 connected universities in order of number of connections are Harvard, Columbia, Penn (Wharton), Chicago, Stanford, Yale, NYU, Princeton, Dartmouth, and Duke. Note that there is an exact overlap between the top 5 connected institutions in Hwang et al (2018) and Cohen et al (2008). The top 10 elite universities are Cal Tech, Harvard, MIT, Princeton, Yale, Pomona, Stanford, Dartmouth, Swarthmore, and Columbia, with six universities appearing in both groups.

"connected" undergraduate or graduate university, compared to 17.4% of passive managers. The averages are significantly different at the 1% level for both measures, consistent with underwriter connections and elite educations being unnecessary for success in passive management. We find the same patterns for the Big 3. We find the top two most common universities for the active managers in our sample are Harvard and Penn (Wharton), both appearing in Hwang et al's top 3 connected universities. In contrast, the top two universities for passive managers are Penn State and Boston College. We report the top 10 universities for each manager type in Table IA.3.

Finally, we report the average industry experience as of the first year a manager appears in our sample, the percentage minority or non-Caucasian, as measured by last name using census data, and the percentage of female managers. We find significant differences in the first two measures at the 1% level for both samples. For example, we find that the average active manager has about 3 more years of experience than passive managers when they enter our sample, and we find 11.5 percentage points fewer minorities among active managers than passive managers, although the difference in minorities for the Big 3 is much larger, around 20 percentage points. The percentage of female managers is also significantly different and also nearly 20 percentage points higher among passive managers in the Big 3, but is not significantly different within the Top 35. Thus, we find that women and minorities are much more likely to be a passive manager than an active manager at Big 3 families.

The results of section 3.2 suggest many similarities in the scope of manager duties and the increase in scope over time between passive and hybrid managers. The t-tests of Table 6 also suggest similarities in manager characteristics, especially within the Big 3 families where the only significant difference is the percentage of minorities, which is about 25 percentage points higher among passive managers than hybrid managers. Although many differences between passive and hybrid are not significant within the Top 35 as well, there are some exceptions. For example, for the percentage who attended an elite or connected university, hybrid managers fall clearly in between active and passive managers.

Interestingly, for the Top 35 there are three measures that appear to be unique to hybrid managers, as they are significantly different from both active managers and passive managers, each at the 1% level. Namely, 12.1% of hybrid managers have a PhD and 44.4% of hybrid managers have an undergraduate degree with a quantitative major such as math, science,

engineering, or computer science. In contrast, only 4.7% of active and 2.1% of passive managers have a PhD, and only 21.3% of active and 25% of passive managers have a quantitative undergraduate major. In addition, 42.3% of hybrid managers manage a hedge fund sometime during our sample period, whereas only about 12% of either passive or active managers also manage a hedge fund.[20] Thus, these measures are supportive of hybrid managers being a "quant" type of manager, as distinct from a typical active or passive manager, although attempts to measure this more precisely is ongoing. The top two most common undergraduate universities of hybrid managers also differ from the other types: MIT and U Mass Amherst. We do not see the same significant differences for hybrid managers in PhD and quantitative major among the Big 3. However, we do see that a majority of the hybrid managers who work for the Big 3 manage hedge funds (53.8%), which is significantly different from active or passive managers at the 1% level.

Together, our measures of manager characteristics collectively point to passive managers having lower status in the industry whether measured by their industry experience, degree attainment, exclusiveness of their alumni network, gender, or ethnicity. Hybrid managers appear to be more similar to passive managers along some dimensions but distinct from passive managers on others. Traditional interpretations point to passive managers having the lowest status among the three types. We will explore another measure of status in the next section.

3.3.2. Manager titles as a measure of position within the family hierarchy

In this section, we propose a measure of a manager's status within their family that is new to the mutual fund literature. From fund prospectuses we hand collect for each manager-year their official job titles at the advisory firms that employ them. We focus on the managers' advisory firm titles instead of their titles at a particular fund to ensure consistency in the hierarchy of managers in a firm. For example, a manager may be a "Vice President" at the firm, a "Senior Vice President" at one of the funds she manages, and a "Vice President" at other funds. We collect the "Vice President" title at the firm for our dataset.

[20] We identify managers who manage hedge funds through SEC disclosures whereby a manager is reported to manage pooled investment vehicle assets with a performance-based fee. This is distinct from managers who manage pooled investment vehicles with no performance-based fee. For more details showing the accuracy of this measure, see Del Guercio et al (2018).

We use these titles to put managers into six official title categories to measure the status of passive managers within a hierarchy that ranges from top management (e.g., CEO, CIO) to assistant portfolio manager or analyst. We only include the 2060 managers in our sample. In other words, we do not include top management if they are not also a "day-to-day manager" of sample funds. Table 7 contains the distribution across these titles for our full sample of manager-years. It also reports the average years of industry experience (measured as number of years since the manager first appeared in the Morningstar Direct database), and average Total AUM and revenue per manager from Tables 4 as validation that our titles are capturing a hierarchy. For example, average industry experience is monotonically increasing across the title categories, with the average assistant portfolio manager or analyst having 6.5 years of experience and the average top executive having 15.7 years. Similarly, average Total AUM and revenue per manager is also increasing with the title hierarchy. One exception is that top executives manage fewer assets and generate less fee revenue on average than the senior executives in the rung below them. This is sensible, however, in that top executives are expected to be overseeing firm-wide operations and spending less of their time on day-to-day portfolio management. Figure 6 shows the distribution of manager-years for active and passive managers using these titles. As evident in the figure, passive managers generally have lower status by this measure. Active managers are much more likely to be among the highest-ranking employees at their firms relative to passive managers.

In Table 8, we examine the differences in titles between our three types of managers, using panel regressions of the following form:

$$Title_{i,t} = \beta_1 Active_{i,t} + \beta_2 Hybrid_{i,t} + Controls_{i,t} + Manager\_Characteristics_i + \varepsilon_{i,t} (1)$$

where $Title_{i,t}$ takes on a value of one to six, corresponding to the six categories presented in Table 6. Higher values indicate higher ranks within the hierarchy. The unit of analysis is manager-years. The omitted group in this analysis is the passive managers, and our main variables of interest are $Active_{i,t}$ and $Hybrid_{i,t}$, indicator variables equal to one if a manager is an active manager or a hybrid manager during that year. We include time-varying control variables such as assets under management and industry experience, as well as time-invariant manager characteristics such as MBA, PhD, Female, and the SAT score of their undergraduate institution. Columns (1), (3), (5) report results for specifications without fixed effects, and columns (2), (4), (6) report results for

specifications with year fixed effects, accounting for the possibility that there may be systematic change in job titles over time.

Columns (1) and (2) report results for the full sample from 2005 to 2016, and we find that active managers are associated with higher-status titles compared to passive managers, whereas there is no significant difference in status for hybrid managers. The signs on the time-varying control variables are as expected; managers with higher assets under management or more industry experience have higher-status titles. Interestingly, among the time-invariant characteristics, only the coefficient on PhD is statistically significant, indicating that a PhD degree is valued in the fund management industry. Columns (3) and (4) report results for the sub-sample analysis from 2006 to 2010, and columns (5) and (6) report results for the sub-sample from 2011 to 2016. We observe similar results for active managers, with a positive coefficient and statistical significance at the 5% level across all specifications. With regards to hybrid managers, however, they are more likely to have lower-status titles in the 2011 to 2016 subsample.

3.3.3. Manager explicit incentives: manager compensation of active vs passive vs hybrid managers

We would like to measure the compensation of a passive manager relative to an active manager, and whether there is any change in relative compensation in the recent period. Previous estimates of manager compensation come from detailed tax registry data from Sweden (Ibert et al 2018) or Israel (Ben Naim and Sokolinski 2017), but to our knowledge there have been no estimates for U.S. fund managers. We follow the procedure in Cheng, Raina, and Xiong (2014) who obtain real estate transactions and incomes of midlevel managers in the securitized finance sector around the financial crisis. Specifically, through the use of the LexisNexis public records database, together with mortgage application data from the Home Mortgage Disclosure Act (HMDA) database from 2007 to 2017, we obtain an estimate of the income stated in a fund manager's mortgage application. We briefly describe the data collection procedure, but Appendix A contains more details.

We use manager names, location of the advisory firm that employs them, employment history, such as would be described in a LinkedIn profile, and age (when available) to uniquely identify a fund manager in the LexisNexis database. A manager's address history that includes

dates associated with each address assures a clean match, as often it is clear that the address history matches the employment history in LinkedIn. LexisNexis contains detailed information on property tax assessment records and deed transfers (real estate transactions), including mortgage loan details. Of the 2060 unique managers in our sample, we are able to match 1448 managers or 70% to LexisNexis, a match rate higher than previous papers identifying fund managers in LexisNexis (Pool, Stoffman, and Yonker (2012, 2015).[21] For each mortgage transaction for which fund managers buy a home or refinance their existing mortgage, we collect the property address, purchase price, mortgage loan amount, mortgage lender name, and record date.

After obtaining the census tract of the property from the property address and the unique ID associated with the mortgage lender, we match the mortgage records to the HMDA database to obtain a manager's stated income based on a match by year, census tract, loan amount, lender, and whether the transaction is an origination or refinancing. The combination of these variables allows us to obtain many unique matches even though personal identifying information, such as the borrower's name, address, or precise record date within the year is not part of the HMDA database. Since the income estimate is coming from a mortgage application, we only observe a manager's income in the year of a non-cash home purchase or refinancing. Moreover, the stated income is the income relied on by the lender in making the credit decision, so there is a possibility that the income may also contain the income of a co-applicant for those transactions with a co-applicant. These limitations would apply to both active and passive managers, so we expect that we are able to obtain a useful estimate of relative pay. To the extent that passive managers tend to have co-applicants more often than active managers, we would be underestimating the difference in compensation. From the Lexis-Nexis data we identify 356 purchase transactions and 628 refinance transactions. We are able to match 426 or 43% to the HMDA income data, out of which 382 are unique matches based on all of our criteria. In the remaining 44 transactions, we do not find a unique match, thus we average the income across all the matching transactions. The average (median) number of duplicate matches is 2.3 (2).

Table 9 Panel A contains summary statistics on manager income and mortgage loan amount for the three manager types, with the unique match sample and the full sample listed separately. It

[21] Match rates are between 44% and 51% in Pool et al, primarily due to the difficulty in identifying the age of fund managers to better limit a search on LexisNexis. Our sample focusing on the Top 35 families is smaller, which makes gathering additional information to accurately identify managers feasible.

is clear that the full sample containing all matches is quite similar to the unique match sample. Consistent with our results throughout the paper, passive managers and hybrid managers have very similar mean (median) annual income of around $450,000 ($280,000). In contrast, mean (median) active manager income is considerably higher at $802,000 ($379,000). Ibert et al (2018) report that the average (median) Swedish active manager in their sample has an annual income of $320,000 ($180,000). Panel B tests for differences in manager income across manager types using the full sample, as the small samples of passive and hybrid managers do not allow for separate tests for the two sample periods.[22] We regress log manager income on an indicator variable equal to one for active managers and equal to zero otherwise, while controlling for industry experience, official job title category, and the median family income in the manager's Metropolitan Statistical Area/Metropolitan Division. We find a coefficient of 0.42 for active managers, significant at the 1% level, indicating that all else equal, active managers have incomes that are about 53% higher than passive and hybrid managers. This result is consistent with our prior finding of lower status for passive and hybrid managers, using managers' official titles as a proxy. Interestingly, the coefficient on managers' official titles in the income regressions suggests that as managers move up in the hierarchy, their pay increases by about 19% on average for each promotion.

5. Conclusion

We provide evidence that passive managers do not appear to have benefitted from the dramatic rise of the passive sector of the fund industry. We find that the number of passive managers did not experience commensurate growth. Rather, passive managers were given more funds and assets to manage, resulting in large increases in the scope of their duties. In addition, passive managers contributed increasing revenues to the family over time on a per manager basis. Despite this, we are unable to measure any improvement in their status in the industry relative to active managers. We conclude that other parties have likely been the beneficiaries of growth of the passive sector. Given the intriguing results in Ibert et al (2018) and Ma et al (2019) that family profits are a large determinant of individual manager compensation, we conjecture that active managers within large passive families such as the Big 3 could be a beneficiary of this growth.

[22] We are conducting ongoing work to increase the sample size of manager income observations.

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Appendix A.

Classifications of Passive and Active Funds

We classify a domestic equity fund offered by the Top 35 fund families as an ETF if the variable et_flag is equal to 'F' in CRSP, which includes mutual fund share classes that are ETFs. We confirm the completeness of the ETF sample by comparing to the list of ETFs in the CRSP monthly stock database with a share class code of 73, the ETFs in Morningstar Direct, and any names containing one of the following words (case insensitive): 'ISHARES,' 'SPDR,' 'HOLDRS,' 'EXCHANGE TRADED,' 'EXCHANGE-TRADED', 'STREETTRACKS', OR 'ETF'. We do not filter out Exchange Traded Notes (et_flag = 'N'), but there are no ETNs among our sample of the Top 35 families. We identify variable annuities using the CRSP flag where vau_fund = 'Y' and classify them as mutual funds. We identify target date mutual funds by the fund name containing a date between 2005 and 2060 or the Lipper class code equal to 'MATA,' 'MATB,' 'MATC,' 'MATD,' "MATE,', 'MATF,' 'MATG,' 'MATH,' 'MATI,' 'MATJ,' 'MATK', 'MATL', or ' MATM'. Target date funds are classified as mutual funds. We have 1484 unique mutual funds in our sample and 170 ETFs.

We classify a mutual fund or ETF as passive if the CRSP index_fund_flag is equal to 'D' or if the Morningstar index_fund flag is equal to 'Yes,' indicating a "pure index fund". We use the CRSP classifications of the index_fund_flag 'E' and the Morningstar classification for enhanced_index equal to 'Yes' to identify enhanced index funds. This category indicates that the fund or ETF is allowed to only hold a subset of the index they track, or that their goal is to opportunistically deviate from the index to enhance performance. We pool ETFs and funds in this category with passive funds. This category has a small number of funds and low aggregate AUM. We manually check other sources in cases where CRSP and Morningstar disagree or where the CRSP index_fund_flag is equal to 'B'. For example, we check the description in the prospectus and question 69 in the N-SAR filing where funds self-identify as an index fund, and classify the fund as an index fund if warranted by either of these sources.[23] Note that the CRSP variable is reported in the quarterly-updated CRSP fund summary file while the Morningstar variable is static and only the most recent value is reported. For the remaining funds, we also manually check cases where the fund name includes at any point one of the following (case insensitive): 'INDEX,' 'IDX,' 'S&P,' 'INDX,' 'BARRA,' 'DOW JONES,' 'DOW 30,' 'RUSSELL 1000,' 'RUSSELL 2000,' 'RUSSELL 3000' and add to the appropriate category if warranted. If the fund name also contains 'ENHANCE' or 'ENHANCED' we manually check whether it should be considered an enhanced index fund. We have 278 mutual funds or ETFs classified as passive, and 1356 as active.

[23] For example, the following funds with the CRSP index_fund_flag = 'B' are determined to be pure passive index funds after consulting the prospectus and N-SAR: Vanguard Tax-Managed Capital Appreciation,Vanguard Tax-Managed Small-cap fund, Vanguard Target Retirement 20XX funds, and Vanguard Life Strategy Growth Fund.

Appendix A. Continued.

Adjusting for Team Size for the AUM in Three Client Account Types disclosed in SEC Filings

Unlike within our main domestic equity sample, we can only adjust for team size to arrive at per manager AUM values in an approximate manner. For example, through information in the SEC filing we know the exact team size for each fund in our main domestic equity sample, implying a precise measure of TNA per manager. But we do not know whether the team members at a fund are the same across a manager's other managed accounts outside that fund (see a typical fund disclosure in Appendix B). Because we do observe AUM for the three client account types (Registered Investment Companies (RIC), Pooled Investment Vehicles (PIV), and Separate Accounts (SA)) for each manager of the fund, we assume that any member with reported assets greater than zero is part of the same team over those assets.[24] For example, suppose that the Franklin Growth fund has three managers, and only two of them report any assets in the category "pooled investment vehicles (PIVs)". We would assume a team size of two for their PIV assets and thus divide each manager's reported PIV assets by two to estimate their PIV AUM per manager. We would adjust AUM for team size in a similar way for RIC and SA assets. We then obtain Total AUM per manager by summing the per manager values across the three client account types (RIC, PIV, SA).

Estimating Total Revenue per Manager Using AUM Disclosed in SEC filings

For each manager-year in our sample, we compute the TNA-weighted average annual expense ratio using all domestic equity funds a manager manages either solo, or as part of a team, using the annual expense ratio reported in CRSP for each of their funds or ETFs. Each year, we then multiply this weighted-average expense ratio by a manager's RIC AUM per manager (as defined above), adjusted for team size, to arrive at an estimate of the revenue per manager generated by this manager's RIC assets. To estimate the revenue per manager generated by a manager's PIV and SA assets outside the mutual fund industry, we apply a percentage discount to the retail weighted-average expense ratio, recognizing that institutional client fees are substantially lower than retail fees. Using information in the literature, we assume that institutional clients of passive managers pay 40% of retail expense ratios, institutional clients of active managers pay 50% of retail expense ratios, and institutional clients of hybrid managers pay 45% of retail expense ratios. Each year, we multiply: the appropriate percentage depending on manager type, the weighted-average expense ratio, and the sum of a manager's PIV AUM per manager (as defined above) and SA AUM per manager (as defined above), adjusted for team size. This produces an estimate of the revenue per manager generated by a manager's PIV and SA assets. We then sum the revenue per manager generated by the manager's RIC assets and the revenue per manager generated by the manager's PIV and SA assets, to arrive at the estimate of Total Revenue per manager (all clientele account types).

[24] Note that the category that we call "Separate Accounts" are listed in SEC disclosures as "Other Accounts." The large average AUM per client account in this category suggests that these are typically separate accounts. We describe them as such throughout the paper.

Appendix A. Continued.
Estimating Fund Manager Compensation

We follow the procedure in the paper and internet appendix of Cheng, Raina, and Xiong (2014) with some modifications. Specifically, through the use of the LexisNexis (LN) public records database, together with mortgage application data at the individual loan level from the Home Mortgage Disclosure Act (HMDA) database from 2007 to 2017, we obtain an estimate of a manager's compensation by using the gross income stated in a fund manager's home mortgage application. This is the income relied on by the lender to make the credit decision to approve the loan.

We use manager names and age (when available) to uniquely identify a fund manager in the LN database. When age is not available or when manager name and age return many potential matches, we use the city and state location of the advisory firm that employs the manager (from ADV filings) as an additional search term. We then use employment history, such as would be described in a LinkedIn profile, to verify an accurate match. When the manager does not have a LinkedIn profile, we do google searches to identify a news article that mentions their name and firm and provides a specific location at a specific point in time. Because a manager's address history in LN includes dates associated with each address, we check whether the address history matches the employment history in LinkedIn or their specific known location. Of the 2060 unique managers in our sample, we are able to match 1448 managers to LN, or 70%. The primary reason for failing to identify a match in LN is if the manager has a very common name (e.g., Michael Johnson), as there are too many potential matches to single out a unique match. LN assigns a unique ID to each individual, and we use this LexId to download the public records for each verified fund manager match from our sample. LN contains detailed information on property tax assessment records and deed transfers (real estate transactions), including mortgage loan details. Thus, we use a script to parse the information from the public record downloads and create an Excel file with the needed information to match with the HMDA database. Specifically, for each mortgage transaction for which a fund manager buys a home or refinances their existing mortgage, we collect the property address, purchase price, mortgage loan amount, mortgage lender name, and record date. We obtain the census tract of the property from the property address using this US Bureau of Census website https://geocoding.geo.census.gov/geocoder/geographies/addressbatch?form.

We only keep originated loans from the HMDA database and throw out withdrawn, incomplete, or denied applications. We remove any home equity loans, as these are less likely to state full borrower income. Matches to the HMDA database require using the census tract numbers from the 2000 census for any transaction in 2001 to 2011, and census tract numbers from the 2010 census for transactions after 2011. We take the lender's name from the LN real estate deeds and obtain the lender ID (called respondent ID in HMDA data) from the website https://www.ffiec.gov/hmdaadwebreport/DisWelcome.aspx. Finally, we match the LN mortgage records to the HMDA database based on mortgage application year, census tract, loan amount,

lender ID, and whether the transaction is an origination or a refinancing associated with that property. The combination of these variables allows us to obtain many unique matches even though personal identifying information, such as the borrower's name, address, or precise record date within the year is not part of the HMDA database. These matches provide us with fund managers' stated income during the years they obtain a mortgage.

When there are multiple matches, we are able to manually delete a few observations due to the codes available on owner-occupancy (vs second home or investment property), gender, or race. We only use those codes when it is very clear from the information we have that the information does not match the manager. Overall, we obtain 382 unique matches based on our matching variables. We also obtain 44 observations that return more than one match. In these cases, we use an average income value, rather than a unique match value.

Since the income estimate is coming from a mortgage application, we only observe a manager's income in the year of a non-cash home purchase or refinancing. Moreover, the stated income is the income relied on by the lender in making the credit decision, so there is a possibility that the income may also contain the income of a co-applicant for those transactions with a co-applicant.

Appendix B. Sample SEC Filing containing information on management of other portfolio accounts by fund managers

The following is an excerpt from the disclosures obtained from the Statement of Additional Information that accompanies the prospectus of the SPDR Russell 1000 ETF offered by State Street Global Advisors for the fiscal year ended June 30, 2016. The filing is available at: https://www.sec.gov/Archives/edgar/data/1064642/000119312516751756/d258279d485bpos.htm

PORTFOLIO MANAGERS

The Adviser manages the Funds, Nuveen Asset Management manages the Municipal Bond ETFs, and SSGA LTD manages the SPDR Bloomberg Barclays International Corporate Bond ETF and SPDR Bloomberg Barclays Emerging Markets Local Bond ETF using a team of investment professionals. The professionals primarily responsible for the day-to-day portfolio management of each Fund are:

Fund	Portfolio Managers
All Equity ETFs	Mike Feehily, John Tucker and Karl Schneider
SPDR Bloomberg Barclays 1-10 Year TIPS ETF SPDR Bloomberg Barclays TIPS ETF SPDR Bloomberg Barclays 0-5 Year TIPS ETF SPDR Citi International Government Inflation-Protected Bond ETF	Mahesh Jayakumar, Cynthia Moy and James Kramer
SPDR Bloomberg Barclays Short Term Treasury ETF SPDR Bloomberg Barclays Intermediate Term Treasury ETF SPDR Bloomberg Barclays Long Term Treasury ETF	Mahesh Jayakumar, Joanna Madden and Cynthia Moy

All ETFs except Municipal Bond ETFs, SPDR Bloomberg Barclays International Corporate Bond ETF and SPDR Bloomberg Barclays Emerging Markets Local Bond ETF. The following table lists the number and types of accounts managed by each of the key professionals involved in the day-to-day portfolio management for each Fund and assets under management in those accounts. The total number of accounts and assets have been allocated to each respective manager. Therefore, some accounts and assets have been counted twice.

Other Accounts Managed as of June 30, 2016

Portfolio Manager	Registered Investment Company Accounts	Assets Managed (billions) *	Pooled Investment Vehicle Accounts	Assets Managed (billions) *	Other Accounts	Assets Managed (billions) *	Total Assets Managed (billions) *
Mike Feehily	112	$ 152.38	382	$ 484.74	331	$ 221.35	$ 858.47
John Tucker	112	$ 152.38	382	$ 484.74	331	$ 221.35	$ 858.47
Karl Schneider	112	$ 152.38	382	$ 484.74	331	$ 221.35	$ 858.47
Mahesh Jayakumar	11	$ 27.84	104	$ 60.34	142	$ 50.23	$ 138.40
Cynthia Moy	11	$ 27.84	104	$ 60.34	142	$ 50.23	$ 138.40
James Kramer	11	$ 27.84	104	$ 60.34	142	$ 50.23	$ 138.40
Joanna Madden	11	$ 27.84	104	$ 60.34	142	$ 50.23	$ 138.40

* There are no performance fees associated with these portfolios.

Appendix C: Variable Definitions

Variable Name	Definition
Manager types	
Passive manager	Managers who *exclusively* manage passive funds or ETFs in 85% or more of the years of their career as a portfolio manager during our sample. Managers stay in same category throughout the sample.
Active manager	Managers who *exclusively* manage active funds or ETFs in 85% or more of the years of their career as a portfolio manager during our sample. Managers stay in same category throughout the sample.
Hybrid manager	Managers who do not fit the exclusively passive or exclusively active category threshold of 85% or more. These managers most commonly tend to manage both passive and active assets simultaneously, or in a few cases have career years that are divided between exclusively active or exclusively passive management. Managers stay in same category throughout the sample.
Funds and styles (Main sample):	
# of funds per manager	Number of domestic equity funds or ETFs a manager simultaneously manages in a year, solo or as part of a team.
# of passive funds per manager	Number of passive domestic equity funds or ETFs a manager simultaneously manages in a year, solo or as part of a team.
# of active funds per manager	Number of active domestic equity funds or ETFs a manager simultaneously manages in a year, solo or as part of a team.
# of Morningstar categories per manager	Number of distinct Morningstar categories within domestic equity that a manager simultaneously manages in a year, solo or as part of a team.
# of Lipper categories per manager	Number of distinct Lipper categories within domestic equity that a manager simultaneously manages in a year, solo or as part of a team.
# of Prospectus Benchmarks per manager	Number of distinct prospectus benchmarks within domestic equity that a manager simultaneously manages in a year, solo or as part of a team.
Assets under management (AUM)	
Total AUM	The sum of fund TNA across all of the domestic equity funds or ETFs that a manager manages in a fiscal-year, solo or as part of a team.
Active AUM	The sum of passive fund TNA across all of the domestic equity funds or ETFs that a manager manages in a fiscal-year, solo or as part of a team.
Passive AUM	The sum of active fund TNA across all of the domestic equity funds or ETFs that a manager manages in a fiscal-year, solo or as part of a team.

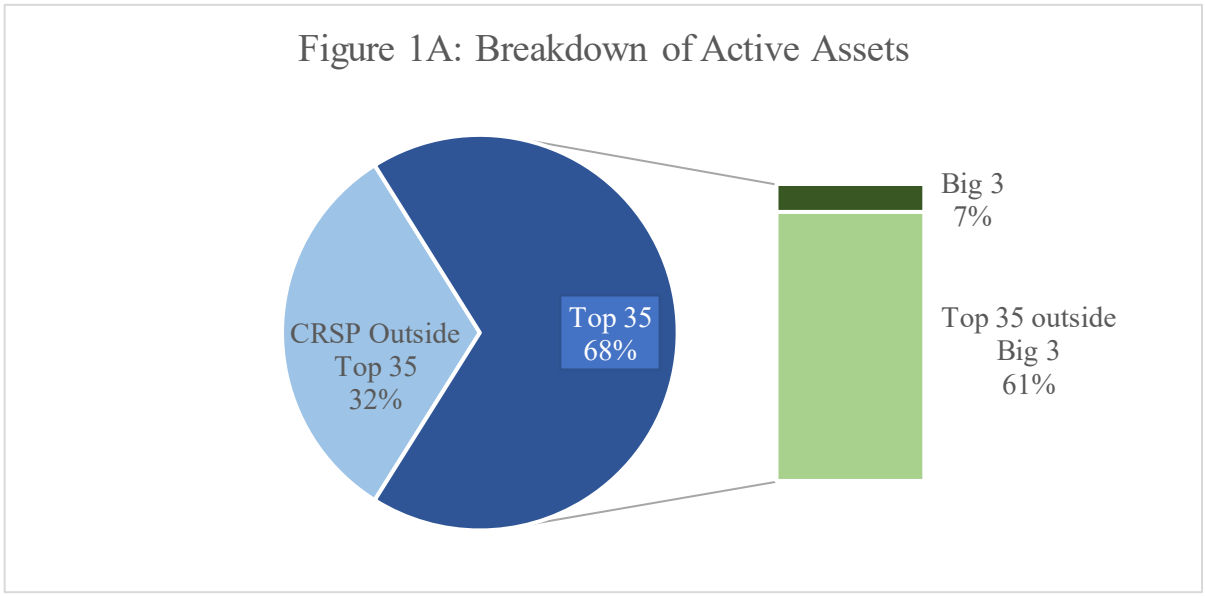
Total AUM per manager	For each domestic equity fund or ETF a manager manages in a fiscal-year, we adjust for team size by first dividing the TNA of the fund or ETF by the number of managers. We then aggregate these per manager asset values for each manager across all of their funds that year.
Active AUM per manager	For each domestic equity active fund or ETF a manager manages in a fiscal-year, we adjust for team size by first dividing the TNA of the active fund or ETF by the number of managers. We then aggregate these per manager asset values for each manager across all of their active funds that year.
Passive AUM per manager	For each domestic equity passive fund or ETF a manager manages in a fiscal-year, we adjust for team size by first dividing the TNA of the fund or ETF by the number of managers. We then aggregate these per manager asset values for each manager across all of their passive funds that year.
Revenue per manager	For each manager-year, we compute the TNA-weighted average expense ratio reported in CRSP across all of a manager's domestic equity funds (whether as a solo manager or as part of a team), multiplied by the AUM per manager (adjusted for team size).
From Morningstar Direct:	
# of funds (all)	Number of funds or ETFs a manager simultaneously manages in a year across all asset classes (e.g., fixed-income, international equity, etc) according to the Morningstar Direct database, solo or as part of a team.
# Morningstar categories (all)	Number of distinct Morningstar categories across all asset classes that a manager simultaneously manages in a year according to the Morningstar Direct database, solo or as part of a team.
# Prospectus Benchmarks (all)	Number of distinct prospectus benchmarks across all asset classes that a manager simultaneously manages in a year according to the Morningstar Direct database, solo or as part of a team.
Industry experience	Number of years since the first date a manager appears in the Morningstar Direct database.
From SEC filings:	
Registered investment companies (RIC) AUM	AUM reported for a manager as of the fiscal-year end effective date under the registered investment companies category in the Statement of Additional Information in each fund's prospectus (485BPOS filing-See sample filing in Appendix B) (RIC AUM includes the TNA of the reporting fund)
Pooled investment vehicles (PIV) AUM	AUM reported for a manager under the other pooled investment vehicles category
Separate accounts (SA) AUM	AUM reported for a manager under the separate accounts (technically "Other" accounts) category
Total AUM	Sum of AUM for a manager across all three client type categories (RIC, PIV, SA)
RIC AUM per manager	AUM in registered investment companies, adjusted for team size
PIV AUM per manager	AUM in pooled investment vehicles, adjusted for team size
Separate account AUM per manager	AUM in separate accounts, adjusted for team size
Total AUM per manager	AUM summed across all three client type categories, adjusted for team size
Total Revenue per manager (all clientele account types)	For each manager-year, we compute the TNA-weighted average expense ratio reported in CRSP across all of a manager's domestic equity funds (whether as a solo manager or as part of a team).

	We then multiply this by a manager's RIC AUM per manager to calculate the revenue from RIC assets. We then multiply this by fractional discount*(PIV AUM per manager +Separate accounts per manager). Fractional discount is an estimate of the ratio of institutional client fees to retail client fees, which is expected to vary by asset type. We assume values of 0.40 for passive managers, 0.50 for active managers, and 0.45 for hybrid managers. Finally, we sum the revenue per manager from RIC assets with revenue per manager from PIV and SA assets.
Manager characteristics:	We obtain a manager's undergraduate university, graduate university, majors, and years of graduation when available from fund prospectuses, Morningstar, LinkedIn, family websites, Capital IQ, or Bloomberg.
SAT score (2003)	Average SAT score of the manager's undergraduate university (obtained from the 2003 U.S. News & World Report). We take the average of the 25th percentile score and 75th percentile score for each institution's freshman class. For universities missing SAT scores, we use ACT scores and convert them to the corresponding SAT scores. For universities missing SAT and ACT scores, we use their acceptance rates as a benchmark and use SAT scores of other universities with similar acceptance rates. Acceptance rates are defined as the number of students accepted divided by the number of students who applied.
SAT percentile (2003)	Average SAT raw scores are converted to SAT percentile scores
MBA	Indicator variable equal to one if the manager has an MBA degree and zero otherwise.
PHD	Indicator variable equal to one if the manager has a PhD degree and zero otherwise
Elite school	Indicator variable equal to one if the manager attended (as an undergraduate or a graduate student) one of the following ten universities: Cal Tech, Harvard, MIT, Princeton, Yale, Pomona College, Stanford, Dartmouth, Swarthmore, and Columbia. These are the top ten universities ranked by average SAT scores between 2001 and 2008. This list is obtained from Hwang, Titman, and Wang (2018) footnote 7.
Connected school	Indicator variable equal to one if the manager attended (as an undergraduate or a graduate student) one of the following ten universities: Harvard, Columbia, Wharton, Chicago, Stanford, Yale, NYU, Princeton, Dartmouth, Duke. These ten schools are those that executives of IPO underwriters most frequently attended. This list is obtained from Hwang, Titman, and Wang (2018) Figure 1.
Experience at hire	Number of years from the first date a manager appears in the Morningstar Direct database to the date the manager first appears in our sample (2005 or first year managing a fund for a Top 35 family, whichever is earlier).
Minority	Indicator variable equal to one if the manager's ethnicity is not Caucasian. Ethnicity is based on the manager's name and the 2010 US Census data. A last name is classified into a particular ethnicity if at least 70% of people with the same last name are identified in the Census as belonging to that ethnicity. Ambiguous last names are treated as missing.
Female	Indicator variable equal to one if the manager's gender is female. We use namsor.com to determine gender using the manager name.

Quantitative major	Indicator variable equal to one if the manager's undergraduate major is any of the following fields: Math, Actuarial Science, Engineering, Math, Science (Biology, Physics, Chemistry, etc.), Computer Science, Statistics, and Quantitative Economics.
Hedge fund	Indicator variable equal to one if the manager is reported in an SEC Statement of Additional Information filing during our sample period to simultaneously invest in a mutual fund in our sample and also a pooled investment vehicle with a performance-based fee. This SEC disclosure indicates that the manager manages hedge fund assets. See Del Guercio et al (2008) for evidence that this disclosure reliably identifies "side-by-side" hedge fund managers.

Figure 1: Breakdown of Active vs Passive Domestic Equity Assets

Figure 1A shows the average percentage of active assets belonging to the Top 35 families, the Big 3 families, and families outside the top 35 from 2004 to 2016. The full universe includes all diversified domestic equity mutual fund and ETF active assets in the CRSP mutual fund database. Figure 1B shows the analogous average percentage of passive assets belonging to the Top 35 families, the Big 3 families, and families outside the top 35 from 2004 to 2016.



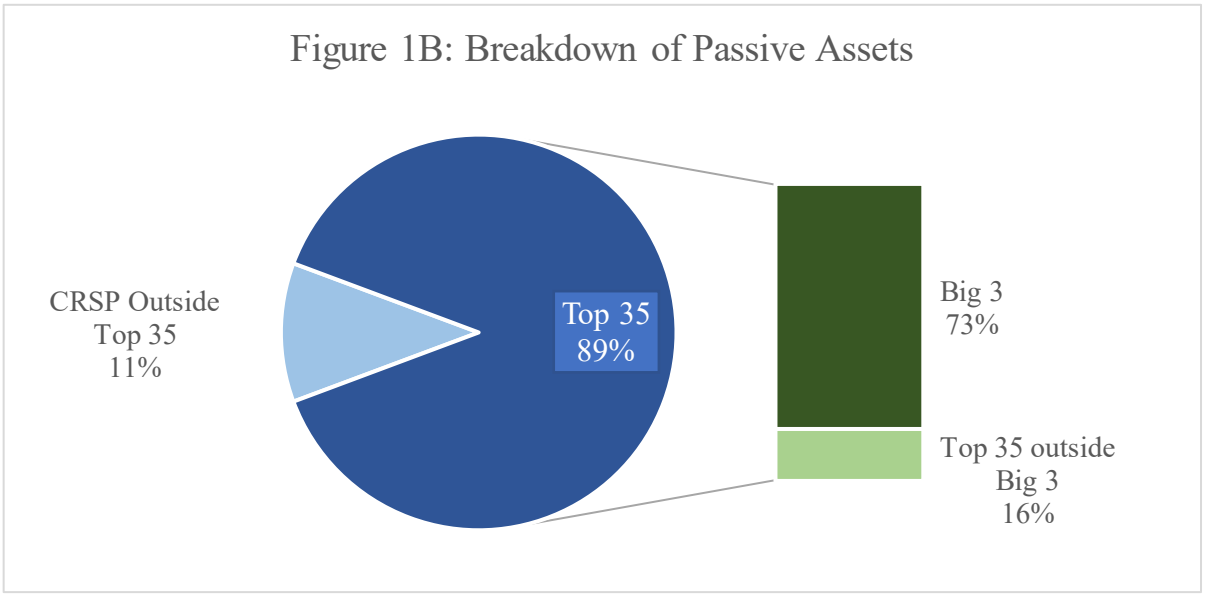


Figure 2: Market share and Revenue Share for the Big 3 families in 2004 vs 2016

Figure 2 reports Big 3 shares as a percentage of industry AUM (market share) and as a percentage of industry aggregate revenue (revenue share). Revenue is defined two ways as the percentage annual management fee times fund total net assets, or the percentage annual expense ratio times fund total net assets, both aggregated across all domestic equity funds and ETFs. Total net assets are measured at year-end.

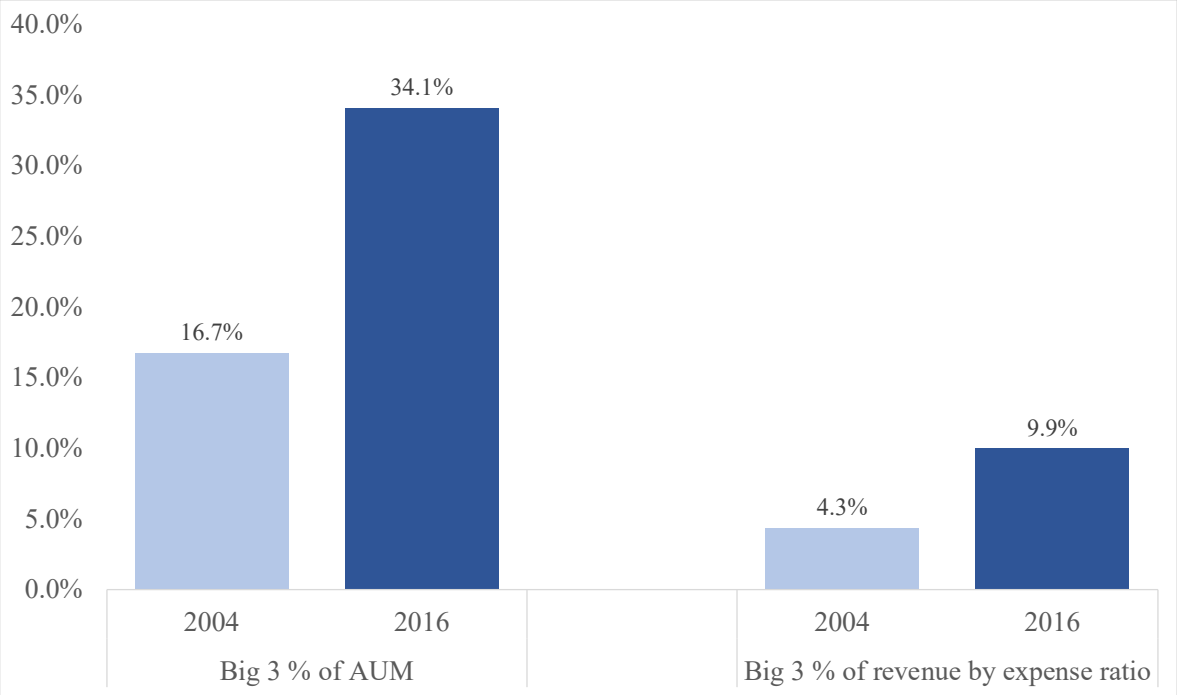
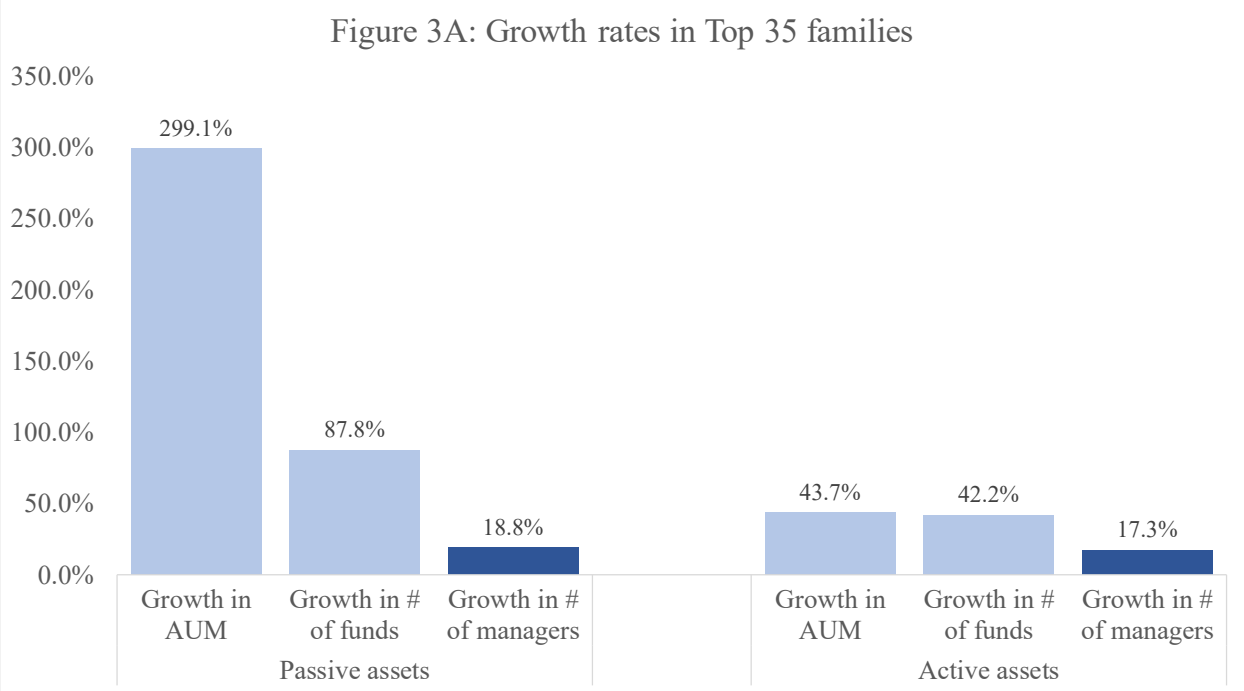


Figure 3: Growth rates in AUM, number of funds, and number of managers in the active vs passive domestic equity sectors (2005-2015)

Figure 3 reports growth rates in assets, number of funds, and number of managers from 2005 to 2015. In all cases, passive mutual funds and ETFs are pooled together and active mutual funds and ETFs are pooled together. Asset and manager growth rates are computed using the same data as in Table 1 and 2, and fund growth rates are computed using the same asset universe.



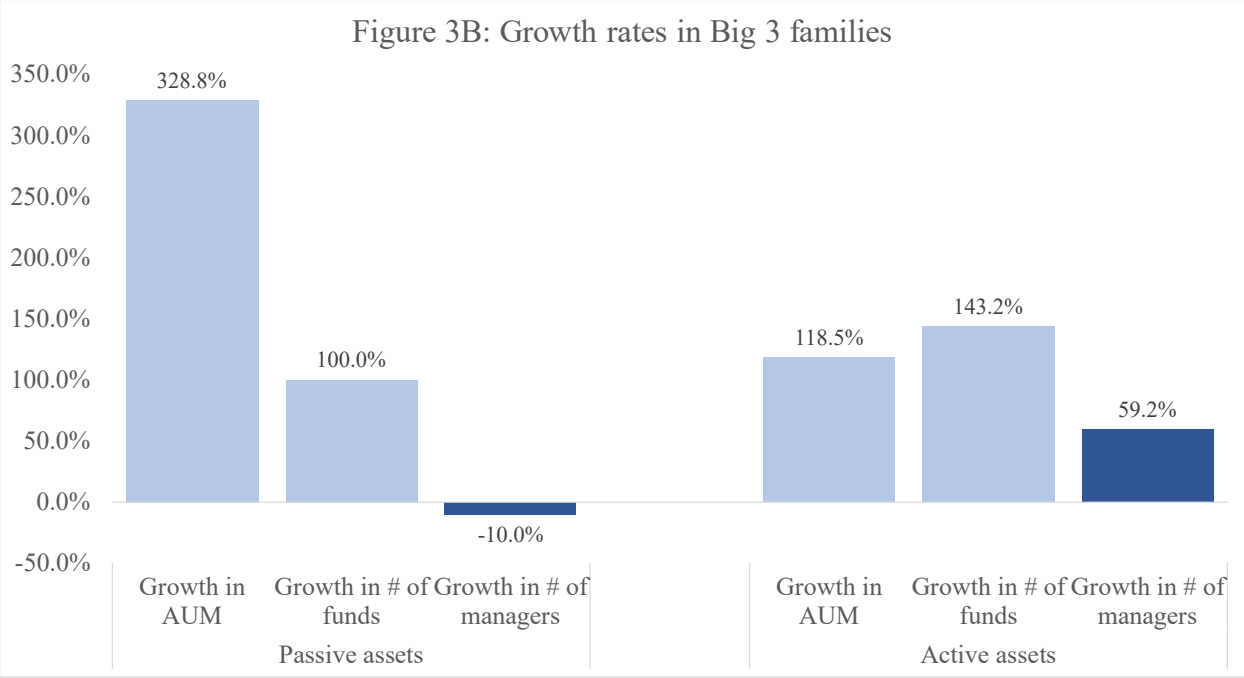
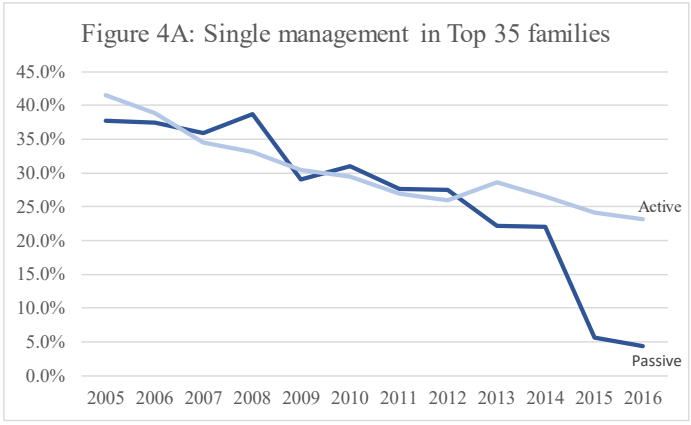
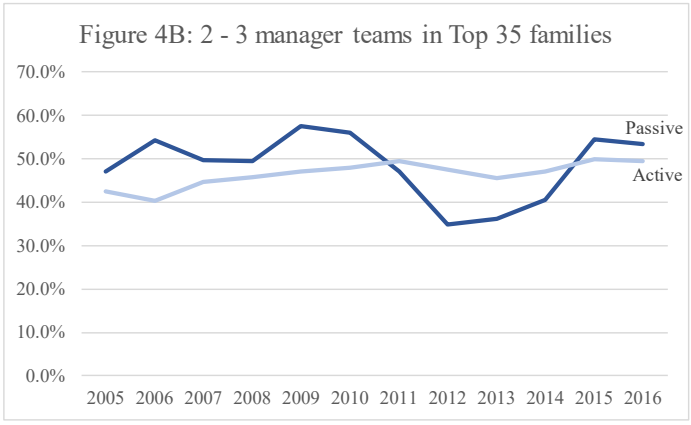


Figure 4: Trends in team management in Top 35 families





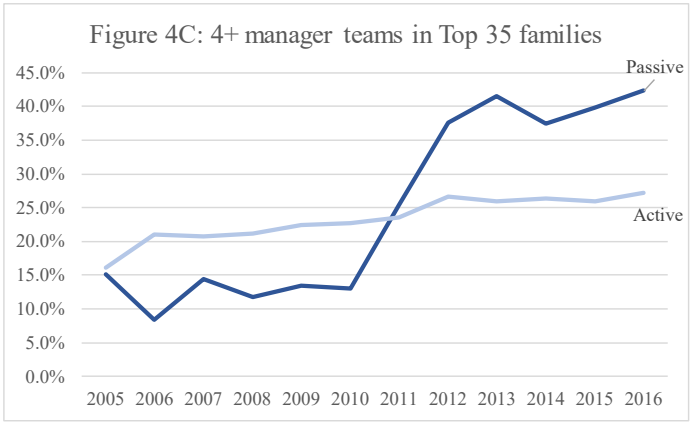
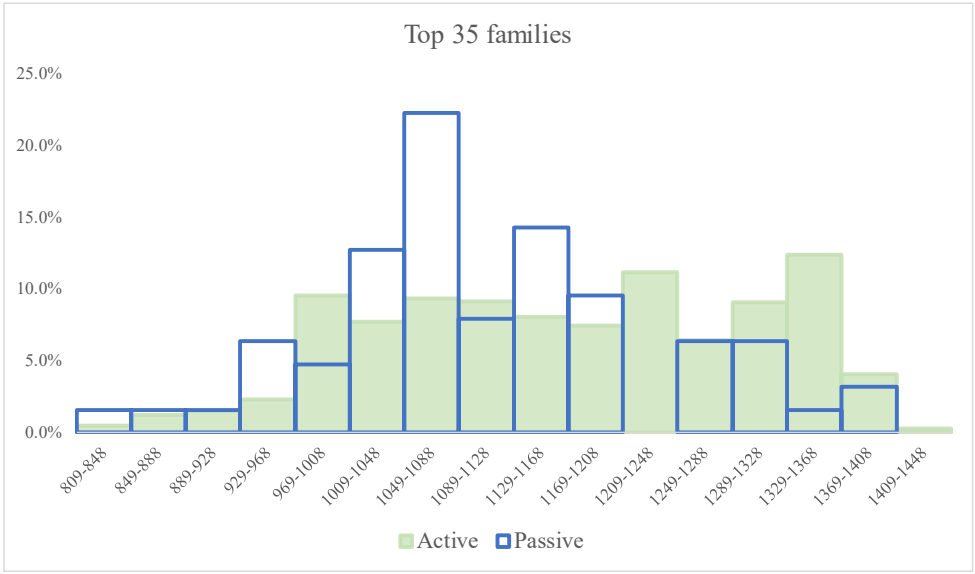


Figure 5: Distribution of SAT scores of undergraduate institutions: Passive and active managers



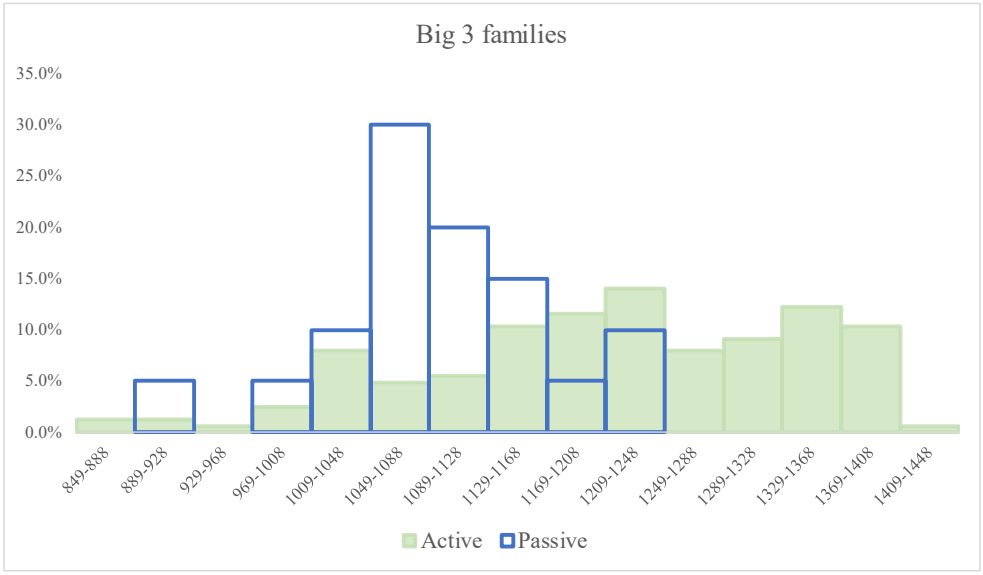
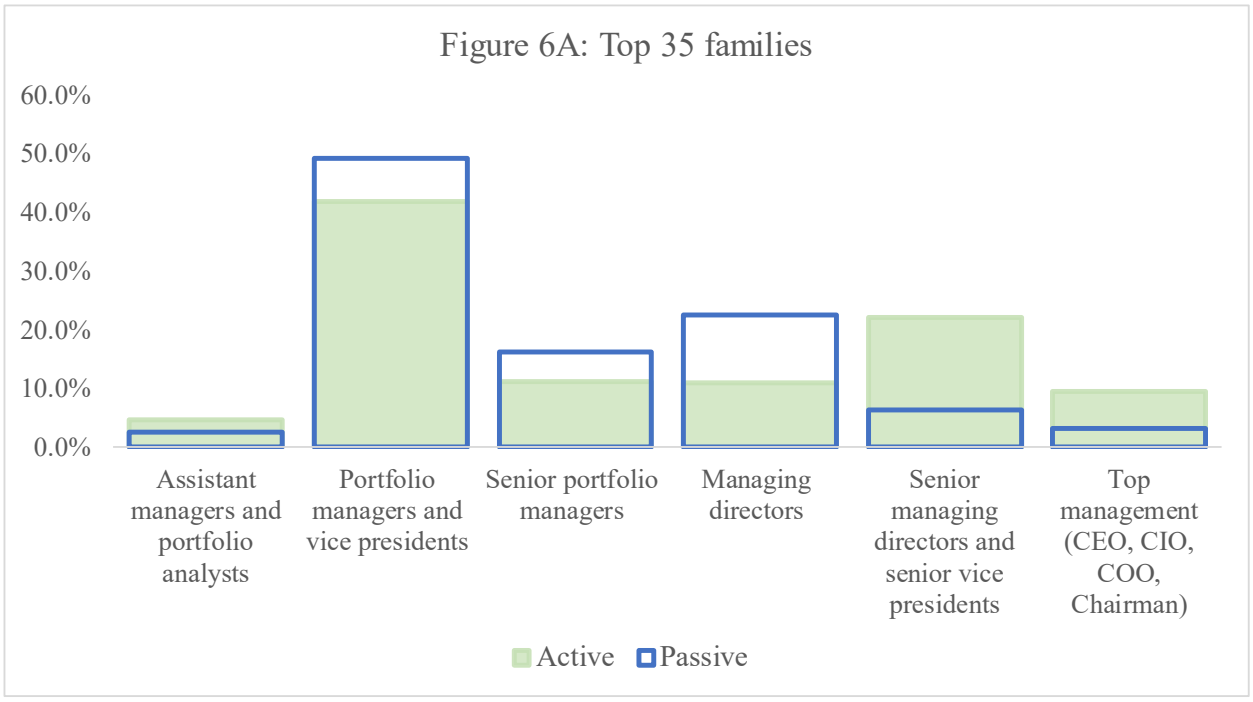


Figure 6: Title ranks within fund families: Passive and active managers



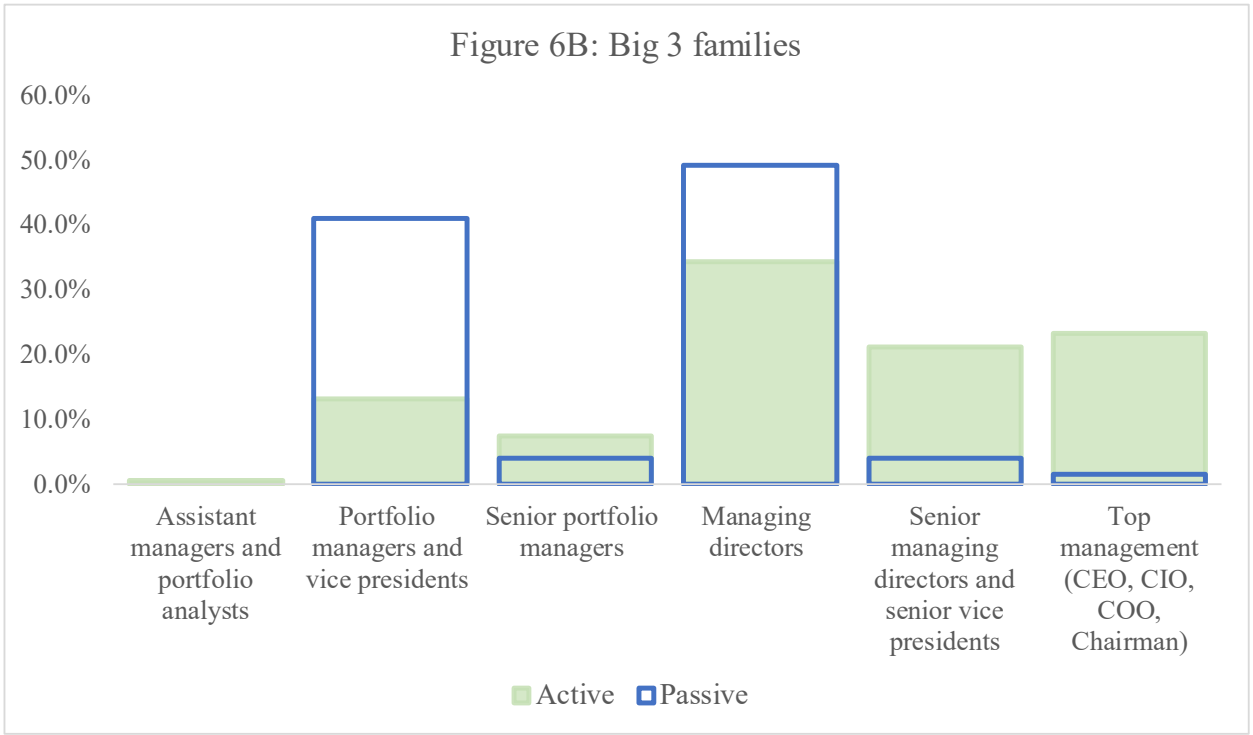


Table 1: Trend over time in aggregate assets under management of active and passive domestic equity mutual funds and ETFs

This table presents year-end aggregate assets under management in billions of dollars for U.S. equity mutual funds and exchange-traded funds (ETFs) in the CRSP mutual fund database, in our sample of the largest 35 families (Top 35), and in the Big 3 families (Vanguard, BlackRock, and State Street Global). We use filters from CRSP and Morningstar Direct to classify mutual funds versus ETFs and passive versus active funds or ETFs. Appendix A provides details on the filters used in the definitions. Numbers are in billions. The last row contains total growth rates of that column from 2004 to 2016. Growth rates for Active ETFs in the Top 35 and Big 3 are not meaningful (N.M.) and therefore not reported due to the asset values close to zero.

	Aggregate Assets Under Management (AUM) in $Billions											
	CRSP Sample				Top 35 families				Big 3 families			
	Mutual funds		ETFs		Mutual funds		ETFs		Mutual funds		ETFs	
	Passive	Active	Passive	Active	Passive	Active	Passive	Active	Passive	Active	Passive	Active
2004	425.8	2,692.4	164.4	0.2	360.7	2,031.2	162.8	0.0	268.2	147.4	132.2	0.0
2005	461.4	2,943.7	188.8	0.1	394.4	2,193.3	186.5	0.0	296.8	170.9	154.9	0.0
2006	552.5	3,342.8	231.4	0.1	490.1	2,504.1	225.9	0.0	367.0	193.1	194.3	0.0
2007	631.0	3,613.3	302.3	0.2	556.0	2,671.9	294.3	0.0	417.3	227.1	254.8	0.0
2008	450.4	2,467.7	252.6	0.5	365.5	1,698.4	249.4	0.0	270.0	144.0	227.0	0.0
2009	637.2	3,162.5	287.5	1.6	521.3	2,149.0	281.6	0.0	400.3	184.6	251.5	0.0
2010	771.5	3,640.3	353.0	3.1	635.4	2,430.4	342.5	0.0	495.8	205.7	302.7	0.0
2011	804.7	3,441.5	381.5	0.5	668.2	2,276.0	368.1	0.0	526.5	208.9	325.5	0.0
2012	963.1	3,754.1	482.2	2.0	816.0	2,464.2	464.9	0.0	655.5	236.1	421.0	0.0
2013	1,365.3	4,904.1	743.7	3.4	1,157.2	3,171.2	707.1	0.1	925.2	308.3	634.0	0.0
2014	1,618.5	5,246.6	916.1	4.1	1,376.2	3,353.2	863.0	0.2	1,095.2	336.9	783.5	0.1
2015	1,666.4	4,934.7	947.6	4.7	1,424.0	3,151.3	894.6	0.2	1,132.6	373.1	804.3	0.1
2016	1,984.0	5,093.2	1,198.8	4.5	1,707.8	3,327.0	1,132.3	0.0	1,354.4	443.1	1,023.7	0.0
Total growth 2004 to 2016	365.9%	89.2%	629.0%	2270.6%	373.4%	63.8%	595.4%	N.M.	405.0%	200.6%	674.4%	N.M.

Table 2: Trend over time in aggregate number of managers of active and passive mutual funds and ETFs

This table provides the number of active and passive managers of mutual funds and ETFs in the Top 35 and Big 3 families over time. Note that we include all managers who manage funds on behalf of the Top 35 or Big 3 families. This mainly includes managers directly employed by these families, but also includes unaffiliated subadvisers employed by other firms, who contract with the Top 35 or Big 3 families for portfolio management services. While this table uses the same universe of mutual funds and ETFs used to report aggregate assets for these families in Table 1, we identify each fund's managers based on SEC filings, resulting in fiscal-year end timing. Because filings contain information as of fiscal-year end "effective dates," we use, but do not separately report in this table, managers who manage funds in 2004 and 2016 because these represent partial years of data. For example, a full year of filings released in 2005 would contain funds with fiscal-year ends in both 2004 and 2005, but the 2004 sample would only contain funds with FY-ends in 2004 and filing release dates in 2005, resulting in 2004 being a partial-year. A manager is counted as managing passive mutual funds for a Top 35 family in 2005 if she manages one or more passive mutual funds offered to the public by a Top 35 family with a fiscal-year end date in 2005 (as a solo manager or part of a team). The other categories are defined similarly. In a given year, managers can appear in multiple categories if they also manage a fund or ETF in that category that same year.

	Top 35 families						Big 3 families					
	Passive			Active			Passive			Active		
		Mutual			Mutual			Mutual			Mutual	
	Total	Funds	ETFs	Total	Funds	ETFs	Total	Funds	ETFs	Total	Funds	ETFs
2005	64	64	16	771	771	0	20	19	12	71	71	0
2006	62	60	12	812	812	1	16	13	8	70	70	0
2007	67	60	17	808	806	3	21	18	9	78	78	0
2008	60	51	22	861	859	3	15	13	10	91	91	0
2009	67	57	24	848	847	8	18	16	10	87	87	0
2010	69	59	25	865	864	6	19	17	11	100	100	0
2011	76	67	28	879	876	14	24	21	15	105	105	0
2012	78	66	30	894	893	9	25	21	15	97	97	0
2013	74	60	32	883	877	14	22	17	17	104	99	5
2014	83	67	37	897	892	23	21	18	17	112	105	8
2015	76	66	29	904	898	18	18	16	14	113	105	13
Average	70.5	61.5	24.7	856.5	854.1	9.0	19.9	17.2	12.5	93.5	91.6	2.4

Table 3: Consistency of manager types during our sample period

We define a manager as active if they *exclusively* manage active funds or ETFs in 85% or more of the years of their career as a portfolio manager during our sample, and we define a passive manager analogously using the 85% threshold. All other managers are put into a third hybrid category, which contains managers who either tend to manage both passive and active assets simultaneously, or their career years are more evenly divided between exclusively active or exclusively passive management. Thus, managers are placed into three mutually exclusive categories, and the total 2,060 managers represent all unique managers in our sample over the 2004 to 2016 sample period. This table reports the percent of years that a manager manages exclusively passive, exclusively active, and both passive and active assets simultaneously, averaged across managers within the three categories. Similarly, we report the percent of years that a manager manages any active assets or any passive assets, averaged across managers within the three categories. Finally, we report the average number of active funds, passive funds, active mutual fund or ETF assets, and passive mutual fund or ETF assets, averaged across managers within the three categories.

	Unique managers in each bin – Top 35 families			Unique managers in each bin – Big 3 families		
	Exclusively passive managers	Exclusively active managers	Hybrid managers	Exclusively passive managers	Exclusively active managers	Hybrid managers
Number of managers	96	1,865	99	26	207	26
Average % years with exclusively passive assets	99.6%	0.0%	16.6%	99.0%	0.0%	18.4%
Average % years with exclusively active assets	0.0%	100.0%	21.1%	0.0%	100.0%	25.1%
Average % years with both active and passive assets	0.4%	0.0%	62.2%	1.0%	0.0%	56.5%
Average % years with passive assets	100.0%	0.0%	78.9%	100.0%	0.0%	74.9%
Average % years with active assets	0.4%	100.0%	83.4%	1.0%	100.0%	81.6%
Average # passive funds	5.8	0.0	4.6	10.6	0.0	9.3
Average # active funds	0.0	2.2	5.2	0.0	2.6	2.3
Average passive AUM	17,088.3	0.0	17,557.5	44,240.4	0.0	42,661.6
Average active AUM	0.4	8,977.1	8,796.8	1.5	10,302.9	1,499.8

Table 4: Change in scope of manager duties for passive vs. active managers

We define a manager as active if they *exclusively* manage active funds or ETFs in 85% or more of the years of their career as a portfolio manager during our sample, and we define a passive manager analogously using the 85% threshold. All other managers are put into a third hybrid category, which contains managers who either tend to manage both passive and active assets simultaneously, or their career years are more evenly divided between exclusively active or exclusively passive management. Thus, managers are placed into three mutually exclusive categories, and the total 2,060 managers represent all unique managers in our sample over the 2004 to 2016 sample period. Panel A reports the univariate comparisons between two sub-sample periods: 2005-2010 and 2011-2016. Panel B reports the coefficients and t-statistics from univariate regressions examining differences between manager types. Columns (1) and (2) report results from regressions comparing passive to active managers. Columns (3) and (4) report results from regressions comparing passive to hybrid managers. Columns (5) and (6) report results from regressions comparing active to hybrid managers. All variable definitions are provided in Appendix C. Standard errors are clustered by manager and year. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Univariate tests of sub-sample differences within each manager type

	Passive managers			Active managers			Hybrid managers		
	2005-2010	2011-2016	T-stat for test of dif. in means	2005-2010	2011-2016	T-stat for test of dif. in means	2005-2010	2011-2016	T-stat for test of dif. in means
Number of managers	68	56		1,419	1,238		77	65	
Domestic equity main sample:									
Number of funds and styles:									
# of funds per manager	5.6	7.0	0.91	2.2	2.6	4.89***	6.4	13.9	2.93***
# of passive funds per manager	5.5	7.0	0.92				3.1	6.9	2.62***
# of active funds per manager				2.2	2.6	4.89***	3.3	7.0	1.77*
# of Morningstar categories per manager	3.1	3.6	0.99	1.6	1.8	3.63***	3.2	4.9	3.03***
# of Lipper categories per manager	3.8	4.4	0.83	1.6	1.8	4.17***	3.8	5.6	2.79***
# of Prospectus Benchmarks per manager	5.1	6.3	0.80	1.5	1.7	4.41***	3.7	6.2	1.88*

Assets under management (AUM) (in millions)									
Total AUM	10,330.5	30,805.5	2.34**	7,946.8	11,946.6	4.06***	10,569.2	44,121.1	4.20***
Passive AUM	10,327.6	30,805.2	2.34**				7,742.2	29,777.6	2.94***
Active AUM				7,946.8	11,946.6	4.06***	2,827.0	14,343.5	2.86***
Total AUM per manager	6,635.2	16,396.7	1.55	2,038.9	2,581.4	2.74***	5,497.4	16,719.0	2.59***
Passive AUM per manager	6,634.6	16,396.7	1.55				3,831.9	11,174.4	1.84*
Active AUM per manager				2,038.9	2,581.4	2.74***	1,665.4	5,544.6	2.00**
Revenue per manager (in millions)									
Total domestic equity	11.5	20.9	1.56	18.2	18.9	0.49	12.1	22.1	1.93*
Full universe of industry funds:									
From Morningstar Direct:									
# of funds (all)	28.3	33.6	0.72	4.3	4.6	1.67*	13.3	30.6	2.89***
# Morningstar categories (all)	11.7	13.4	0.74	2.7	3.0	3.01***	6.5	10.4	2.73***
# Prospectus Benchmarks (all)	26.4	30.6	0.58	2.6	2.9	2.89***	8.7	19.4	1.96**
From SEC filings:									
Assets under management (AUM) (in millions)									
Registered investment companies (RIC)									
AUM	29,641.1	69,685.4	2.65***	13,842.1	16,732.4	2.11**	21,131.3	82,259.0	4.39***
Pooled investment vehicles (PIV) AUM	16,347.5	47,835.8	2.14**	953.5	1,325.9	1.60	16,937.9	37,984.7	1.59
Separate accounts AUM	10,644.5	36,693.8	2.51**	3,401.3	2,801.9	(1.16)	13,739.9	25,836.6	1.60
Total AUM	56,633.0	154,215.0	3.28***	18,197.0	20,860.2	1.75*	51,809.0	146,080.3	3.53***
RIC AUM per manager	17,262.9	35,215.9	1.98**	3,921.9	4,502.9	1.78*	10,608.3	29,781.1	3.27***
PIV AUM per manager	6,641.0	18,468.4	2.19**	293.7	422.2	2.33**	7,127.2	13,989.0	1.37
Separate account AUM per manager	4,941.0	17,108.5	2.52**	1,122.6	824.5	(1.49)	5,637.4	9,677.7	1.25
Total AUM per manager	28,565.2	69,481.7	3.11***	4,944.7	5,260.0	1.02	23,228.0	52,479.7	2.68***
Revenue per manager (in millions):									
Total (all clientele account types)	48.4	98.7	2.86***	39.4	35.2	-1.47	46.4	93.3	2.60**

Panel B: Tests of differences between manager types

	Passive - Active		Passive - Hybrid		Active - Hybrid	
	$Y_i = \alpha + \beta Passive_i + \epsilon_i$		$Y_i = \alpha + \beta Passive_i + \epsilon_i$		$Y_i = \alpha + \beta Active_i + \epsilon_i$	
	Coef. β	T-stat	Coef. β	T-stat	Coef. β	T-stat
	(1)	(2)	(3)	(4)	(5)	(6)
Domestic equity main sample:						
Number of funds and styles:						
# of funds per manager	4.5	(3.57)***	-3.5	(-1.63)	-8.1	(-4.13)***
# of passive funds per manager			1.8	(1.11)	-2.7	(-2.12)**
# of active funds per manager						
# of Morningstar categories per manager	1.9	(4.49)***	-0.6	(-1.04)	-2.5	(-5.82)***
# of Lipper categories per manager	2.6	(4.79)***	-0.5	(-0.70)	-3.1	(-6.18)***
# of Prospectus Benchmarks per manager	4.8	(3.90)***	1.1	(0.75)	-3.7	(-3.55)***
Assets under management (AUM) (in millions)						
Total AUM	15,892.8	(1.68)*	-1,204.2	(-0.12)	-17,096.9	(-2.33)**
Passive AUM			7,245.7	(0.73)		
Active AUM					3,860.3	(1.51)
Total AUM per manager	14,753.8	(2.01)**	5,556.8	(0.72)	-9,197.0	(-2.62)***
Passive AUM per manager			9,164.8	(1.19)		
Active AUM per manager					-747.0	(-0.67)
Revenue per manager (in millions)	-0.2	(-0.03)	4.0	(0.52)	4.1	(0.95)
Full universe of industry funds:						
From Morningstar Direct:						
# of funds (all)	29.2	(4.70)***	10.0	(1.36)	-19.2	(-3.58)***
# Morningstar categories (all)	10.4	(6.17)***	4.3	(2.31)**	-6.0	(-5.03)***
# Prospectus Benchmarks (all)	28.3	(4.67)***	15.5	(2.24)**	-12.8	(-2.83)***
From SEC filings:						
Assets under management (AUM) (in millions)						
Registered investment companies (RIC) AUM	39,547.4	(2.74)***	2,430.7	(0.15)	-37,116.7	(-2.53)**
Pooled investment vehicles (PIV) AUM	31,771.9	(3.35)***	2,859.6	(0.22)	-28,912.3	(-2.62)***
Separate accounts AUM	23,532.4	(3.07)***	3,200.5	(0.33)	-20,332.0	(-2.75)***
Total AUM	94,851.7	(4.10)***	8,490.8	(0.30)	-86,361.0	(-3.14)***

RIC AUM per manager	29,952.5	(3.18)***	12,666.2	(1.28)	-17,286.3	(-3.32)***
PIV AUM per manager	13,668.7	(3.65)***	2,131.7	(0.39)	-11,537.0	(-2.59)***
Separate account AUM per manager	11,966.4	(3.24)***	3,612.8	(0.79)	-8,353.6	(-2.57)**
Total AUM per manager	54,878.9	(4.78)***	18,133.9	(1.33)	-36,745.1	(-3.54)***
Revenue per manager (in millions):						
Total (all clientele account types)	73.0	(2.34)**	38.6	(1.13)	-34.5	(-2.06)**

Table 5: Manager characteristics and fund performance

This table presents the results of fixed effects regressions examining the relationship between manager characteristics and fund performance. The unit of analysis is fund-months. Manager characteristics are averaged across members of the team managing the fund. For ease of interpretation, SAT scores are standardized to have a mean of zero and standard deviation of one. All variable definitions are provided in Appendix C. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Standard errors are clustered at the manager level.

Variables	Excess return	Excess return	Four-factor alpha	Four-factor alpha	DGTW	DGTW
SAT 2003	0.024	0.017	0.016	0.016	0.019	0.018
	(3.51)***	(2.75)***	(3.10)***	(3.11)***	(3.50)***	(3.27)***
SAT 2003 * Passive	-0.049	-0.030	-0.018	-0.014	-0.030	-0.029
	(-3.53)***	(-2.27)**	(-2.06)**	(-1.80)*	(-3.27)***	(-3.18)***
Passive	0.154	0.077	0.046	0.041	-0.027	-0.028
	(9.87)***	(5.05)***	(4.35)***	(3.78)***	(-1.93)*	(-1.92)*
Percent MBA	0.037	0.031	0.011	0.016	-0.004	-0.003
	(2.59)***	(2.29)**	(0.93)	(1.33)	(-0.35)	(-0.26)
Percent PhD	-0.140	-0.099	-0.052	-0.040	-0.023	-0.019
	(-3.62)***	(-2.60)***	(-1.98)**	(-1.52)	(-0.84)	(-0.67)
Percent connected	-0.032	-0.017	-0.050	-0.042	-0.023	-0.023
	(-1.83)*	(-1.00)	(-3.66)***	(-3.22)***	(-1.79)*	(-1.82)*
Log (Fund age)	0.025	0.033	0.013	0.016	0.009	0.016
	(3.42)***	(4.85)***	(2.31)**	(2.82)***	(1.30)	(2.14)**
Log (Fund TNA)	0.011	0.001	-0.001	-0.003	-0.008	-0.009
	(3.46)***	(0.28)	(-0.29)	(-1.27)	(-2.37)**	(-2.71)***
Turnover	0.049	0.032	0.031	0.030	-0.019	-0.020
	(2.32)**	(1.63)	(3.94)***	(3.78)***	(-1.29)	(-1.39)
Expense ratio	14.576	4.260	0.772	-1.763	-0.904	-1.416
	(9.94)***	(2.83)***	(0.69)	(-1.50)	(-0.68)	(-1.05)
Year-month FEs	Yes	Yes	Yes	Yes	Yes	Yes
Style FEs	No	Yes	No	Yes	No	Yes
Observations	116034	116034	113994	113994	82273	82273
R-squared	0.866	0.866	0.096	0.097	0.025	0.025
p-value (Wald test of $B_1 + B_2 = 0$)	0.060*	0.293	0.811	0.835	0.168	0.153

Table 6: Comparison of time-invariant manager characteristics between manager types

We define a manager as active if they *exclusively* manage active funds or ETFs in 85% or more of the years of their career as a portfolio manager during our sample, and we define a passive manager analogously using the 85% threshold. All other managers are put into a third hybrid category, which contains managers who either tend to manage both passive and active assets simultaneously, or their career years are more evenly divided between exclusively active or exclusively passive management. Thus, managers are placed into three mutually exclusive categories, and the total 2,060 managers represent all unique managers in our sample over the 2004 to 2016 sample period. All variable definitions are provided in Appendix C. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively.

	Top 35 managers			Big 3 managers			T-tests (Top 35)			T-tests (Big 3)		
	Passive	Active	Hybrid	Passive	Active	Hybrid	Passive-Active	Passive-Hybrid	Active-Hybrid	Passive-Active	Passive-Hybrid	Active-Hybrid
Number of managers	96	1,865	99	26	207	26						
MBA	40.6%	57.1%	45.5%	46.2%	55.6%	46.2%	-3.18***	-0.68	2.28**	-0.91	0.00	0.91
PhD	2.1%	4.7%	12.1%	0.0%	3.4%	3.8%	-1.19	-2.75***	-3.31***	-0.95	-1.00	-0.12
SAT score (2003)	1205.1	1267.6	1217.1	1180.9	1280.6	1195.0	-3.80***	-0.55	3.33***	-3.50***	-0.39	2.90***
SAT percentile	75.3	81.9	74.1	74.1	83.4	71.4	-3.53***	0.46	4.39***	-2.82***	0.58	3.47***
Elite school	6.9%	26.7%	19.8%	3.8%	30.9%	16.0%	-4.14***	-2.57**	1.50	-2.94***	-1.46	1.55
Connected school	17.4%	43.3%	29.5%	11.5%	45.1%	16.0%	-4.77***	-1.91*	2.66***	-3.33***	-0.45	2.81***
Experience at hire	2.9	5.8	3.3	3.2	6.2	4.0	-4.46***	-0.65	3.85***	-2.48**	-0.64	1.89*
Minority	21.2%	9.7%	14.8%	27.8%	7.3%	5.3%	2.68***	0.88	-1.28	2.76***	1.90*	0.32
Female	15.6%	11.8%	10.1%	26.9%	8.7%	11.5%	1.11	1.15	0.53	2.87***	1.41	-0.48
Quantitative major	25.0%	21.3%	44.4%	8.3%	18.2%	21.7%	0.77	-2.59***	-4.88***	-1.19	-1.29	-0.40
Hedge fund	12.5%	12.1%	43.3%	19.2%	18.4%	53.8%	0.11	-5.08***	-9.01***	0.11	-2.72***	-4.23***

Table 7: Manager official job titles within their families as a measure of manager status

This table shows the average industry experience as reported in Table 5 and the Total assets under management (AUM) as reported in Table 4 for each category of titles. We hand collect official titles at the advisory firm level for all manager-years from fund prospectuses. In other words, our focus is the manager's title at their employer advisory firm, and thus we ignore any official titles at the fund level (e.g., lead manager or vice-president).

Official job title category	Number of manager-years	Percent of total number of manager-years	Industry experience (years)	Total AUM across all three client account types (in millions	Revenues per manager (in millions)
Assistant managers and portfolio analysts	468	4.5%	6.5	14,310.3	33.4
Portfolio managers and vice presidents	4,374	42.2%	7.8	18,774.7	37.6
Senior portfolio managers	1,248	12.0%	8.5	25,754.0	36.0
Managing directors	1,207	11.6%	10.0	40,645.4	50.0
Senior managing directors and senior vice presidents	2,130	20.5%	11.2	60,859.1	73.1
Top management (CEO, CIO, COO, Chairman)	941	9.1%	15.7	32,455.5	64.2

Table 8: Multivariate regressions of official job titles

This table presents results of multivariate regressions examining the differences in job titles between active, hybrid, and passive managers. We hand collect official titles at the advisory firm level for all manager-years from fund prospectuses. In other words, our focus is the manager's title at their employer advisory firm, and thus we ignore any official titles at the fund level (e.g., lead manager or vice-president). We define a manager as active if they *exclusively* manage active funds or ETFs in 85% or more of the years of their career as a portfolio manager during our sample, and we define a passive manager analogously using the 85% threshold. All other managers are put into a third hybrid category, which contains managers who either tend to manage both passive and active assets simultaneously, or their career years are more evenly divided between exclusively active or exclusively passive management. Passive managers are the omitted category in this regression. All variable definitions are provided in Appendix C. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Standard errors are clustered at the manager level.

	Full sample		2005-2010 sub-sample		2011-2016 sub-sample	
	(1)	(2)	(3)	(4)	(5)	(6)
Active manager	0.385	0.381	0.335	0.334	0.456	0.458
	(2.417)**	(2.413)**	(2.153)**	(2.142)**	(2.474)**	(2.477)**
Hybrid manager	-0.132	-0.135	0.188	0.185	-0.445	-0.440
	(-0.689)	(-0.715)	(0.875)	(0.860)	(-2.186)**	(-2.156)**
RIC AUM	0.003	0.003	0.003	0.003	0.002	0.002
	(3.241)***	(3.363)***	(2.772)***	(2.749)***	(2.562)**	(2.629)***
Total AUM	0.001	0.001	0.002	0.002	0.001	0.001
	(2.208)**	(2.323)**	(1.655)*	(1.657)*	(2.493)**	(2.482)**
Industry experience	0.056	0.059	0.061	0.062	0.054	0.054
	(10.332)***	(10.415)***	(8.922)***	(8.916)***	(9.121)***	(9.110)***
MBA	0.001	-0.005	-0.036	-0.038	0.024	0.022
	(0.007)	(-0.061)	(-0.427)	(-0.451)	(0.267)	(0.251)
PhD	0.671	0.653	0.394	0.384	0.953	0.958
	(2.950)***	(2.859)***	(1.494)	(1.452)	(3.257)***	(3.269)***
Female	-0.152	-0.143	-0.137	-0.136	-0.165	-0.160
	(-1.369)	(-1.283)	(-1.069)	(-1.059)	(-1.236)	(-1.202)
SAT score (2003)	0.000	0.000	0.000	0.000	0.000	0.000
	(0.667)	(0.636)	(0.431)	(0.441)	(0.507)	(0.512)
Year FE	No	Yes	No	Yes	No	Yes
Observations	9,082	9,082	4,596	4,596	4,486	4,486
R^2	0.124	0.130	0.139	0.141	0.130	0.130

Table 9: Manager income across manager types

This table presents the analysis of differences in manager income across manager types. Manager's stated income is obtained from data provided by the Home Mortgage Disclosure Act (HMDA). Information on a fund manager's real estate transactions, property address, mortgage loan amount, lender is obtained from Lexis Nexis public records, which are then matched to HMDA data based on census tract, loan amount, lender, and whether the property is a refinancing. Panel A presents the summary statistics. Unique matches are transactions for which we obtain a unique match based on all matching variables. All matches include unique matches as well as transactions for which we obtain more than one match for each transaction. For each transaction with multiple matches, we average the stated income across all matches. Panel B presents the results of multivariate regressions of the determinants of manager income. Hybrid and passive managers are the omitted group in these regressions. All variable definitions are provided in Appendix C. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% level, respectively. Standard errors are robust.

Panel A: Manager income summary statistics

	Passive managers	Active managers	Hybrid managers
Unique matches			
Number of manager-years	24	324	34
Mean income ($000)	448	810	497
Median income ($000)	281	400	300
Standard deviation ($000)	677	1,169	441
Loan amount ($000)	705	876	852
All matches			
Number of manager-years	24	361	41
Mean income ($000)	448	802	450
Median income ($000)	281	379	279
Standard deviation ($000)	677	1,160	419
Loan amount ($000)	705	868	785

Panel B: Multivariate regressions of manager income

	Log of manager income	
	(1)	(2)
Active	0.429	0.424
	(4.063)***	(4.081)***
MBA	0.042	0.062
	(0.459)	(0.681)
PhD	-0.394	-0.383
	(-1.927)*	(-1.864)*
Female	-0.040	-0.056
	(-0.288)	(-0.402)
Industry experience	0.010	0.009
	(1.116)	(0.924)
Log (median family income of metro area)	0.432	0.497
	(1.802)*	(1.949)*
Manager's official job title category	0.177	0.175
	(4.668)***	(4.743)***
Year FE	No	Yes
Observations	420	420
R^2	0.090	0.106