The Use of ETFs by Actively Managed Mutual Funds[*]

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Abstract

Nearly one-fourth of actively managed mutual funds hold ETFs, and when holding, take average positions of 13.16% of TNA. In light of this, we provide the first examination of ETFs within mutual fund portfolios. We find that funds holding ETFs in smaller amounts manage cash better and have improved market timing ability. In contrast, funds that hold larger ETF positions hold more cash, have poor market timing ability, and generate a negative alpha of 2.14% per year. Our results are consistent with a small allocation to ETF positions being associated with marginal benefits, while larger positions are associated with a lack of ability.

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I. Introduction

Since 2004, the number of domestic equity mutual funds available to investors decreased from 3,651 to 3,239. However, the mutual fund industry still saw tremendous growth in total net assets. The market for domestic equity mutual funds grew from $3.6 trillion as of 2004 to over $6.2 trillion in 2014 and average fund size increased from $993 million to $1.925 billion. During that same period, the exchange-traded fund market grew from $228 billion to over $1.97 trillion, representing growth of 765% (ICI Fact Book 2015). While ETFs are not typically thought of as a primary investment vehicle for actively managed mutual funds, the use of ETFs within mutual fund portfolios has grown significantly, mirroring the growth of ETFs in the overall market. In 2004, 7.69% of actively managed domestic equity mutual funds held a passive ETF and by 2014 that had risen to 24.05% of funds. If actively managed mutual funds are designed to provide investors with benefits beyond what can be obtained through the use of a passive investment, it warrants examination into the increasing use of passive ETFs within actively managed portfolios.[1]

To examine the use of ETFs within actively managed mutual fund portfolios, we first determine which mutual fund characteristics are associated with holding ETF positions and which ETF characteristics are most appealing to a mutual fund. We then provide an examination of the performance of mutual funds that hold ETF positions versus those that do not. For every piece of support in the literature showing that the typical mutual fund fails to generate positive risk-adjusted performance, there is an offsetting piece of support extoling mutual fund ability. [2] Given the dichotomous nature of research on actively managed mutual fund performance, and the importance

[1] To examine passive ETFs, we remove any ETF that is classified as "active" within the Morningstar Direct database.

[2] See Chen et al. 2000, Frank et al. 2004, Grinblatt and Titman 1989, and 1993, Grinblatt et al. 1995, and Wermers 2000, among others for support of mutual fund ability. See Carhart 1997, French 2008, Jensen 1968, and Malkiel 1995, among others for support of a lack of ability amongst mutual funds.

of performance to these funds, we seek to answer the question, "Are ETFs being used by actively managed mutual funds to improve their performance?" If ETF usage is not associated with an increase in fund performance, their usefulness within actively managed mutual fund portfolios comes into question.

Marchioni and Niall (2013) suggest that an alternative use of ETF positions is tactical asset allocation. The use of ETFs to quickly move into and out of the markets makes them an attractive vehicle for use in a market timing strategy. In explaining performance, we examine if ETF-user mutual funds time the markets. ETFs can also be used by mutual funds to mitigate liquidity-related problems, which in turn may impact fund performance. Specifically, by allocating assets to liquid ETF positions, ETF-user mutual funds may be better able to manage large in- and out-flows, motivating our examination of flow management. Marchioni and Niall (2013) suggest that another use of ETFs is in cash management. Rather than investing excess cash in the risk free rate, mutual funds can place excess cash into ETF positions. We examine this hypothesis by exploring the relationship between cash held and ETF usage.

Utilizing a sample of 956 passive ETFs that have been held by a mutual fund, we find preferences for ETFs are consistent with the findings of Falkenstein (1996) on mutual funds' stock preferences. Mutual funds prefer ETFs that are larger, are older, have higher volume, have lower expense ratios, and that have smaller bid/ask spreads.

An actively managed mutual fund's most visible characteristic is its performance. Thus, if an ETF's usage is not associated with an increase in performance, their usefulness comes into question. Through the examination of risk-adjusted performance measures, we find that holding an ETF is significantly associated with underperformance. Mutual funds that hold ETFs generate a statistically significant alpha of negative 1.24% per year when measured with a 5-factor model

using gross returns. Compared to a sample of mutual funds that never hold an ETF, we find mutual funds that hold ETFs underperform by 1.03% per year. We further subdivide our sample into low-, mid-, and high-ETF-user terciles based on the proportion of their portfolio invested in ETFs. Our results using terciles find that the underperformance is being driven almost entirely by the funds within the high-user tercile, generating an annualized 5-factor alpha of negative 2.14%. When compared to the sample of non-ETF-user funds, the high-user tercile underperforms by 1.94% per year, while funds within the low-user tercile generate annualized 5-factor alphas which are not significantly different than non-ETF-user mutual funds. We further examine mutual fund performance under a multivariate framework, controlling for fund and family characteristics, and confirm our result of underperformance. Our findings suggest that it is primarily underperforming mutual funds that utilize ETFs in larger proportions. Additionally, we find that there is performance persistence among mutual funds that hold ETFs, which is concentrated among the poorest performing funds. This indicates that the underperformance associated with ETF use may not be random, and may be indicative of a true inability to outperform.

ETFs can allow mutual funds to move into and out of markets with relative ease when compared to purchasing securities directly, greatly improving a fund's ability to tactically allocate assets or time markets (Marchioni and Niall 2013). To determine if ETFs are being used to improve a fund's market timing ability, we utilize the methodologies of Henriksson and Merton (1981) and Treynor and Mazuy (1966), which are subsequently used by Bollen and Busse (2001), Edelen (1999), and Frino et al. (2009), among others. Consistent with prior studies, we find that in general, mutual funds have poor market timing ability. However, we find that high-ETF-user mutual funds are the worst market timing funds and time markets significantly worse than non-ETF-user funds, while mutual funds within the low-user tercile exhibit significantly better market timing ability

than non-ETF-user funds, and in some specifications display a marginal ability to positively time the market. This indicates that there may be benefits associated with holding ETF positions in moderation.

In examining liquidity management ability among mutual funds, we begin with an analysis of flow management by examining the impact that holding ETFs has on a fund's ability to manage large in- and out-flows. Following methods utilized by Frino et al. (2009), Rakowski (2010), and Rohleder et al. (2015), we find that ETF-holding mutual funds, regardless of tercile of usage, possess no additional ability to manage flows. We then examine cash management as related to ETF holdings following the work of Yan (2006) and find that ETF-user mutual funds within the high-user tercile hold greater cash than other funds, indicating that high-ETF-user mutual funds are using ETFs in a way that is in contrast to the literature's suggestion that ETF positions can be used as an alternative to cash holdings. However, funds within the low tercile of ETF usage hold marginally less cash, indicating that low-ETF-user mutual funds may be extracting a benefit from their ETF positions in the form of reducing the performance drag associated with holding cash.

Our paper contributes to the literature in several ways. The extant literature on mutual funds and ETFs fails to examine the role that ETFs play within a mutual fund's portfolio. Although Chen et al. (2013) examine the role of short selling within a fund's portfolio, Cici and Palacios (2015) and Koski and Pontiff (1999) examine the use of derivatives within a fund's portfolio, and Falkenstein (1996) studies mutual fund holding preferences of stocks, no paper to date has provided a detailed examination of the relationship between passive ETF holdings and mutual fund performance. In this regard, our paper is the first in-depth analysis of this topic.

In a broader sense, our study contributes to the overall issue of mutual fund performance. Dating back to Jensen (1968), the performance of actively managed mutual funds has been a topic

of debate. We herein add to the literature on active management, as we examine the performance of mutual funds that hold ETFs and show that they generate a negative risk-adjusted alpha. However, this result is driven primarily by mutual funds within the top two terciles of ETF-user groups, while low-ETF-user mutual funds generate alphas which are statistically equivalent to the non-ETF-user mutual funds. We add to the literature on market timing by showing that ETF-holding mutual funds within the top tercile of usage have inferior timing ability, while those within the bottom tercile of use exhibit improved timing ability.

In explaining this underperformance, we add to the literature on liquidity management by showing that ETF-holding mutual funds do not utilize ETF positions to better manage flow risk. We also show that in general, ETF positions are not being used to replace cash holdings. When examined by tercile of ETF usage, we find that mutual funds among the top tercile of ETF-holding mutual funds are holding more cash, while funds within the bottom tercile of ETF use hold less cash. Overall, our results demonstrate the marginal benefits associated with moderate ETF usage, while failing to find benefits associated with larger positions. These findings are consistent with the notion that actively managed mutual funds derive their value from being "active," while ETF positions represent a passive investment.

The remainder of our paper is organized as follows: Section II describes the data, our sample creation, descriptive statistics, and the mutual fund characteristics most associated with holding an ETF. Section III examines mutual fund performance. Section IV examines market timing benefits of holding ETFs. Section V examines the liquidity management benefits of ETFs as related to fund performance and Section VI concludes.

II. Data, Sample Creation, and ETF Descriptive Statistics

A. Data

We utilize the Center for Research in Security Prices Survivor-Bias-Free US Mutual Fund Database (hereafter CRSP MF) to obtain data on mutual fund returns, holdings, mutual fund characteristics, and family characteristics to analyze actively managed domestic equity mutual funds from January 2004 through year-end 2014. We begin our sample in 2004 because this is the first full year that CRSP MF begins reporting holdings with consistency. Within CRSP MF, most variables are reported at the share-class level. To avoid counting each share-class as a unique mutual fund, we aggregate share-classes belonging to the same mutual fund into one total net asset weighted portfolio observation.[3] Mutual fund and fund family variables are retained at monthly frequencies for analysis, unless otherwise noted. The Morningstar Direct database provides ETF characteristics such as identifier variables for inverse and leveraged ETFs. ETF prices, returns, bid/ask spreads, shares outstanding, and volume traded are obtained from the CRSP US Stock database (hereafter CRSP). Data from CRSP MF, Morningstar, and CRSP are merged together by CUSIP. Those observations with missing data are removed from our sample.

To construct our sample of actively managed domestic equity mutual funds that hold ETFs, we group mutual funds into quartiles based on the percent of periods the mutual fund holds an ETF and drop those mutual funds within the bottom quartile to ensure the mutual fund is "actively" holding an ETF position (as opposed to buying an ETF one time and never holding one again).[4,5] Like Chen et al. (2013), we use monthly holdings data to update our ETF positions and assume a maximum holding period of six months if a mutual fund has missing holdings data.[6] After six

[3] As detailed in the *CRSP Survivor-Bias-Free Mutual Fund Guide*, we utilize the CRSP Fund Header when aggregating to the portfolio level. If the portno is missing, then the portno is obtained from the Portno Map file.
[4] With no clear cutoff as to what constitutes an active participant in ETFs, we utilize quartiles. The resulting cutoff for being actively engaged in ETF positions falls at 24.5% of reported periods, meaning that all mutual funds that hold an ETF, but that do so for less than 24.5% of their reported holding periods are dropped from the sample.
[5] For mutual funds that hold ETFs, we exclude observations prior to the first ETF holding.
[6] When monthly holdings are not available, we use quarterly holdings subject to the same six-month restriction.

consecutive months (two quarters) with no updated holdings data, we set the fund's holdings to missing. We require funds to have 18 months of observations for an accurate calculation of risk-adjusted performance. Finally, we identify domestic equity mutual funds as funds with "ED" as their CRSP MF objective code. To ensure our sample contains only actively managed mutual funds, we drop mutual funds identified as "index funds," and, to ensure we retain only passively managed ETFs, we drop any ETF identified as "actively managed." This results in a sample size of 1,145 actively managed domestic equity mutual funds with passive ETF positions.

[Insert Figure 1 and Figure 2]

We begin by analyzing the data on passive ETF positions within actively managed domestic equity mutual funds. As shown in Figure 1, there has been an increase in the proportion of actively managed domestic equity mutual funds that hold ETFs, growing from 7.69% in 2004 to 24.05% in 2014. Figure 2 shows that the number of unique ETFs held by any actively managed domestic equity mutual fund during a given year increases over time, reaching 523 in 2014. Combined, we show that the growth ETF positions are experiencing is widely spread amongst ETFs rather than being concentrated among a select few. This growth of ETF utilization by actively managed mutual funds is the underlying motivation for the following analyses.

Table 1 shows that, on average, when actively managed domestic equity mutual funds hold ETFs, they take average (median) long ETF positions of 13.16% (2.15%) of total net assets while holding 3.86 (1.00) separate ETFs. When we look at ETF holdings by tercile of ETF use (which is created by ranking the average lifetime percent of portfolio TNA attributed to ETF positions for each ETF-holding mutual fund), we see large differences between the groups. Low-users have

total average (median) positions of 0.76% (0.63%) of TNA, mid-users allocate 2.43% (2.02%) of TNA to ETF positions, and high-users take positions of 34.43% (17.49%) of TNA. As a result of the large differences between ETF usages amongst terciles, many subsequent analyses are done by subgroup of ETF usage.

[Insert Table 1 Here]

B. ETF Characteristics

Table 2 provides descriptive statistics on ETFs that have been held by mutual funds (956 unique ETFs) and those that have never been held (677 unique ETFs). We use *t*-tests to analyze the differences between these ETFs based on mutual fund ownership. Our results show that mutual fund preferences for ETFs are similar to many of the stock preferences found in Falkenstein (1996), with preference given to larger ETFs, older ETFs, ETFs with lower expense ratios, ETFs from larger families, ETFs with greater volume traded, ETFs that trade at a smaller premium, and ETFs with smaller Bid/Ask spreads.

[Insert Table 2 Here]

C. Mutual Fund Characteristics

To examine the mutual fund characteristics associated with holding an ETF, Table 3 provides descriptive statistics of our ETF-holding and non-ETF holding mutual funds. Differences between the sample means are statistically significant and show that, on average, funds that hold

ETFs are smaller, younger, charge slightly higher expense ratios, have larger annual turnover, are members of smaller families, have smaller monthly flows, and hold higher amounts of cash.

[Insert Table 3 Here]

We further examine what mutual fund characteristics are associated with holding an ETF following the methodology of Koski and Pontiff (1999) with a logit regression defined as:

$$ETF_i = \beta_0 + \sum_{j=1}^{n} \beta_j X_i + \varepsilon_i \qquad (\mathbf{1})$$

where ETF_i is an indicator variable that takes on a value of 1 if the mutual fund is an ETF user and 0 if they are not an ETF user. The control variables include the log of average total net-assets (TNA) for the mutual fund (*Size*), the average expense ratio (*Expense Ratio*), the log of the age of the mutual fund (*Age*), the average cash held as a percentage of mutual fund TNA (*Percent Cash*), an indicator variable if the mutual fund charges a front or back load fee (*Load*), the average turnover (*Turnover*), and the log of the average mutual fund family TNA (*Fam. Size*). All variables are averaged over the sample period.

In Table 4, we report the results from our logit regression and find mixed results among ETF usage groups. For low-ETF-user mutual funds, size, age, and turnover are positively associated with holding an ETF, while cash held is negatively associated. This could indicate that low-ETF-users manage cash more efficiently than mutual funds not using ETFs. Mid-users are positively associated with age and turnover and are negatively associated with size and charging a load. In contrast, high-user funds are positively associated with turnover and cash, indicating they

may do a worse job at managing cash, and are negatively associated with fund size, age, and family size.

[Insert Table 4 Here]

III. Mutual Fund Performance

A. Performance of a Mutual Fund

In this section, we examine the performance of mutual funds that hold ETFs in their portfolios. As a result of the potential liquidity benefits of holding an ETF, we utilize alpha from the 5-factor model as our main measure of risk adjusted performance (Carhart 1997 and Pastor and Stambaugh 2003).[7] For robustness, we examine a 1- (Jensen 1968), 3- (Fama and French 1993), and 4-factor model (Carhart 1997), with all results qualitatively unchanged. We report results using gross returns because it allows for a more direct comparison between a fund's ability to generate performance and a passive benchmark, which does not include fees (Fama and French 2010). To compute gross monthly returns, we add back one-twelfth of the annual expense ratio to each monthly net return observation. We calculate our risk-adjusted alphas on a sample of mutual funds that actively hold an ETF (as described in Section II.A) and for a sample of mutual funds that never hold an ETF.

B. Performance Results

In Figure 3, we report the risk-adjusted 5-factor alphas estimated from monthly portfolio gross returns obtained from the CRSP MF database. We begin by ranking ETF-user funds into 10

[7] Data for these factors are obtained from Ken French's website and from Robert Stambaugh's website.

groups based on ETF ownership levels and 1 group for non-ETF-user funds. Within each of these groups we calculate the 5-factor alphas for each fund and present the averages. As evident in Figure 3, there are mixed results among low-ETF-user funds, however, among higher usage funds, we find that performance decreases considerably, resulting in substantially negative risk-adjusted performance for funds with larger ETF allocations.

[Insert Figure 3 Here]

In Table 5 we further examine the relationship between ETF-user and non-ETF-user funds through a *t*-test and mean alpha comparison. Panel A reports the results between all ETF-user mutual funds and non-ETF-user mutual funds. Panels B, C, and D report the results by tercile of ETF use. The first two columns report the average performance measure of the ETF-user mutual funds and non-ETF-user mutual funds, respectively, and the third column reports the difference in performance measures between the high-user and non-user samples. Results in Panel A show that with all measures of performance, ETF-user mutual funds significantly underperform, generating a negative alpha of 1.24% per year, while non-ETF-user mutual funds generate alphas close to zero. When compared to non-ETF user funds, ETF-users underperform by 1.03% per year. However, the underperformance does not hold across all terciles of ETF usage. Looking at the low-ETF-user group, we find no statistical difference in performance with the multifactor models. As we move across the mid-ETF-user tercile and into the high-ETF-user tercile we see the underperformance increasing in absolute terms and relative to the non-ETF-user group. Among the high-ETF-user tercile, the 5-factor alpha for ETF-user funds is negative 2.14% per year and ETF-users underperform non-ETF-users by 1.94% per year. This indicates that the act of holding

an ETF is not necessarily associated with negative performance, but holding ETF positions in larger quantities is. These results are consistent with ETF-holding mutual funds underperforming their peers by a significant margin, and should come as no surprise given that these are actively managed mutual funds that take substantial positions in passive investments.

[Insert Table 5 Here]

We further examine the relationship between holding an ETF and mutual fund performance with a cross-sectional regression:

$$\alpha_i = \beta_0 + \beta_1 ETF_i + \sum_{j=2}^{n} \beta_j X_i + OFE_i + FFE_i + \varepsilon_i \qquad (\mathbf{2})$$

where α_i is the risk-adjusted performance of a given mutual fund from our 4- and 5-factor models. The control variables are as stated in equation (1) plus the average standard deviation of returns (*Return Volatility*) and also include indicator variables for if the mutual fund ever held a leveraged ETF (*Leveraged),* an inverse ETF (*Inverse*), or an ETF that is managed by the same family as the mutual fund (*Family). OFE* and *FFE* are objective and fund family fixed effects, respectively.

[Insert Table 6 Here]

Table 6 reports the performance results from equation (2) using a 4-factor alpha in columns 1 – 3 and a 5-factor alpha in columns 4 – 6. Columns 1 and 4 look at the impact of holding an ETF with no control variables. Columns 2 and 5 add in controls as well as objective and family fixed

effects, and in columns 3 and 6 we replace *ETF* with 3 indicator variables signifying which tercile of ETF use a mutual fund belongs to. When compared to mutual funds that do not hold ETFs, we find significant underperformance by the ETF-user mutual funds, with a negative coefficient of 0.09 representing underperformance of 1.03% per year. When we explore the relationship by tercile of ETF use, we find the largest underperforming subgroup is the high-ETF-user funds, with a coefficient of -0.13 representing underperformance of 1.55% per year. In contrast, the funds within the low-user tercile have a coefficient of -0.03 representing underperformance of 0.36% per year, although it is significant at only the 10% level. Our results show that holding an ETF is, on average, consistent with an inability to outperform. However, it is not the low-user funds driving the underperformance, rather it is the funds using ETFs in greater quantities that generate the lowest performance. This result raises questions as to the benefits of investing in an actively managed mutual fund that allocates a large portion of their portfolio to passive ETFs.

C. Performance Persistence

We find that mutual funds holding ETF positions underperform, although we have not yet addressed whether or not this underperformance persists. To examine persistence, we follow Baesel (1974) and Carhart (1997) and compare the consistency of fund rankings through a contingency table of initial and subsequent period performance ranks. However, we are interested in the persistence among mutual funds that hold ETFs rather than within the full sample. To examine this, we rank all mutual funds into deciles each calendar year from 2004 to 2014 based on one-year gross returns.[8] From these rankings, we remove all mutual funds that do not hold an ETF position. The result is a ranking that compares the mutual funds that hold ETFs to all available

[8] Gross returns are used to remove the predictable impact of expenses on performance as described in Carhart (1997).

mutual funds rather than a comparison of ETF-holding mutual funds to other ETF-holding mutual funds. Rankings from the initial year's returns are then paired with rankings from the subsequent year and used to create the contingency table in Figure 4. A ranking of 1 represents the worst performing decile and rank 10 represents the best performing decile. Bar heights represent the probability of a fund being ranked in decile *i* in the subsequent period given its rank in the initial period.

[Insert Figure 4 Here]

When tested with a chi-square statistic, we conclude that the subsequent rankings earned by our mutual funds are non-random and that persistence does exist within the sample. As seen in Figure 4's contingency table, losers are more likely to remain losers than any other outcome. This is evident from the heighted bars concentrated around the initial rankings of 1 through 3 and the subsequent rankings of 1 through 3. Of funds that ranked in the bottom decile in the initial period, nearly 30% remain in the bottom decile in the subsequent period. The other outcome which we find evidence of is last year's winners becoming losers in the subsequent period. This is consistent with prior literature relating to tournament behavior (Brown et al. 1996), where underperforming mutual funds take on additional risk in an attempt to finish the year as a top performing mutual fund, often times as a result of luck. As their luck runs out, they often revert to the lower ranks of performance in subsequent periods. While we find evidence that ranks of the worst performing ETF-holding mutual funds persist over, it appears that the majority of other fund ranks are random.[9] This strengthens our prior findings of underperformance and demonstrates that among

[9] Performance persistence results hold for three-month and six-month month periods as well.

the underperforming mutual funds that hold ETFs, the underperformance does not appear to be random bad luck, but rather an indication of a persistent lack of skill.

IV. Market Timing

The literature posits that one reason an actively managed mutual fund might hold ETF positions is to time the markets (Marchioni and Niall 2013). To examine if ETF-holding mutual funds are using ETFs to better time the markets, we follow the methodologies put forth by Henriksson and Merton (1981) (hereafter HM) and by Treynor and Mazuy (1966) (hereafter TM). The methodology of HM incorporates a measure of the absolute value of market excess return to measure market timing while the TM methodology measures market timing by incorporating a measure of squared excess market return, as in:

$$r_{i,t} - rf_{i,t} = \alpha_i + \sum_{j=1}^{n} \beta_j X_{i,t} + \gamma_i Z_{i,t} + \varepsilon_i \qquad (\mathbf{3})$$

where $X_{i,t}$ represents factors in the 1-, 4-, and 5-factor models. As in Bollen and Busse (2001), the size, book to market, momentum, and liquidity factors are included as controls, but are not used to measure market timing. $Z_{i,t}$ is measured as the absolute value of excess market return in Panel A and as the square of excess market return in Panel B. γ represents the amount of market timing a manager has. In a market with positive (negative) excess market returns, a fund's beta increases (decreases) by the value of γ; thus, positive (negative) market timing ability is indicated with a positive (negative) coefficient on γ.

[Insert Table 7 Here]

Table 7 reports the results from equation (3) using the HM specification in Panel A and the TM specification in Panel B. From left to right, we report the timing coefficient on a sample of non-ETF-user mutual funds, the low-ETF-user tercile of mutual funds, the mid-ETF-user tercile of mutual funds, the high-ETF-user tercile of mutual funds, and the difference between high-user funds and non-ETF-user funds. Consistent with prior literature, our sample of non-ETF-user mutual funds exhibit negative market timing ability. When we examine ETF user funds by usage, we primarily find nonsignificant market timing ability on the low-user funds, with marginal support for market timing ability among the TM specification. However, when we examine the high-ETF-user mutual funds, we find negative market timing ability that is much larger in magnitude. Results are similar under both the HM and TM specifications. Similar to our earlier results, this indicates that ETF use is not necessarily associated with unskilled mutual funds, but rather it is the mutual funds that take on the largest ETF positions that lack skill.

V. Liquidity Management

Literature suggests that actively managed mutual funds may take ETF positions as a way to manage liquidity (Marchioni and Niall 2013). In this regard, we test the relationship between holding an ETF and liquidity management as measured by flow management (Frino et al. 2009, Rakowski 2010, and Rohleder et al. 2015) and cash management (Yan 2006).

A. Flow Management

Holding an ETF position may allow fund managers to more easily deal with large in- and out-flows by removing the need to sell other securities during periods of out-flows and the need to

invest in-flows into suboptimal investments, both of which create a drag on performance (Edelen 1999). Based on the methodology of Frino et al. (2009) and Rohleder et al. (2015), we test the impact of holding an ETF position on flow management with the following OLS cross-sectional regression:

$$\alpha_i = \beta_0 + \beta_1 Flow\ Mgmt_i * ETF\ Rank_i + \sum_{j=2}^{n} \beta_j X_i + FE_i + \varepsilon_i \quad (\mathbf{4})$$

To measure flow risk, we calculate the absolute value of net flows to a fund (Frino et al. 2009). Utilizing this measure of flow risk, we calculate a measure of flow management by interacting the absolute value of net flows with our indicator variables of tercile of ETF usage (similar to the methodology of Rohleder et al. 2015, where they interact flow risk with derivative use). By utilizing an interaction, we are able to interpret the coefficient as the amount of flow risk that is removed from the low-, mid-, and high-use of ETFs (*Low-ETF*Flow Mgmt, Mid-ETF*Flow Mgmt,* and *High-ETF*Flow Mgmt,* respectively). The equation uses the control variables as described in equations (1) and (2) as well as the average mutual fund flow (*Flow*) and the average absolute value of a mutual fund's flows (*Abs Flow*). For the OLS regression, all variables are averaged over the sample period.

Sirri and Tufano (1999) document a positive relationship between fund performance and inflows. As a result, our specification may suffer from endogeneity issues (Rakowski 2010) when using the absolute value of flow in explaining fund returns. To alleviate these concerns, we employ a two-stage least squares (2SLS) regression as well. In the first pass of the 2SLS, we regress absolute flows on our instrumental variable, lagged performance and lagged control variables as in the following:

$$Absolute\ Flows_{i,t} = \beta_0 + \sum_{j=2}^{n} \beta_j X_{i,t} + FE_i + \varepsilon_i \,. \qquad (\mathbf{4a})$$

In the second stage, we replace absolute flow with the predicted value of absolute flow from our first stage. For the 2SLS, all variables are calculated annually.

We report the results of our flow management analysis in Table 8. Columns 1 – 3 measure performance with a 4-factor alpha and columns 4 – 6 measure performance with a 5-factor alpha. Results from the OLS model are reported in columns 1, 2, 4, and 5, while the 2SLS results are reported in columns 3 and 6. In all specifications of our model, we find a negative and significant relationship between the absolute value of flow and mutual fund performance. Interestingly, we do not find support for the use of ETFs providing any flow management benefit. This is a distinctly different result than what has been shown in the literature when examining how mutual funds utilize derivative positions (Frino et al. 2009 and Rohleder et al. 2015).

[Insert Table 8 Here]

B. Cash Management

The negative performance effects of holding cash have been documented in the literature (Wermers 2000). The relative ease of moving into and out of ETF positions provides managers with a method for offsetting the drag of holding cash by providing instant exposure to the markets. To examine if ETFs are replacing cash holdings within mutual fund portfolios, we follow the methodology of Yan (2006), regressing percent cash on control variables and an indicator of ETF holding mutual funds as:

$$Percent\ Cash_i = \beta_0 + \beta_1 ETF\ Rank_i + \sum_{j=2}^{n} \beta_j X_i + OFE_i + FFE_i + \varepsilon_i \quad (\mathbf{5})$$

where the dependent variable, *Percent Cash*, is the average percent cash held by a mutual fund over the sample period. The variable of interest, *ETF Rank,* represents three separate dummy variables taking on the value of 1 if a mutual fund is in the low-user, mid-user, or high-user tercile, respectively, and 0 otherwise. All control variables are as stated in equation (1) and (2).

The results are presented in Table 9. Column 1 presents the coefficients on low-, mid-, and high-ETF-users (*ETF Rank*) with no control variables, column 2 incorporates our controls, and column 3 is our full model specification as in equation (5). Contrary to suggestions in the literature, we find strong support that high-ETF-user mutual funds hold more cash. This is indicative of mutual funds with high ETF positions also managing cash poorly if one assumes they are trying to avoid the established performance drag from large cash positions. We do find mild support for low-ETF-users having smaller cash positions. Given the high percentage of portfolio TNA that high- and mid-users allocate to their ETF positions, it is not surprising that they may have other intended uses ETFs, while the results among the low-user subgroup are more consistent with skilled cash management. In contrast to other funds, low-ETF-user mutual funds have portfolios with cash holdings that are lower by 0.68%, which is approximately the value that the average fund within the low-user subgroup attributes to ETF positions (0.76%). Overall, the table suggests that high-ETF-use mutual funds do not use ETFs as a substitute for cash and, in fact, hold higher cash reserves than the average fund.

[Insert Table 9 Here]

VI. Conclusion

In this paper, we contribute to the literature on both mutual funds and exchange-traded funds by conducting the first detailed examination on the use of ETF holdings. The rapid growth experienced by ETFs over the past decade, combined with their prevalence within actively managed mutual fund portfolios suggests that research on this topic is important from both an academic and practitioner's standpoint. Thus, we examine the association between mutual fund performance and ETF positions as well as performance related characteristics such as liquidity management, cash management, and market timing ability.

Through the examination of risk-adjusted performance measures by subgroups of low-, mid-, and high-ETF-user terciles, we show that the underperformance of ETF-holding mutual funds is being driven almost entirely by the funds within the high-user tercile, generating an annualized 5-factor alpha of negative 2.14% and underperforming non-ETF-user funds by 1.94% per year. The underperformance among high-ETF-user mutual funds holds after controlling for fund and family characteristics. Compared to high-user mutual funds, those in the bottom tercile of ETF usage differ very little from non-ETF-user mutual funds, with marginal underperformance of 0.36% per year. Our findings suggest that it is primarily the actively managed mutual funds that utilize passive ETFs in larger quantities that underperform. We find that the underperformance found among ETF-user mutual funds is persistent over time, providing evidence that may be a true indication of a lack of ability.

The ease with which ETFs allow mutual funds to move into and out of markets make them excellent candidates for use with market timing strategies. Despite this potential benefit, we find

that high-ETF-user mutual funds time markets significantly worse than non-ETF-user funds. However, mutual funds within the low-user tercile exhibit significantly better market timing ability than non-ETF-user funds, and display a marginal ability to positively time the market. This indicates that there may be benefits associated with holding ETF positions in moderation.

Our analysis of liquidity management ability among mutual funds finds no evidence of an additional ability to manage flows within any tercile of ETF use. These results are contrary with suggestions in the literature that ETF positions can be used to manage flows. We examine cash management as related to ETF holdings and show that funds within the top tercile of ETF usage hold greater cash than other funds, while funds within the low-user tercile display a marginal decrease in cash holdings of a magnitude similar to their ETF positions.

Although our overall results in regards to the benefits provided to actively managed mutual funds from ETF positions are mixed, the results become more compelling when we examine ETF usage by tercile of use. We find that low-ETF-user mutual funds exhibit many of the same qualities that non-ETF mutual funds exhibit, which is not surprising given that low-ETF-user mutual funds allocate just 0.76% of their portfolios to ETF positions. However, we do find that low-ETF-user mutual funds reduce cash positions relative to non-ETF-user mutual funds by approximately the same percent of TNA that they allocate to ETF positions. We also find that low- ETF-user mutual funds time markets substantially better than other funds within our sample. However, the benefits of holding ETF positions are limited to those in the low-ETF-user group. Actively managed mutual funds that allocate substantial portions of their portfolios to ETF positions exhibit no redeeming qualities. They are uniformly the worst performing funds in our sample; holding increased cash positions, possessing poor market timing ability, and generating negative risk-adjusted performance. Given that actively managed mutual funds are designed to provide investors with

benefits that cannot be accomplished through passive management, it comes as no surprise that actively managed mutual funds that allocated substantial portions of their portfolios to a passive investment fail to create value for investors.

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Figure 1
Mutual funds using ETFs over time

Figure 1 shows the percentage of individual mutual funds that hold at least one ETF during the year relative to all mutual funds in a given year from January 2004 to December 2014.

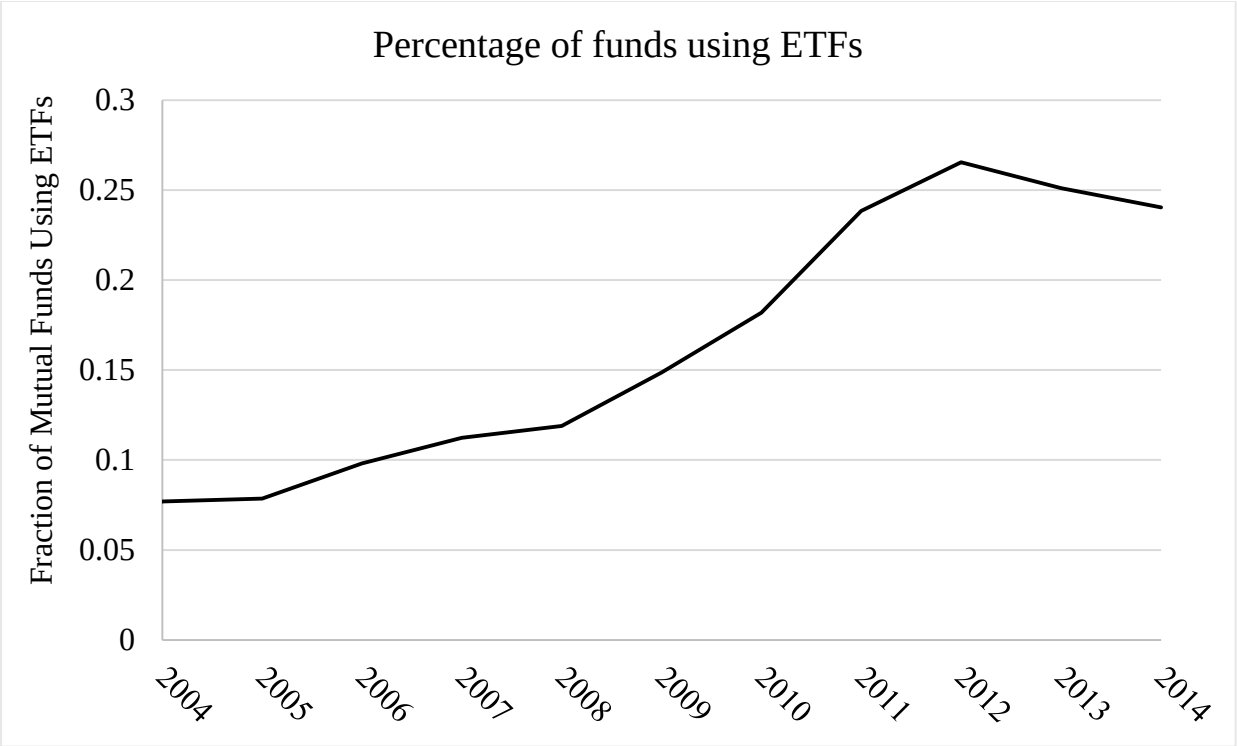

Figure 2
Number of ETFs held by mutual funds over time

Figure 2 shows the number of individual ETFs that are held by domestic equity mutual funds in a given year from January 2004 to December 2014.

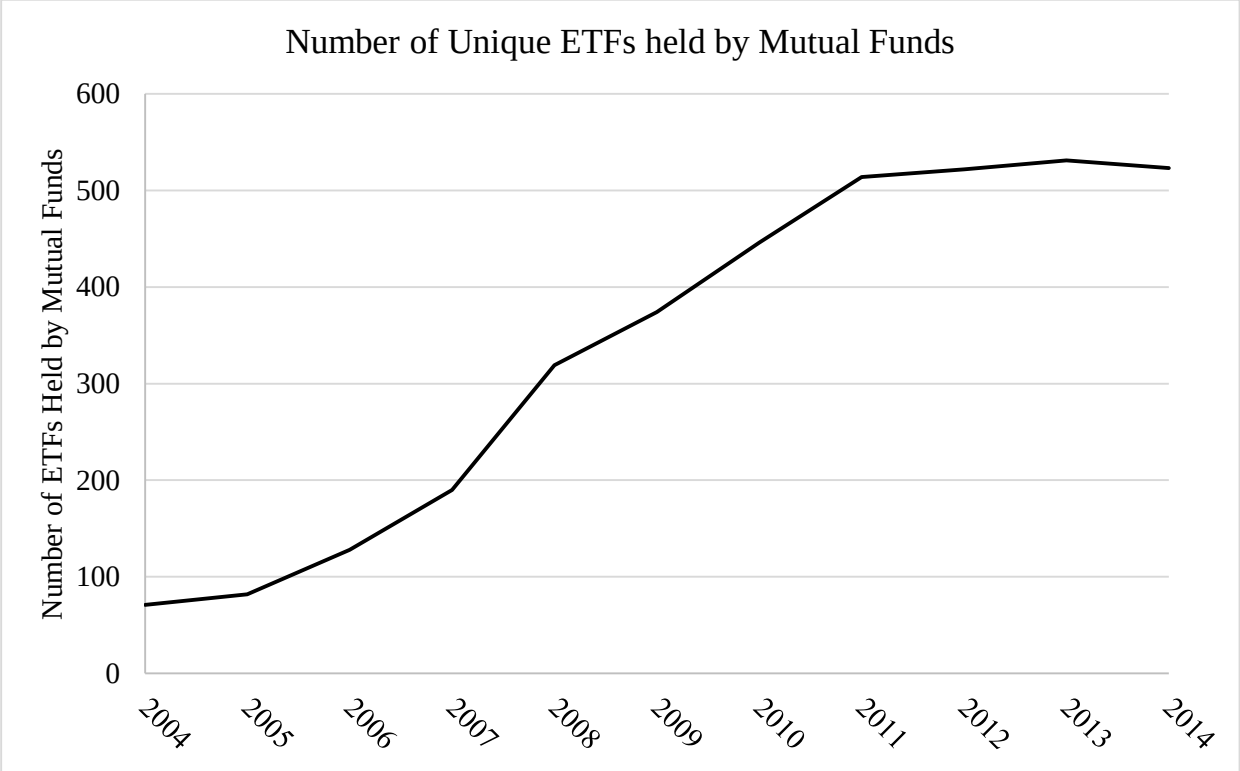

Figure 3
Mean performance as a function of ETF ownership

Figure 3 shows a comparison of the relative ETF ownership and 5-Factor alpha performance relationship with gross returns. All ETF holding mutual funds are ranked into 10 groups based on their percent TNA allocated to ETF positions and non-ETF holding mutual funds are retained in a separate group. Within each of these 10 groups, average 5-factor alphas are calculated and graphed.

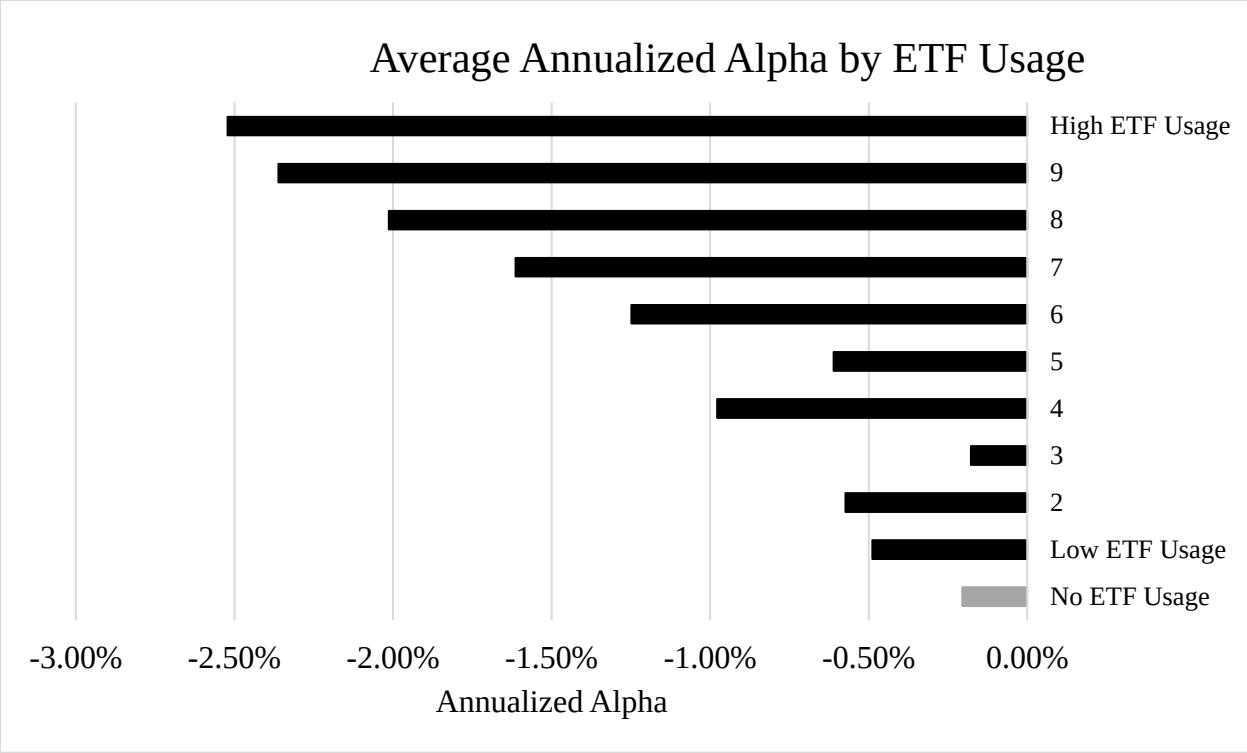

Figure 4
Contingency table of performance persistence

Figure 4 shows the relationship between initial and subsequent period performance. Each calendar year from 2003 to 2014, we rank funds into deciles based on their one-year gross returns. Funds are then re-ranked in the subsequent calendar year. Bar heights (initial, subsequent) represent the probability of funds falling into the subsequent year decile ranking contingent on their initial year rank. Ranks of 1 represent the worst performing mutual funds and ranks of 10 represent the top performing mutual funds.

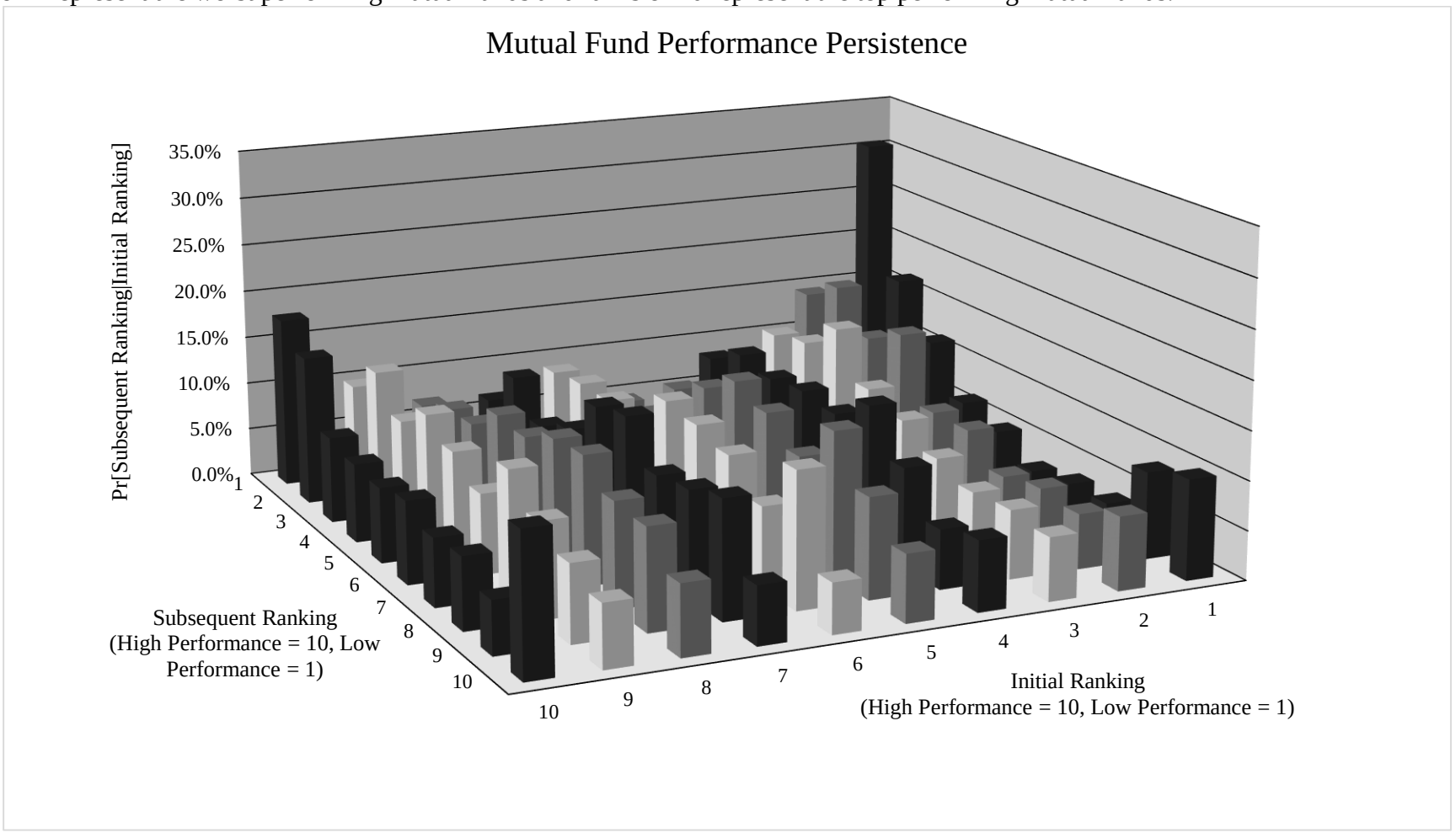

Table 1
Size of ETFs in mutual fund portfolios

Table 1 lists the mean and median total weight of ETFs in the mutual fund portfolio and the number of ETFs held for all months where a mutual fund reports holding an ETF by ETF usage. Mutual funds in this sample must be classified as Equity Domestic under the CRSP objective codes.

Panel A: ETF Holding Mutual Funds

	Mean		Median	
User Group	Total ETF Positions	No. of ETFs Held	Total ETF Positions	No. of ETFs Held
All-ETF-Users	13.16%	3.86	2.15%	1.00
Low-ETF-Users	0.76%	1.31	0.63%	1.00
Mid-ETF-Users	2.43%	1.69	2.02%	1.00
High-ETF-Users	34.43%	8.19	17.49%	6.00

Table 2
ETF sample descriptive statistics

Table 2 contains the descriptive statistics of ETFs that were held by mutual funds to those that have not been held. For those ETFs that were held by a mutual fund, the first observation of data pertains to the first reported mutual fund holding in our sample and then continues to the end of the sample. The mean values are reported. Asterisks denote statistical significance between the two samples with *, **, and *** indicating significance at the 10%, 5% and 1% levels, respectively.

	Means		Difference
Variable	Not Held	Held	(ETFs Held – ETFs Not Held)
Size ($M)	$30.47	$1314.53	$1,284.06***
Age (Years)	1.22	4.07	2.85***
Expense Ratio (%)	0.59%	0.53%	-0.06%***
Family ETF Size ($M)	$110,373.36	$163,319.69	$52,946.33***
Family No. of ETFs	77.10	106.12	29.02***
Monthly Volume (thousands)	23,912.01	251,488.17	227,576.15***
Premium-to-NAV	0.09%	0.07%	-0.02%***
Bid/Ask Spread	$0.20	$0.10	-$0.10***
No. of Unique Funds	677	956	

Table 3
Mutual fund sample descriptive statistics

Table 3 contains the descriptive statistics of our samples of mutual funds that have held an ETF to those that have not. All funds must have at least 18 months of data. The means of each sub-sample are listed below as well as tests on the differences in these values. Asterisks indicate statistical significance between the ETF holding mutual funds and non-ETF holding mutual funds, with *, **, and *** indicating significance at the 10%, 5%, and 1% levels, respectively.

	Mean		Difference
Variables	ETF Holding Mutual Funds	Never Held ETF	ETF Holding - Never Held
Size ($M)	$710.70	$1,212.40	-$501.7***
Age (years)	11.36	12.4	-1.04***
Annual Expense Ratio (%)	1.19%	1.17%	0.02%***
Annual Portfolio Turnover (%)	93.17%	65.24%	27.93%***
Family Size ($M)	$83,307	$141,085	-$56,503***
Monthly Flow (%)	0.86%	1.32%	-0.46%***
Cash (% TNA)	4.94%	3.92%	1.02%***
No. of Unique Funds	1,145	3,790	

Table 4
Mutual fund characteristics associated with ETF ownership

Table 4 presents the relationship between fund characteristics and ETF utilization from the logistic regression:

$$ETF_i = \beta_0 + \sum_{j=1}^{n} \beta_j X_i + \varepsilon_i$$

The dependent variable is an indicator variable that takes on the value of 1 if the mutual fund holds an ETF in column 1, a value of 1 if the mutual fund falls in the bottom tercile of ETF use in column 2, a value of 1 if the mutual fund falls in the middle tercile of ETF use in column 3, and a value of 1 if the mutual fund falls into the top tercile of mutual fund use in column 4, and 0 otherwise. Columns 2 – 4 retain only ETF holding mutual funds that fall within the respective terciles of usage. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, and *p*-values are in parenthesis.

	All Funds	Low Users	Mid Users	High Users
Variables	1	2	3	4
Intercept	-4.357***	-7.188***	-7.017***	-12.600
	(0.000)	(0.000)	(0.000)	(0.953)
Size	-0.066***	0.150***	-0.170***	-0.205***
	(0.005)	(0.000)	(0.000)	(0.000)
Expense Ratio	-0.232**	-0.255	-0.169	-0.169
	(0.017)	(0.136)	(0.262)	(0.262)
Age	0.168***	0.318***	0.450***	-0.263***
	(0.000)	(0.000)	(0.000)	(0.000)
Percent Cash	0.005	-0.017*	0.006	0.018***
	(0.283)	(0.063)	(0.407)	(0.004)
Load	-0.072*	0.089	-0.237***	-0.073
	(0.085)	(0.191)	(0.001)	(0.275)
Turnover	0.350***	0.294***	0.274***	0.422***
	(0.000)	(0.000)	(0.000)	(0.000)
Fam. Size	-0.034**	0.010	-0.025	-0.083***
	(0.018)	(0.688)	(0.272)	(0.000)
Objective FE	Yes	Yes	Yes	Yes
No. of Obs.	4935	4171	4172	4712

Table 5
Performance comparison

Table 5 reports the risk-adjusted performance measures for our sample from 2004-2014, using gross fund returns. We require that a fund has at least 18 months of returns. For the two sub-samples, *Funds with ETFs* pertains to funds that have held ETFs while *Funds without ETFs* are mutual funds that have never held an ETF. The means presented are the cross-sectional means of the annualized alphas obtained from regressing gross fund returns on the factors for the 1- (Jensen 1968), 3- (Fama and French 1993), 4- (Carhart 1997), and 5-factor (Pastor and Stambaugh 2003) alphas. Panel A compares all ETF holding mutual funds to all non-ETF holding mutual funds and Panel B, C, and D compare the Low, Mid, and High Use terciles, respectively, to non-ETF use funds. Asterisks indicate statistical significance from zero in the first two columns and between the two samples in column 3, with *, **, and *** indicating significance at the 10%, 5%, and 1% levels, respectively.

Panel A: All Funds			
	Funds with ETFs (N = 1145)	Funds Without ETFs (N = 3790)	Annualized Difference
Variable	Mean	Mean	Mean
1-Factor	-1.316%***	-0.107%	-1.209%***
3-Factor	-1.295%***	-0.021%	-1.273%***
4-Factor	-1.286%***	-0.104%	-1.182%***
5-Factor	-1.237%***	-0.205%***	-1.032%***
Panel B: Low ETF User Group			
	(N = 381)	(N = 3790)	
1-Factor	-0.509%***	-0.107%	-0.402%*
3-Factor	-0.343%*	-0.021%	-0.322%
4-Factor	-0.368%*	-0.104%	-0.264%
5-Factor	-0.397%***	-0.205%***	-0.192%
Panel C: Mid ETF User Group			
	(N = 382)	(N = 3790)	
1-Factor	-1.424%***	-0.107%	-1.317%***
3-Factor	-1.230%***	-0.021%	-1.209%***
4-Factor	-1.222%***	-0.104%	-1.118%***
5-Factor	-1.170%***	-0.205%***	-0.965%***
Panel D: High ETF User Group			
	(N = 382)	(N = 3790)	
1-Factor	-2.015%***	-0.107%	-1.908%***
3-Factor	-2.308%***	-0.021%	-2.286%***
4-Factor	-2.268%***	-0.104%	-2.164%***
5-Factor	-2.144%***	-0.205%***	-1.939%***

Table 6
Multivariate performance analysis

Table 6 reports relationship between holding an ETF and mutual fund performance. Coefficients are obtained from:

$$\alpha_i = \beta_0 + \beta_1 ETF_i + \sum_{j=2}^{n} \beta_j X_i + OFE_i + FFE_i + \varepsilon_i$$

The dependent variable is the risk-adjusted performance of a given mutual fund from our 4- or 5-factor model. The coefficient of interest is from the *ETF* variable. Columns 1 and 4 report the coefficients on an indicator variable of 1 for ETF holding mutual funds and 0 for non-ETF holding funds. Columns 2 and 5 add in control variables as well as objective and family fixed effects. Columns 3 and 6 examine ETF users by tercile of ETF use based on the percent of portfolio TNA dedicated to ETF positions. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, and *p*-values are in parenthesis.

	4 Factor Alpha			5 Factor Alpha		
Variables	1	2	3	4	5	6
Intercept	-0.009	-0.449***	-0.438***	-0.017***	-0.415***	-0.402
	0.115	0.007	0.008	0.001	0.009	0.011
ETF	-0.099***	-0.085***	-	-0.086***	-0.074***	-
	0.000	0.000		0.000	0.000	
Low-ETF Use	-	-	-0.038**	-	-	-0.030*
			0.024			0.064
Mid-ETF Use	-	-	-0.105***	-	-	-0.085***
			0.000			0.000
High-ETF Use	-	-	-0.137***	-	-	-0.129***
			0.000			0.000
Leveraged	-	-0.043	-0.038	-	-0.041	-0.036
		0.463	0.516		0.461	0.520
Inverse	-	-0.078	-0.067	-	-0.041	-0.061
		0.119	0.179		0.134	0.201
Family	-	-0.042	-0.029	-	-0.024	-0.010
		0.546	0.179		0.718	0.878
Size	-	0.014***	0.012***	-	0.009***	0.007**
		0.000	0.000		0.008	0.030
Age	-	0.028***	0.028***	-	0.032***	0.031***
		0.000	0.000		0.000	0.000
Expense Ratio	-	0.082***	0.079***	-	0.080***	0.076***
		0.000	0.000		0.000	0.000
Turnover	-	0.005	0.006	-	0.002	0.002
		0.451	0.441		0.790	0.777
Return Volatility	-	-5.009***	-5.130***	-	-5.334***	-5.463***
		0.000	0.000		0.000	0.000

Family TNA	-	-0.012**	-0.012**	-	-0.006	-0.006
		0.035	0.033		0.251	0.237
Percent Cash	-	-0.005***	-0.003***	-	-0.003***	-0.003***
		0.000	0.000		0.000	0.000
Load	-	-0.005	-0.003	-	-0.009	-0.008
		0.758	0.848		0.528	0.600
Objective FE	No	Yes	Yes	No	Yes	Yes
Family FE	No	Yes	Yes	No	Yes	Yes
No. of Obs	4935	4935	4935	4935	4935	4935
R^2	1.49%	44.03%	44.27%	1.21%	45.06%	45.29%

Table 7
Market timing

Table 7 provides the market timing ability of mutual funds based on two methods, the absolute value of excess market returns provided by Henriksson and Merton (1981) in Panel A, and the squared market excess returns provided by Treynor and Mazuy (1966) in Panel B. Coefficients are obtained from:

$$r_{i,t} - rf_{i,t} = \alpha_i + \sum_{j=1}^{n} \beta_j X_{i,t} + \gamma_i Z_{i,t} + \varepsilon_i$$

Where $X_{i,t}$ represents the excess market return, high-minus-low, small-minus-big, momentum. $Z_{i,t}$ is measured as the absolute value of excess market return in Panel A and as the square of excess market return in Panel B. γ represents the amount of market timing a manager has and is the reported value below. Market timing is reported by ETF user group with significance from zero and as the annual difference between high ETF users and non-ETF users. The Treynor-Mazuy coefficients have been multiplied by 100 for scaling purposes. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels, respectively.

Panel A: Henriksson-Merton Specification

	Non ETF Users (N = 3790)	Low ETF Users (N = 381)	Mid ETF Users (N = 382)	High ETF Users (N = 382)	Annual Difference (High User - Non User)
Variable	Mean	Mean	Mean	Mean	Mean
1-Factor	-0.006*	0.009	-0.012	-0.018***	-0.012
4-Factor	-0.020***	0.012	-0.020**	-0.033***	-0.013*
5-Factor	-0.013***	0.016	-0.015	-0.031***	-0.018***

Panel B: Treynor-Mazuy Specification

	Non ETF Users (N = 3790)	Low ETF Users (N = 381)	Mid ETF Users (N = 382)	High ETF Users (N = 382)	Annual Difference (High User - Non User)
Variable	Mean	Mean	Mean	Mean	Mean
1-Factor	-0.086*	0.209*	-0.134	-0.278***	-0.192*
4-Factor	-0.133***	0.261	-0.254**	-0.447***	-0.314***
5-Factor	-0.058	0.298*	-0.205	-0.448***	-0.390***

Table 8
Flow management

Table 8 examines a mutual fund's ability to manage large in- and out-flows. Cross-sectional OLS coefficients are obtained from:

$$\alpha_i = \beta_0 + \beta_1 Flow\ Mgmt_i * ETF\ Rank_i + \sum_{j=2}^{n} \beta_j X_i + FE_i + \varepsilon_i$$

For the two stage least squares (2SLS), coefficients are obtained from the following first stage regression of the endogenous variable, absolute flow, on instrumental variables:

$$Absolute\ Flows_{i,t} = \beta_0 + \sum_{j=2}^{n} \beta_j X_{i,t} + FE_i + \varepsilon_i$$

Where the instrumental variables for the 2SLS first stage include the lagged control variables from the OLS model and lagged performance, and the endogenous variable is absolute flows. The dependent variable is the average percent cash held by a mutual fund. The coefficient of interest is from the interaction variable, *Flow Mgmt * ETF Rank*. Columns 1 and 4 examines ETF users by tercile of ETF use. Columns 2 and 5 includes control variables and columns 3 and 6 includes objective and family fixed effects. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, and *p*-values are in parenthesis.

	4 Factor			5 Factor		
	OLS		2SLS	OLS		2SLS
Variables	1	2	3	4	5	6
Intercept	-0.457***	-0.578***	0.146	-0.397***	-0.548***	-0.236**
	(0.000)	(0.001)	(0.167)	(0.000)	(0.001)	(0.039)
Low-ETF*Flow Mgmt	1.121	0.765	-0.897	1.237*	0.729	-1.282
	(0.125)	(0.243)	(0.278)	(0.081)	(0.257)	(0.151)
Mid-ETF*Flow Mgmt	0.121	0.183	0.057	0.157	0.256	-0.040
	(0.808)	(0.718)	(0.936)	(0.746)	(0.599)	(0.605)
High-ETF*Flow Mgmt	-0.353	-0.445	-0.392	-0.398	-0.519	-0.614
	(0.323)	(0.217)	(0.554)	(0.251)	(0.135)	(0.390)
Low-ETF Use	-0.077***	-0.057**	0.031	-0.071***	-0.047**	0.038
	(0.004)	(0.022)	(0.260)	(0.006)	(0.046)	(0.192)
Mid-ETF Use	-0.106***	-0.108***	-0.047*	-0.093***	-0.091***	-0.022
	(0.000)	(0.000)	(0.093)	(0.000)	(0.000)	(0.467)

High-ETF Use	-0.164***	-0.119***	-0.170***	-0.153***	-0.104***	-0.136***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Flow	1.839***	1.620***	2.584***	1.647***	1.502***	2.677***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Abs Flow	-0.938***	-0.580***	-0.466***	-0.773***	-0.658***	-0.448***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.005)
Size	0.007**	0.008**	0.003	0.006*	0.003	-0.002
	(0.031)	(0.019)	(0.398)	(0.071)	(0.297)	(0.514)
Age	0.060***	0.052***	0.035***	0.057***	0.055***	0.045***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Expense Ratio	0.095***	0.091***	0.087***	0.096***	0.087***	0.079***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Turnover	0.000	0.009	-0.008	-0.005	-0.004	-0.021***
	(0.974)	(0.215)	(0.208)	(0.347)	(0.439)	(0.002)
Return Volatility	-3.853***	-4.729***	-10.940***	-4.248***	-5.093***	-9.071***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Family TNA	0.005***	-0.010*	0.004*	0.004**	-0.005	0.004*
	(0.009)	(0.085)	(0.080)	(0.048)	(0.439)	(0.082)
Load	0.017	-0.014	-0.016	0.007	-0.018	-0.009
	(0.119)	(0.379)	(0.152)	(0.535)	(0.233)	(0.439)
Percent Cash	-0.003***	-0.003***	-0.002***	-0.003***	-0.003***	-0.001*
	(0.000)	(0.000)	(0.006)	(0.000)	(0.000)	(0.074)
Objective FE	No	Yes	Yes	No	Yes	Yes
Family FE	No	Yes	No	No	Yes	No
Time FE	No	No	Yes	No	No	Yes
No. of Obs	4935	4935	4935	4935	4935	4935
R^2	12.04%	45.22%	16.52%	11.62%	46.20%	9.31%

Table 9
Cash management

Table 9 reports relationship between percent cash holdings and ETF usage from:

$$Percent\ Cash_i = \beta_0 + \beta_1 ETF\ Rank_i + \sum_{j=2}^{n} \beta_j X_i + OFE_i + FFE_i + \varepsilon_i$$

The dependent variable is the average percent cash held by a mutual fund. The coefficient of interest is from *ETF Rank*. Column 1 examines ETF users by tercile of ETF use. Column 2 includes control variables and column 3 includes objective and family fixed effects. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively, and *p*-values are in parenthesis.

Variables	1	2	3
Intercept	4.366***	5.687***	54.434***
	(0.000)	(0.000)	(0.000)
Low-ETF Use	-0.735	-0.153	-0.683*
	(0.115)	(0.723)	(0.065)
Mid-ETF Use	1.058**	0.674	-0.462
	(0.023)	(0.116)	(0.247)
High-ETF Use	3.453***	1.052**	1.300**
	(0.000)	(0.019)	(0.004)
Load Indicator	-	-0.634**	-0.378
		(0.030)	(0.279)
Size	-	0.374***	0.276***
		(0.000)	(0.000)
Age	-	-0.303**	0.047
		(0.048)	(0.749)
Expense Ratio	-	2.102***	0.381
		(0.000)	(0.267)
Turnover	-	1.522***	1.659***
		(0.000)	(0.000)
Family TNA	-	-0.271***	-0.716***
		(0.000)	(0.000)
Flow	-	-44.287***	-23.623***
		(0.000)	(0.000)
Abs Flow	-	70.780***	35.367***
		(0.000)	(0.000)
Return Volatility	-	-91.329***	-59.736***
		(0.000)	(0.000)
Objective FE	No	No	Yes
Family FE	No	No	Yes
No. of Obs	4935	4935	4935
R^2	1.27%	18.40%	57.78%