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The U.S. Mutual Fund Market: an updated study of the Equity-Retail-Domestic Open-ended Fund 2005-2012

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ABSTRACT

This article examines the effects of mutual funds' fees, size, age, and active management on fund expense ratio and performance of nearly 1000 equity-retail-domestic open-ended funds in the US. From the period 2005 through 2012 the empirical analysis finds that: first, the loaded funds are more expensive than no-load funds, the 12b-1 funds are more expensive than non 12b-1 funds, and the actively managed funds are more expensive than index funds. Secondly, the front-end load, redemption fee, and 12b-1 fee are dead weight losses to investors. Moreover, bigger and more mature funds on average are cheaper and better-performing than smaller and newly issued funds. Lastly, the new finding in this study is that not only the index funds but also the stock picking funds and moderately active funds all beat the benchmarks after expenses; while the concentrated funds and factor betting funds underperform.

Key words: mutual funds, fees, active share, tracking error, information ratio

JEL Classification: G10, G11, G20, G23

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PREFACE

First, the main aim of this research is to make a contribution to the academic research in the equity retail mutual fund field regarding to the funds' fees, size, age, active management, expenses and performance. Moreover, I believe that this paper will also be interested to the investors and mutual fund companies, as it provides valuable information for making investment decisions and fund managing.

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MUTUAL FUNDS have been a popular investment choice for retail investors since 1970s. The household ownership of mutual fund has increased dramatically from 5.7% in 1980 to 89.23% of total net assets (13 trillion) in the U.S. in 2012 (ICI, 2012). There are 52.3 million households (44% of the total U.S. households) and 90.4 million U.S. individuals who own mutual funds in 2011. People invest in mutual funds with several reasons. First, the transaction fees are relatively low, because they can be bought easily through an intermediary, or directly via telephone or internet. Moreover, investors can hold a share of a diversified portfolio with a limit amount of money. Thirdly, the customer service of mutual funds enables investors transfer money between funds within the same family at a very low cost. In addition, they can buy and sell funds at net asset value at any time. Finally, retail investors can get financial experts who can run the fund professionally (Pozen, 1998).

Mutual funds are also named as open-ended funds which are pools of financial instruments that may include stocks, bonds, commercial paper, cash and other instruments (Alamuddin & Callaban, 2006; SEC[1]). There are four classes of mutual fund: money market funds, bond funds, equity funds, and hybrid funds. Money market funds are the funds which invest in the money market instruments, which are fixed income securities with a very short time to maturity and high credit quality. Bond funds mainly invest in the bonds which are fixed income securities. Equity funds, as the name suggests, are the funds that mainly invest in the stocks. The hybrid funds invest in the bonds, equity or other investments. From the investment geographic point of view, mutual funds can be divided into domestic funds and international funds. Last but not least, mutual funds can be retail funds or institutional funds. The retail funds are traded and available to the general public. While, the institutional funds are available to a limited set of investors, including larger financial service providers like banks, and insurance companies etc (Alamuddin & Callaban, 2006).

[1]SEC is short for U.S. Securities and Exchange Commission that provides all kinds of information about mutual funds, as well as the differences between mutual funds and other investment vehicles. http://www.sec.gov/investor/pubs/inwsmf.htm

With the popularity of mutual funds, a lot of research has been done in this field. Treynor (1966), Sharp (1966) and Jensen (1968, 1969) studied the performance of fund, they find that after expenses, mutual fund perform worse than what investors can earn through a *naïve* buy and hold strategy. Later on, with different time periods, frequencies, and choice of benchmarks, researchers find mutual fund managers were able to justify the expenses they charge (Friend, Blume, and Crockett, 1970; Willianmson, 1972; McDonald, 1974; and Creshaw, 1977). Chen, Hong, Huang and Kubik (2004) found strong evidence that fund size erodes performance based on the US mutual fund data from 1962 to 1999. Ferris and Yan (2008) present that funds managed by public fund families acquire more funds and charge higher fees than those managed by private fund families during the period 1992-2004. Khorana, Servaes and Tufano (2008) and Franger (2012) find that institutional funds have lower expense ratio than retail funds. More recent studies have focused on the active and passive management with respect to the market timing and stock selectivity of mutual funds. Most research shows that only a limited number of fund managers have market timing and/or stock selectivity expertise, since the passively managed funds perform better than actively managed funds after expenses (Kon and Jen, 1979; Merton, 1981; Woerheide, 1982; Veit and Chency, 1982; Ferri, Oberhelman, and Roenfeldt, 1984; Chen and Stockum, 1985; Lee and Rahman, 1990 & 1991; Schlanger, Philips and LaBarge, 2012). However, Cremers and Petajisto (2009) introduce a new measure for portfolio active management named Active Share, which represents the share of portfolio holdings that differ from the benchmark index holdings. They claim that active share has prediction power, and the funds with the highest active share significantly outperform their benchmarks, both before and after expenses. On the contrary, Schlanger, Philips and LaBarge (2012) find that the most active funds outperform their benchmarks, but they do not outperform low active-share funds.

However, most of the investors focus too much on the fund performance and do not pay enough attention on the expenses. Capon, Fitzsimons, and Prince (1996) find that most of the individuals do not know the investment objective of their mutual funds or even if the fund is domestic or international, based on their survey of 3386 investors.

Additionally, most of those who have been surveyed consider fees to be of relatively little importance in the mutual fund selection process. Alexander, Jones, and Nigro (1998) indicate that most of those participants did not know the expenses of their largest funds, even at the time when they made the initial investment in it. Wilcox (2003) performed an experiment of fund choice on 50 investors, and find that most of them pay less attention to fees than past performance, even though past performance provides little indication of future performance. Barber, Odean and Zheng (2005) find that investors were attracted by exceptional performance, marketing, or advertising when making funds purchasing decisions; as did Wallison and Litan (2007). Most recent study shows that when fees were clearly stated in a one-page tear sheet, only 20% of 720 investors chose to invest only in the cheapest fund (Choi, Laibson, and Madrian, 2009).

In reality, there are many factors that influencing mutual fund expenses, either directly or indirectly. The direct factors are the fees and expenses that associated with the management of fund assets, the sales and distribution of fund shares (Malhotra & Mcleod, 1997). They include the front-end loads, redemption fee and deferred loads, operating expenses, account fees, and trading fees etc. The front-end load is the fee that investors paid to brokers when they buy the funds which deducted directly from their initial investments; it is the difference between the initial investment in the fund and the real value of the fund in the first month statement. Moreover, it decreases with the amount of money that invested (Barder, Odean and Zheng, 2005). The deferred load is the money that investors pay to brokers when they sell shares, but it decreases to zero with holding time. The longer period that investors hold the share, the lower deferred load they pay. A fund named as loaded fund when it charges front-end load and/or deferred loads; and named as no-load fund when it charges none of them. The redemption fee is another type of fee that is paid by investors when they redeem their shares, it proceeds like the deferred load, also deducted directly from the redemption (it is the difference between the investor receives and the fund value reported). However, unlike deferred load is paid to the broker, redemption fee is paid to the fund. The traditional expense ratio defined by SEC consists of rule 12b-1 fees, management fees, and “other” expenses (Houge & Wellman, 2007; Haslem, 2010). The rule 12b-1 fee is one of the most

controversial fees in the US mutual fund industry. Investors pay it to compensate the financial advisers, marketing or distribution fee such as advertising expenses. The management fee is paid to the investment advisers for managing the investment portfolio of mutual fund. It also includes the incentive fees that are intended to encourage portfolio managers to outperform the fund's benchmark. The "other" expenses include the transfer agent fees that paid to the entity which conducts back-office functions; the securities custodian fees that used for keeping mutual fund securities safeguarded and partitioned from other assets; the shareholder accounting expenses, legal, auditor fees and independent direct fees (Haslem, 2010). The indirect factors can be other characteristics of mutual fund. For instance, the size, age and how active the fund managed etc.

To all of the investors, the fees must be checked and added into fund selection toolkit, since a large part of return can be eaten by that without notice. Moreover, most of mutual funds aggressively advertise historical performance, but rarely compete on expenses, which lead the investors to focus on the fund performance (Houge & Wellman, 2007). In addition, equity mutual funds have undergone significant changes with respect to the types of fees they charge shareholders (Dellca and Olson, 1998). Grinblatt and Titman (1994), Elton, Gruber, Das and Hlacka (1993) and Elton, Gruber, and Blake (1996) considered the effect of loads on mutual fund performance. They conclude that in general, there is no relationship between the loads and performance, although Elton, Gruber, and Blake (1996) find that funds switch from no-load to loaded are typically underperformers. Jensen (1968), Elton, et al, (1993), Malkiel (1995), and Carhart (1997) present that mutual fund returns are negatively related to the fund expense ratios. Dellva and Olson (1998) present that no-load funds with 12b-1 fee earn higher risk adjusted returns. Barber, Odean, and Zheng (2005) conclude that advertising helps funds growing, and the fund with high 12b-1 fee gathers more new money.

As we can see, past studies are controversial. It can be explained by their different time periods, frequencies, benchmarks or measurements. In addition, all of them were doing research in broad fund categories. No one focus on the effects of all fees on

expenses and performance in a specific kind of fund. Moreover, few academic studies have been done in recent years. Therefore, it is time to revisit the study in this filed, investigating the effects of fees on fund expense ratio and performance in a specific fund category over recent years including the world financial crisis period. Moreover, it is interesting to combine the studies together with active management, to exam the relationships between the mutual funds' active management, expense ratio, and performance.

This empirical research aims to investigate the effects of mutual funds' front-end loads, deferred loads, redemption fees, 12b-1 fees, management fees, size and age on fund expense ratio; and their relations with fund performance. Next, I will examine the relationships between the level of active management, expense ratio, and performance. The study focuses on the U.S. Equity-Retail-Domestic Open-ended funds during the period from 2005 to 2012. This paper also provides suggestions to the people who are interested in the U.S. retail mutual funds.

The paper proceeds as follows. Section I discusses the previews literature and hypothesis. Section II describes the methodology. Section III displays the data source with the selection criteria. The empirical results are presented in Section IV. Section V concludes.

I. Literature review

There are direct and indirect factors that influence the mutual fund expenses. Except for all kinds of fees that mentioned before, Alamuddin & Callaban (2006) presented that the factors influence retail fund expenses are the investment objectives, the category of instruments that fund held, whether the fund is actively managed, and the sales commission. Moreover, the influential factors like fund size and age have also been mentioned by prior researchers. In this section, the previous literature on the factors that

influence fund expenses and their relations with fund performance will be presented, followed by the corresponding hypothesis.

Several academic studies have documented the relationship between the fees and fund expense ratio. The loaded funds charge front-end load and/or deferred loads, while no-load funds charge none of them. Researchers find that front-end loads are not significant in explaining expense ratio around the 1990s (Ferris and Chance, 1987; Tracinka and Zweig, 1990; Mcleod and Malhotra, 1994). Front-end loads as one of the marketing distribution costs that generally not improve the fund performance. Dellva and Olson (1998) notice that funds charge front-end load earn lower risk adjusted returns, and suggest investors to avoid it. They also find the deferred load has no relation with fund performance. Moreover, the funds with redemption fees are associated with superior performance, although the redemption fee is positively related to the expense ratio. More recent studies find the percentage of U.S. equity mutual fund assets that invested in the front-end load funds has dropped since 1962. It indicates that investors are more likely to choose the no-load or low-load funds and they are more sensitive to salient fees, like the front-end loads and commission, than operating expenses (Barber, Odean and Zheng, 2005). Houge and Wellman (2007) present that the loaded funds are more expensive and do not outperform than no-load funds. It indicates that the sales loads result in a deadweight loss to investors. Del Guercio and Reuter (2011) show that no-load funds mainly competing on portfolio performance. Broker-sold funds (front-end load funds) are typically more expensive than direct-sold funds because they bundle portfolio management with personalized financial advice and these funds compete on both characteristics.

Hypothesis I (a): *The expense ratios of loaded funds and no-load funds are the same.*

Hypothesis I (b): *There performance of loaded funds and no-load funds are the same.*

The 12b-1 fee provides incentives to brokers and other sales representatives to sell the fund, which are permitted under the Rule 12b-1 of Investment Company Act of

1940 in the US. In addition, it is limited to 1% of the mutual fund's asset annually. Theoretically, stronger investment in marketing and more incentives paid to brokers would create more opportunities to increase the fund size, then resulting in economies of scale that would lower overall expense ratio as well as per unit cost. However, it increases the expense ratio, which in fact might lead the no-load or low-load funds to become loaded funds while publicly advertising their no-load and low-load status. Therefore, shareholders can benefit from this plan when the economies of scale outweigh its cost. Alternatively, investors would benefit from it when the fees are used to gather more information or attract exceptional managers that enable the fund to generate higher risk adjusted returns (Dellva and Olson, 1998). While, the extant studies find that 12b-1 fees are "dead-weight" costs borne by investors. Researches based on different time periods present that the 12b-1 funds (funds charge 12b-1 fee) ask higher expense ratio but gain lower net investment returns than non 12b-1 funds (funds without 12b-1 fee) (see, e.g. Ferris and Chance, 1987; Trzcinka and Zweig, 1990; Chance and Ferris, 1991; Mcleod and Malhotra, 1994). Umamaheswar Rao (2001) concludes that 12b-1 plan increases expense ratio without offering economic value to investors. Freeman (2007) claim that the rules have generated huge wealth for fund sponsors and distributors at investors' expenses.

Hypothesis II (a): *The expense ratios of 12b-1 funds and non 12b-1 funds are the same.*

Hypothesis II (b): *There is no relation between the 12b-1 fee and fund performance.*

The agency conflict between the managers and shareholders is always a hot topic in the mutual fund industry. Since the fund managers' penchant for maximizing the level of asset (size) under management and the associated management fees, while the shareholders desire high, risk-adjusted returns at low cost (Ferris & Yan, 2008). Investors are easily misled by the managers who are boasting about their "special" skills (e.g. market timing skills, stock selection skills or just a nice promise of excellent returns etc.), as a result of paying extremely high management fees which erode their own returns.

Reported by the Bloomberg Businessweek[2], even the best managers, like Mario Gabelli, John Neff and Michael Price, have a hard time beating the market. Fama and French (2010) present that managers lack skills generally, although they do find some talent managers in the upper tail of the distribution of managers. Management fees vary with the investment managers and the nature of the investment products, and grow with the complexity of management, research, and monitoring services.

Hypothesis III: *There is no relation between management fee and fund expense ratio.*

Prior studies presented controversial results on the effect of size (measured by funds' net assets) on mutual fund expense ratio and performance. Theoretically, the expenses would decrease with the increasing size due to the economies of scale; then the fund performance improves. Grinblatt and Sheridan Titman (1989) find that fund returns decline with size. Other studies also find that fund size erodes fund performance based on different time periods (see, e.g. Perold and Salomon, 1991; Lowenstein, 1997; Cheng et al, 2004; Yan, 2008). On the contrary, Malhotra and Mcleod (1997) and Dellva and Olson (1998) present that size is negatively related to the fund expenses, which indicates that the operating efficiencies achieved by larger funds and it passed onto investors in the form of lower per unit costs. Fan and Addams (2012) propose that large funds, which can explore the economies of scale and attract skilled managers, have significantly better market performance than small funds.

Hypothesis IV (a): *There is no relation between the fund size and fund expense ratio.*

Hypothesis IV (b): *There is no relation between the fund size and fund performance.*

[2] http://www.businessweek.com/stories/1992-01-26/poof-wall-streets-sorcerers-lose-their-magic

The age would influence the expenses negatively, since the new funds may incur start-up cost at the beginning, while older fund can generate more experiences in the longer operation period then achieves greater operating efficiency. This is known as learning curve effect (Umamaheswar Rao, 2001). Previews studies provide evidence that fund age is negatively related to the fund expenses (Ferris and Chance, 1987; Trzcinka and Zweig, 1990; Malhotra and Mcleod, 1997; Dellva and Olson, 1998; LaPlante, 2001).

Hypothesis V (a): *There is no relation between the fund age and fund expense ratio.*

Hypothesis V (b): *There is no relation between the fund age and fund performance.*

The active funds are more expensive than passive funds (index funds), because of the higher investment advisory fees. The passively managed funds follow an index, buying all or most all of stocks in the index and holding them. The actively managed funds then are the funds that deviate from passively managed funds. Moreover, the degree of deviation determines how active the funds are (Cremers & Petajisto, 2009). Prior researches show that only a limited number of funds outperformed different benchmarks, have market timing ability or selectivity expertise, although the percentage wealth invested in mutual funds kept growing over the years. Moreover, there is strong evidence of the negative relation between the expense ratio and performance of actively managed funds. Malkiel (1995) find that 100 basis points of expense ratio decreased performance by 192 basis points, and he concludes that most investors would be better off purchasing low-expense funds. Carhart (1997) claim that fund performance decreased 153 basis points corresponding to every 100 basis points of expense ratio. Net of all fees and expenses, on average, the actively managed fund cannot beat a low-cost index fund (Jensen, 1968; Gruber, 1996; Wermers, 2000). Umamaheswar Rao (2001) note that active funds have higher expense ratio. Elton, Gruber, and Busse (2004) and Hortascu and Syverson (2004) examine the S&P 500 index funds and find that more money has flowed into the most expensive funds than the least expensive funds. However, more recent studies present that the more active funds are, the more expensive they tend to be;

but the expenses may be covered by their better performance. Kacperczyk et al. (2005) use various performance measures in their research and find that active managers who concentrate on making investment in specific industries perform better after controlling risk. Cremers and Petajisto (2009) argue that active managers are differing in how active they are and what type of active management they practice. They report that fund with the highest active share significantly outperform 19 benchmark indexes, both before and after expenses. Moreover, they propose that active share has prediction power in the fund performance. Schlanger, Philips and LaBarge (2012) follow the same study and find the higher the active-share level, the higher the funds' costs and the larger dispersion of the excess returns. Moreover, they claim that funds with highest level of active share did not significantly outperform low active-share funds and the expense ratio is still the most important tool for selecting the investment.

Hypothesis VI (a): *There is no relation between active management and expense ratio.*

Hypothesis VI (b): *There is no relation between active management and performance.*

The pioneering studies present controversial results on the relation between fund expense ratio and performance. Most research reveals that on average, funds with superior performance also have lower expense ratio. Funds equipped with more informational competent are more efficient in their operations, thus providing higher risk adjusted returns and charging lower expense simultaneously (Dellva and Olson, 1998). Carhart (1997) find that higher fees depress the investment performance. However, more recent studies conclude that the active funds with high expense ratio outperform their benchmarks after all fees (Cremers and Petajisto, 2009; Petajisto, 2013). Fan and Addams (2012) did not find positive relation between fund expense ratio and performance. But they claim that a higher expense ratio does not mean poor returns, and a lower expense ratio does not guarantee high returns.

Hypothesis VII: *There is no relation between fund expense ratio and fund performance.*

II. Methodology

A. Mutual fund fees and expense ratio

For studying the effects of front-end load, deferred load, redemption fee, 12b-1 fee, management fee, size, and age on fund expense ratio. I start from analyzing the development of the size, 12b-1 fee, management fee, and fund expense ratio during the period from 2005 to 2012. Then, I compare the differences in the fund characteristics between the loaded funds and no-load funds; between the 12b-1 funds and non 12b-1 funds. Finally, I analyze the effects of these factors on fund expense ratio over the years based on the regression as follows,

$$Exp\ ratio_{i,t} = b_0 + b_1(lnNA_{i,t}) + b_2\,(age_{i,t}) + b_3(manage.fee_{i,t}) + b_4(12b1_{i,t}) + b_5\,(frontload_{i,t}) + b_6(\,def.load_{i,t}) + b_7(red.fee_{i,t}) + V_i + e_{i,t}\,, \quad (1)$$

where b_0 is the intercept; $Exp\ ratio_{it}$ $(i = 1 \ldots 997)$ refers to the *i*th fund's expenses as a percentage of fund net assets at time *t*; $ln(NA_{it})$ is the natural log of *i*th fund's net assets which represents the fund size at time *t*; age_{it} is the actual age of *i*th fund at time *t*. The $manage.fee_{it}$,$12b1\ fee_{it}$, $frontload_{it}$, $def.load_{it}$, $red.fee_{it}$ are refer to the funds' management fee, 12b-1 fee, front-end load, deferred load, redemption fee at time *t* respectively; all of the fees are presented in percentage. The V_i is the fixed effects to be estimated which are absorbed by intercepts in the fixed effects panel regression. However, it represents the between-entity error which has been assumed to be zero on average in the random effects panel regression. The $e_{i,t}$ is the error term.[3]

B. Mutual fund fees and fund performance

Benchmark adjusted returns have always been used to measure the mutual fund performance, since the benchmark assumed as the market index. In this study, the fund

[3] The explanation of b_0, V_i and $e_{i,t}$ in regression (6) is the same as in regression (1). Thus, I will not explain again in following content.

performance is measured by the fund's net return and two benchmark (risk) adjusted returns. The net return of fund is the gross return after fees, expenses, and brokerage commissions, but before any front-end or rear loads. I choose two indexes as the benchmarks, which are S&P 500 index and Russell 2000 index. The benchmark adjusted returns calculated using Jensen's alpha as follows,

$$Performance\ 1 = \mathrm{r_{i,t}}, \tag{2}$$

$$Prformance\ 2 = r_{i,t} - [r_{f,t} + beta1_{i,t}(r_{s\&p500,t} - r_{f,t})], \tag{3}$$

$$Prformance\ 3 = r_{i,t} - [r_{f,t} + beta2_{i,t}(r_{russell2000,t} - r_{f,t})], \tag{4}$$

$$Beta = \frac{covariance\ (r_{i,t},\ r_{index,t})}{variance\ (r_{index,t})}, \tag{5}$$

where $r_{i,t}$ $(i = 1 \ldots 997)$ is the net return of fund *i* at time *t*; $r_{f,t}$ is the three-month return on US Treasury Bills at time *t*; $r_{s\&p500,t}$ is the return of the S&P500 index at time *t*; $r_{russell2000,t}$ is the return of the Russell 2000 index at time *t;* $r_{index,t}$is either $\mathrm{r_{s\&p500,t}}$ or $r_{russell2000,t.}$

I implement the following regression for estimating the relations between the funds' characteristics and performance,

$$\begin{aligned} Performance_{i,t} = {} & b_0 + b_1(exp.ratio_{i,t}) + b_2(manage.fee_{i,t}) + b_3(12b1_{i,t}) + \\ & b_4\,(front\ load_{i,t}) + b_5\big(def.load_{i,t}\big) + b_6\big(red.fee_{i,t}\big) + \\ & b_7(ln(NA_{i,t})) + b_8\,(age_{i,t}) + V_i + \\ & e_{i,t}\,, \end{aligned} \tag{6}$$

Where b_0 is the intercept; $performance_{i,t}$ refers to the performance 1-3 that mentioned by equations (2) through (5); $exp.ratio_{it}$ is the *i*th fund's expenses as a percentage of fund net assets at time *t*; *ln* (NA_{it}) is the size of *i*th fund at time *t*; age_{it} is the actual age of *i*th fund at time *t*; The $manage.fee_{it}$, $12b1\ fee_{it}$, $frontload_{it}$, $def.load_{it}$,

$red.fee_{it}$ are refer to the funds' management fee, 12b-1 fee, front-end load, deferred load, redemption fee at time *t* respectively; all of the fees are displayed in percentage[4].

C. Active management, mutual fund expense and performance

Prior researches show that only a limited number of funds outperformed different benchmarks. In other words, only a few funds have market timing ability or selectivity expertise. Tracking error is the traditional active management measure which measures the degree of deviation from a specified benchmark (Grinold and Kahn, 1999). It is defined as the standard deviation ($Stded$) of the difference between the fund return ($R_{i,t}$) and the benchmark return ($R_{index,t}$),

$$Tracking\ error_{i,t} = Stded\ (R_{i,t} - R_{index,t}). \quad (7)$$

However, some researchers present that tracking error is not a good measure of active management when it is used in isolation (Israelsen and Cogswell, 2007; Cremers and Petajisto, 2009). Cremers and Petajisto (2009) claim that tracking error mostly measures exposure to systematic risk, which can be used to measure managers' market timing ability. They propose a new active management measurement called active share, which mostly measures the stock selectivity. It is defined as the sum of the deviation of shareholdings from the benchmark index,

$$Active\ share = 0.5 * \sum_{i=1}^{N} \left| W_{fund,i} - W_{index,i} \right|, \quad (8)$$

where $W_{fund,i}$ refers to the weight of security i in the mutual fund; $W_{index,i}$ is the weight of security i in the index. I take the absolute value of the difference of weights and the sum is taking over the universe of all assets. For the active share of mutual funds that never short stocks and never buy on margin will always between 0% and 100 %.

[4] The explanation of b_0, V_i and $e_{i,t}$ is presented under regression (1).

Based on the active share and tracking error, I follow Petajisto (2013) combining them to measure the different levels of active management. Different from the traditional classification of active management, which are market timing and stock picking, there are five active management categories as presented in table I, which are closet indexers, moderately active, factor bets (market timing), concentrated, and stock pickers (stock picking). The closet indexing funds with active share smaller than 20%, and consists of pure index funds. These funds behave the same as the passively managed funds, while they still charging for management fee and claiming as the actively managed funds. The other four types present the different degree of active management, which actually are the extension of the two main types of active management. The concentrated funds combine very active stock picking with exposure to systematic risk. The moderately active funds are in the middle which has no distinction between stock selection and market timing. According to these five categories of actively managed funds, the characteristics of mutual funds will be presented.

Table I

5 types of active management

Active share quintile	Tracking error quintile					Group	Label
	Low	2	3	4	High		
High	5	5	5	5	4	5	Stock pickers
4	2	2	2	2	3	4	Concentrated
3	2	2	2	2	3	3	Factor bets
2	2	2	2	2	3	2	Moderately active
Low	1	1	1	1	3	1	Closet indexers

Sources: Petajisto (2013).

After that, I present the relations between the fund size, active management, and fund expense ratio by tabulating the fund expense ratio based on five quintiles of fund

size and five categories of active management. In addition, the same method will be implemented for examining the relations between the fund size, active management, and fund performance.

Finally, I analyze the relation between active management and fund performance. Except for the three performance measures of mutual funds that displayed in equation (2) through (4), I add information ratio as an extra measurement. Since the information ratio is a useful and accurate tool for assessing the skills of an active manager (Goodwin, 1998; Israelsen and Cogswell, 2007). It is defined as the difference between the fund return and benchmark return divided by the fund's tracking error, which are the funds' net returns and risk adjusted returns

$$Information\ ratio_i = \frac{(R_i - R_{index})}{TE_i}, \tag{9}$$

where $Information\ ratio_i$ refers to the information ratio of fund i. R_i is the net return of fund i; R_{index} is the return of benchmark (either S&P 500 index or Russell 2000 index); TE_i is the tracking error of fund i. Therefore, there are five performance measures in this study, which are the funds' net returns, two benchmark-adjusted returns based on the returns of S&P 500 index and Russell 2000 index, and two information ratios based on the returns of S&P 500 index and Russell 2000 index.

III. Data

A. Data on expenses

I first acquire the data of active open-ended equity funds that domicile in the U.S. and focus the domestic markets from the Bloomberg Database[5]. There are 1534 funds in total

[5] Bloomberg Database provides the most powerful and flexible platform for financial professionals who need real-time data, news and analytics to make smarter, faster, more informed business decisions.

which consist of both retail and institutional funds. Bloomberg provides current information for all mutual funds over the world. However, it does not provide data for the fees. Therefore, the majority data of this study was obtained from the for Research in Security Prices (CRSP) survivorship bias free database of mutual fund that first complied in Carhart (1997). CRSP[6] mutual fund database provides both active and inactive mutual funds. It contains complete historical information from 1962 to 2012, for about 39,000 open-ended funds, which consists of more than 26,000 active and nearly 13,000 delisted funds. I finally collect the descriptive information and expenses' data both in quarterly and yearly for 997 retail mutual funds out of 1534 sample funds from the first quarter of 2005 to the last quarter of 2012. The descriptive information includes the fund symbol, name, initial offer date which is used for calculating the fund age, portfolio identifier, and retail fund identification. Other data contains the latest month fund's net asset, 12b-1 fee, management fee, and expense ratio. The front-end load, deferred load and redemption fee are presented only in the effective period as reported. Therefore, I manually filled the reported fees for the funds in each quarter during the period. For the outliers in some variables, I treat them as missing data. The equally-weighted average value of each variable that mentioned above from 2005 to 2012 is presented in the appendix A.

B. Data on holdings

In order to compute the active share, I have to collect the composition of mutual funds as well as the benchmark indexes. The data of stock holdings for 799 retail mutual funds out of 997 is obtained from the CRSP mutual funds portfolio holdings database at the end of each year from 2005 to 2012.

I choose two indexes as the benchmarks in this study, which are S&P 500 index and Russell 2000 index. The S&P 500 focuses on the large-cap sector of the US market. Since it includes a significant portion of the total value of the market, it has

[6] http://www.crsp.com/products/mutual_funds.htm

always been assumed as the market index in academic research (see, e.g. Elton, Gruber, and Busse, 2004; Hortascu and Syverson, 2004). Except for the S&P 500 index that includes only big companies, I also use Russell 2000 index that includes small companies as a complement benchmark. The Russell 2000 Index measures the performance of the small-cap segment of the U.S. equity universe. It includes approximately 2000 of the smallest securities based on a combination of their market cap and current index membership. It is constructed to provide a comprehensive and unbiased small-cap barometer and is completely reconstituted annually to ensure larger stocks do not distort the performance and characteristics of the true small-cap opportunity set. It is the benchmark used by small cap investors in the US. The yearly data of index constituents from 2005 to 2012 is directly from the index providers, which are Standard & Poor's and Frank Russell Co. respectively.

Based on the shareholdings of mutual funds and two benchmarks, I calculate active share for each fund at the end of each year from 2005 to 2012. There are two values of active share for each fund because of two benchmarks. For better comparison, I combined them as one by picking the larger value between them.

C. Data on returns

Monthly net returns for mutual funds are from the CRSP survivorship bias free database of mutual funds. They are all net returns, which are the gross returns after fees, expenses, and brokerage commissions, but before any front-end or rear loads. Mutual funds daily returns are from Bloomberg database. Monthly and daily returns of indexes are directly from the index providers, including dividends. All of the returns are from 1st January 2005 to 31st December 2012. Based on the monthly returns, I calculate the compounded quarterly and yearly returns for mutual funds and indexes.

I use one year period daily returns calculate the tracking error and information ratio for each fund at the end of each year from 2005 to 2012. Therefore, all of the funds have two values in tracking error and information ratio at each year because of the two

benchmarks. The equally-weighted average value of funds' active share, tracking error, and information ratio from 2005 to 2012 are presented in the appendix B.

As noticed, there are two different time frequencies in the database. The data for mutual funds' fees, net assets, expenses and performance have both quarterly and yearly data; while, the funds' active share, tracking error, and information ratio are presented in yearly. Therefore, I use the quarterly data to analyze the effects of mutual funds' fees on fund expenses, and their relations with fund performance. The relations between active management, fund expenses and performance are investigated based on the yearly data.

IV. Empirical results

A. Mutual fund fees and expense ratio

Figure 1 portrays the developments of funds' size, expense ratio, management fee and 12b-1 fee of 997 US retail mutual funds during the period from 2005 to 2012. As panel A displays, the average net assets of US retail mutual funds only grew slightly during the study period. However, this is a rather turbulent period, with ups and downs. The fund size experienced a gradual rise from $726 million in the first quarter of 2005 and peaked at $1000 million in the second quarter of 2007. Reflecting the macroeconomic environment, the fund size plummeted, dropping dramatically during 2007 and 2008 by more than $400 million on average. Bottoming out and hitting an eight years low of less than $600 million in the end of 2008. After that, it started to recover and rose to more than $800 million in 2012.

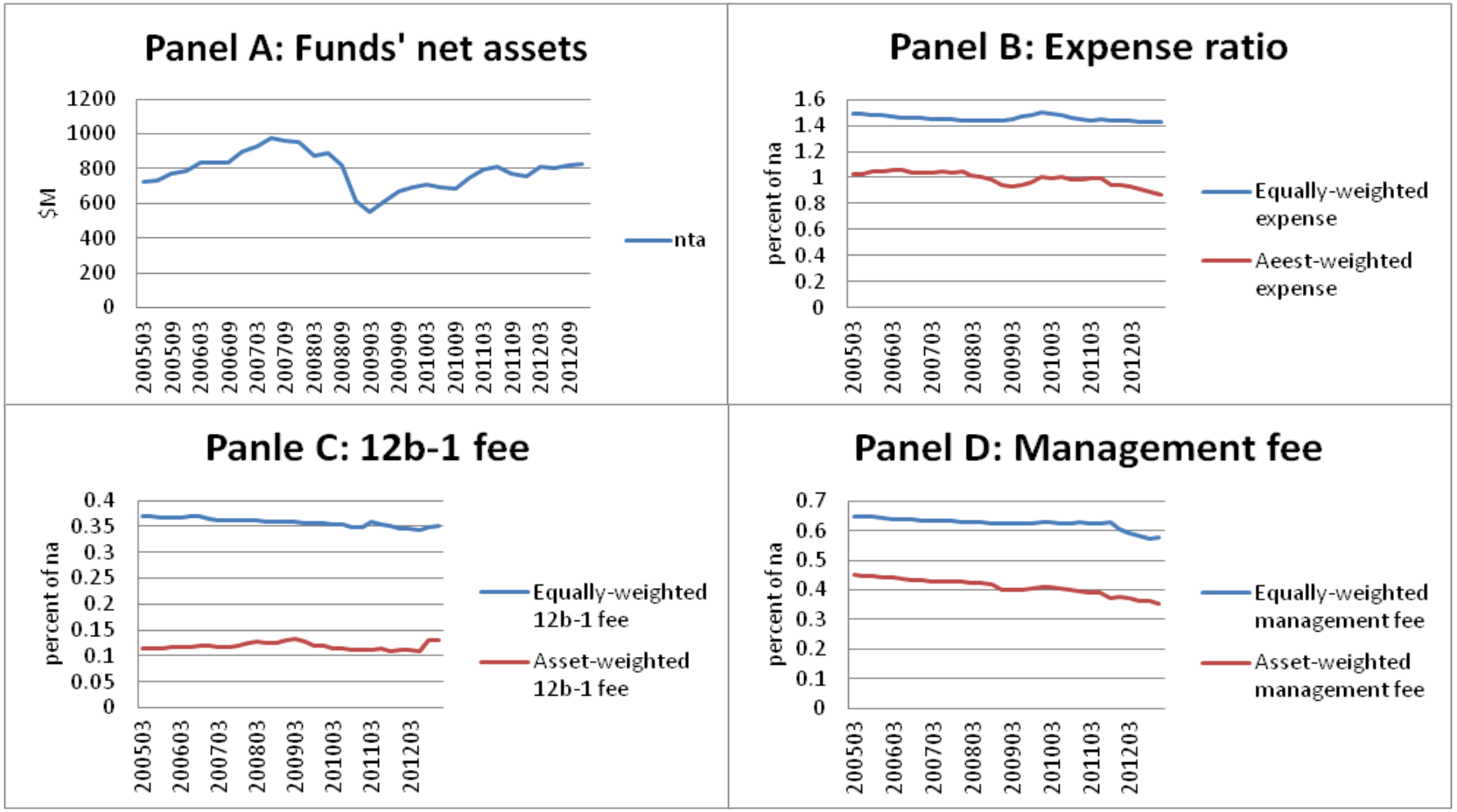

Figure 1: The trend of funds' net assets and fees. This figure depicts the average funds' net assets and both equal and assets-weighted average expense ratio, 12b-1 fee and management fee of all U.S. retail equity mutual funds during the period from the first quarter of 2005 to the fourth quarter of 2012. The asset-weighted values are calculated based on the net assets of mutual funds.

Panel B through D depict the trends in expense ratio, 12b-1fee and management fee from 2005 to 2012. As we can see, all asset-weighted average fees are much lower than their equally-weighted average values. The equally-weighted average value is the simple average for all of the funds. The asset-weighted average is computed by assigning an asset weight based on the average net assets of a fund. Typically, as the fund grows in size, greater operational efficiencies are realized then result in lower total expense ratio. The difference of two average values most likely arises from economies of scale. Since big funds are given greater weight than smaller funds in computing the asset-weighted average values. As noticed, both equally-weighted and asset-weighted average expense ratio and management fee display a declining trend over the study period, as did the equally-weighted average 12b-1 fee. However, the asset-weighted average 12b-1 fee tends to grow after 2011. Moreover, it is interesting to find that both expense ratio and management fee has fallen at least 0.1% over the period, while the asset-weighted average 12b-1 fee rises no matter during the world financial crisis period or in the recovering time.

Table II presents the characteristics of fees between loaded funds and no-load funds. As defined before, loaded funds charge front-end load and/or deferred load; no-load funds charge none of the loads. The table shows that only about 12% of retail funds are loaded funds, reflecting that loads are not the most popular fees charged by the US retail mutual funds anymore. In addition, the average front-end load and deferred load are 0.15 % and 0.057 % of fund net assets value respectively. As we can see, the loaded funds charge higher management fee but lower 12b-1 fee and redemption fee than no-load funds. However, what is the statistical difference between the load funds and no-load funds?

Table III presents the statistical results of Wilcoxon rank sum test[7] for checking the differences between loaded funds and no-load funds. Before conducting the hypothesis test, I test the distribution of the variables. The results reveal that none of them is

[7] I conduct the two-sided Wilcoxon Rank-Sum Test in this study. The Wilcoxon Rank-Sum Test (Keller, p756) is a nonparametric alternative to the two-sample t-test which is valid for data from any distribution. It detects whether the distribution of the measurements in population A is the same as that in B with the null hypothesis: H0: A=B.

normally distributed which are presented in the appendix C. Therefore, I go for the Wilcoxon rank sum test. The results above display that the loaded funds on average ask ask higher expense ratio and management fee but lower 12b-1 fee than no-load funds. The findings are consistent with the prior studies and also indicate that loaded funds are are more expensive than no-load funds. Comparing their average net assets, the loaded funds are generally smaller than no-load funds. However, the negative z-statistic of funds' net asset shows that a random loaded fund would be bigger than a random no-load fund. It indicates that broker advisory do attract more investment for the loaded funds. Surprisingly, the loaded funds perform better than no-load funds implied by their net returns, which contradicts to the results of prior research (see, Houge & Wellman, 2007). However, we cannot prove the economies of scale, since the bigger size of loaded funds does not result in lower expense ratio. Therefore, the higher return would come from somewhere else which needs to do further research.

Table II

The characteristics of fund fees between loaded funds and no-load funds

The retail mutual funds are sorted by loaded funds and no-load funds. This table displays the fund characteristics about the fees of loaded funds and no-load funds, as well as the number of loaded funds and no-load funds. All of the fees are computed as the percentage of funds' net assets.

	Mean (%)	Std. Dev.	Maximum (%)	Minimum (%)	No. of funds
Loaded funds					*113*
Management fee	0.706	0.253	2.559	0.002	
12b-1 fee	0.100	0.261	1.006	0.000	
Redemption fee	0.031	0.071	0.200	0.000	
Front-end load	0.150	0.114	0.550	0.000	
Deferred load	0.057	0.108	0.500	0.000	
No-load funds					*852*
Management fee	0.614	0.500	21.935	0.000	
12b-1 fee	0.391	0.413	1.111	0.000	
Redemption fee	0.065	0.093	0.500	0.000	
Front-end load	0.000	0.000	0.000	0.000	
Deferred load	0.000	0.000	0.000	0.000	

Table III

Results of Wilcoxon rank sum test by loaded and no-load funds

The 997 retail mutual funds are sorted by loaded funds and no-load funds. The two-sided Wilcoxon rank-sum (Mann-Whitney) test checks whether the differences in the distribution of expense ratio (expense), management fee (manag.fee), 12b-1 fee, fund size (fund NA), and fund return between the two categories are statistically significant or not. This table displays the average mean and standard deviation of each variable between loaded funds and no-load funds, as well as the z-statistics. The results reveal that the loaded funds are statistically significantly different from no-load funds in all of the variables. The loaded funds on average charge higher expense ratio and management fee than no-load funds, but lower 12b-1 fee. In addition, they generate higher net returns. However, the negative z-statistic of Fund NA represents that the loaded fund is statistically bigger than no-load fund, although on average the loaded funds is smaller. [Examine HI]

	Mean (%/$M)	**Standard Deviation**	***Z-statistic***
Expense (loaded)	1.522	0.528	*-15.84***
Expense (no-load)	1.447	2.586	
Manag. fee (loaded)	0.706	0.253	*-21.92***
Manag. fee (no-load)	0.614	0.500	
12b-1fee (loaded)	0.100	0.261	*31.22***
12b-1fee (no-load)	0.391	0.413	
Fund NA (loaded)	754	1271	*-21.49***
Fund NA (no-load)	791	3722	
Fund return (loaded)	1.644	10.608	*-7.651***
Fund return (no-load)	1.225	8.437	

Notes: ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10 levels respectively.

After studied the differences between the loaded funds and no-load funds above, I investigate the differences between the 12b-1 funds and non 12b-1 funds. Table IV presents the statistical results of Wilcoxon rank sum test for checking the differences in the fund characteristics of US retail mutual funds with and without 12b-1 fees from 2005 to 2012. As noted, more than 75% of US retail mutual funds charge 12b-1 fees over this period. On average, the 12b-1 funds charge higher expense ratio and management fee than non 12b-1 funds by 56 basis points and 3 basis points

respectively. Moreover, they generate higher net returns. However, the smaller size of 12b-1 funds indicates that the 12b-1 fee cannot grow funds, let alone the operating efficiencies. Therefore, their higher net returns must be contributed by other factors that need further research.

Table IV

Results of Wilcoxon rank sum test by 12b-1 and no 12b-1 funds

The 997 retail mutual funds are sorted by 12b-1 funds and non 12b-1 funds. The two-sided Wilcoxon rank-sum (Mann-Whitney) test examines whether the differences in the distribution of funds' expenses ratio (expense), management fee (manag.fee), size (fund NA) and net return (fund NR) between the two categories are statistically significant or not . The results reveal that, in general, the four characteristics of 12b-1 funds are significantly different from non 12b-1 funds as their average values presented. [Examine HII]

	Mean ($M/%)	**Standard Deviation**	**No. of funds**	***Z-statistic***
Expense (12b-1)	1.578	2.244	780	*-77.60***
Expense (non 12b-1)	1.018	3.001	217	
Manag.fee (12b-1)	0.632	0.314	773	*-18.64***
Manag.fee (non 12b-1)	0.598	0.844	208	
Fund NA (12b-1)	426	1657	780	*41.42****
Fund NA(non 12b-1)	2101	6757	217	
Fund NR (12b-1)	1.280	8.841	780	*-2.93****
Fund NR (non 12b-1)	1.248	8.224	217	

Notes: ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10 levels respectively.

Given the features of funds with and without loads (12b-1 fee), an interesting question is raised about the impact of all specific fees, fund size, and age on the mutual fund expense ratio over time. The fund size and age are indirect elements that might influence the fund expenses. As a fund grows bigger, it may benefit from the economies of scale

which results in lower marginal expense. The operation efficiency may be achieved by the older funds. To test their effects on fund expenses, I employ the regression that presented in equation (1) based on quarterly data.

Table V displays the results for the regression that specified in equation (1) for each year from 2005 to 2012. It reveals the effects of all fees, fund size, and age on mutual fund expense ratio. I implement the random effects panel regression under the guidance of Hausman test[8]. The results of Hausman test are presented in the appendix D. The overall power of the model to explain the variation in fund expenses is fairly stable during the sample period. F values are significant at 1 % each year.

Generally speaking, the US retail mutual fund industry can be categorized as experiencing the economies of scale. Except for the coefficients for the fund size in year 2009 and 2010 are positive; all other coefficients are negative and significant at 1% level. This negative results support the findings from Malhotra and Mcleod (1997) and Dellva and Olson (1998), which indicate that larger funds benefit from operating efficiencies with lower expenses than smaller funds. However, the new findings about the positive relation between the fund size and expenses in 2009 and 2010 reveal that US retail mutual funds did not benefit from their big size in these two years.

The significant negative coefficients for the age variable indicate that older funds are cheaper than younger funds in most of the years except for 2007 and 2009. It informs investors that they may pay higher expense for newly issued funds, either because of the start-up costs, or less efficient in operation. This result is consistent with the findings from Ferries and Chance (1987), Trzcinka and Zweig (1990) and Dellva and Olson (1998). While, the positive relation between the fund age and fund

[8] The Hausman test checks a more efficient model against a less efficient but consistent model to make sure that the more efficient model also gives consistent results. It checks the differences of coefficients from fixed effect model and random effect model; and chooses the better model according to the consistency and efficiency.

expenses in 2007 and 2009 indicates that older funds are more expensive just before and after the world financial crisis.

The coefficient for the management fee is significantly positive, which indicates that management fee increase the fund expenses definitely. However, whether the higher management fee brings economic value needs to be investigated further.

As explained, 12b-1 fees are mainly spent on the marketing activities; it aims for attracting more capital that increases the fund size, then lead to economies of scale. Therefore, investors would benefit from it when per unit cost decrease with an increase in the degree of funds' operating efficiency. However, I find controversial results on 12b-1 fee over the years. Five out of six significant coefficients for 12b-1 fee are positive in this study; except in 2012 which is negative. The positive relation indicates that 12b-1 fees increase the fund per unit cost and provide no economic benefit for investors. While, the negative relation reveals that 12b-1 fee may reduce the fund expenses, but investors can only benefit when the marginal return covers its additional expenses. Prior studies found that 12b-1 fees are not covered by the fund return (see, e.g. Ferris and Chance, 1987; Chance and Ferris, 1991; Mcleod and Malhotra, 1994).

Only one out of eight coefficients for the front-end loads is statistically significant and positive. As mentioned before, there is only about 12 % of US retail mutual funds are loaded funds, which charge front-end load and/or deferred load. The front-end load as one of market distribution costs aims to increase the fund size by attracting more capital. Whereas, the positive coefficient indicates that front-end loads increase the overall expenses. The insignificant coefficients for deferred load and redemption fee provide no information for their impact on fund expenses. Therefore, I find no relation between the deferred load and fund expenses, as well as the redemption fee and fund expenses during the study period.

Table V

Results of random effects panel regression for expense ratio and funds' characteristics

	2005	2006	2007	2008	2009	2010	2011	2012
Intercept *(z-value)*	1.323 *(15.19)***	1.161 *(12.48)***	0.986 *(9.43)***	1.670 *(18.63)***	-0.438 *(-3.58)***	1.860 *(16.92)***	1.018 *(6.68)***	1.542 *(17.52)***
Fund size	-0.005 *(-1.60)*	-0.009 *(-2.16)***	-0.004 *(-0.49)*	-0.026 *(-7.05)***	0.042 *(3.51)***	0.024 *(3.64)***	-0.012 *(-0.98)*	-0.011 *(-3.45)***
Age	-0.015 *(-5.69)***	-0.013 *(-5.42)***	0.007 *(-2.02)***	-0.012 *(-4.00)***	0.019 *(3.47)***	-0.045 *(-14.27)***	-0.005 *(-0.88)*	-0.014 *(-7.89)***
Manage. fee	0.395 *(21.70)***	0.476 *(17.90)***	0.566 *(19.25)***	0.030 *(2.73)***	1.884 *(106.51)***	0.042 *(4.09)***	0.845 *(13.40)***	0.193 *(12.59)***
12B-1fee	0.327 *(13.24)***	0.391 *(13.19)***	0.495 *(8.11)***	0.020 *(0.57)*	0.646 *(9.24)***	0.647 *(20.71)***	-0.041 *(-0.66)*	-0.028 *(2.22)***
Front-end load	-0.016 *(-0.02)*	0.430 *(4.01)***	-0.826 *(0.24)*	-0.292 *(-0.60)*	-0.229 *(-0.48)*	0.125 *(0.11)*	-0.377 *(-0.28)*	-0.021 *(0.99)*
Def. load	0.153 *(0.30)*	0.142 *(0.30)*	0.302 *(0.39)*	0.502 *(0.54)*	1.153 *(0.71)*	1.305 *(0.59)*	1.027 *(0.47)*	1.216 *(0.56)*
Red. Fee	-0.216 *(-0.48)*	0.721 *(0.97)*	0.641 *(0.39)*	0.065 *(0.29)*	0.601 *(0.78)*	-0.188 *(-0.23)*	0.781 *(0.95)*	0.111 *(0.48)*
F probability	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***	0.000***
R^2	0.165	0.134	0.116	0.018	0.793	0.213	0.002	0.081

Notes: The z-statistics are in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10 levels respectively. [Examine HII (a)-HV (a)]

In general, the results from table V reveal that the 12b-1 fee and front-end load are "hidden fees". And the management fee increases mutual fund expense ratio. In addition, the effects of deferred load and redemption fee on expense ratio are not significantly significant during the period from 2005 to 2012.

B. Mutual fund fees and fund performance

How do the mutual funds' fees, size and age relate to the fund performance? I conduct the regression that specified in equation (6) for testing their relationships based on quarterly data with all funds that are bigger than $20 million during the period from 2005 to 2012. As mentioned earlier, I use three returns to measure the fund performance which are the funds' net returns, risk adjusted return based on S&P 500 index, and risk adjusted return based on Russell 2000 index. Moreover, I use dummy variables instead of their true values for front-end load and deferred load in this regression. The D front-end load is a dummy variable with a value of 1 if the fund charges front-end load and zero otherwise. The D def. load is a dummy variable with a value of 1 if the fund charges deferred load and zero otherwise. Before conducting the regression, I employ the Hausman Test for choosing the appropriate test for the panel data analysis. The results which presented in the appendix E reveal that the fixed-effects regression is preferable. Table VI displays the results of the fixed-effects panel regression. As we can see, the F values for the regression are statistically significant at 1% level. Three intercepts for the fund performance measures are negative, but they are quite different from each other and two of them are significant at 1% level. The results reflect the sensitivity of fund average performance to different risk measures.

The coefficients for management fee are negative and significant at 1% level. Combine this result with its effect on mutual fund expenses which is significantly positive over most of the years from 2005 to 2012. It indicates that in general management fee increases fund expenses without bringing economic benefit to investors.

Similar results are found on the 12b-1 fee, although its negative effect on fund performance is weaker than management fee. The negative coefficients are significant at 1% or 5% level. It reveals that marketing and distribution costs increase fund total expenses, while they do not improve the fund performance. As noticed in table IV, the 12b-1 funds are much smaller than non 12b-1 funds, which indicates that either advertising is useless or the 12b-1 fee actually did not used in the promotion and advertising but somewhere else. The Investment Company Institute did a research in 2005 and find that less than 5% of the estimated $10.9 billion collected for 12b-1fee were used for funds promotion and advertising (Haslem, 2010). The result from this study implicates that 12b-1 fees are dead weight loss to retail mutual fund investors. Moreover, it provides evidence that higher net returns of 12b-1 funds that I find in the last subsection are not contributed by marketing and advertising, but from somewhere else.

The Front-end load erodes the fund performance measures on average. As indicated by the two significantly negative coefficients, one unit increase in the front-end load lead to at least 2 basis points decline in the net returns.

Both deferred loads and redemption fees are sales charges, which would reduce investors' welfare at selling the fund shares. While, the deferred loads decrease with the holding period, it then has no effect to the long-term investors. The coefficients of deferred load are not significant for any of the performance measures. Two coefficients for redemption fee variable are negative and significant at 10% level for the first two performance measures. These results present that redemption fee is negatively relate to the fund performance, and no relation between the deferred loads and fund performance.

The fund expense ratio is positive and significant at 1% level for all performance measures, which is different from most of the prior studies. Since most previous research provides strong evidence of negative relation between expense ratio and performance. However, more recent studies in mutual funds also find the positive relation between expense ratio and performance (see, Cremers and Petajisto, 2009;

Petajisto, 2013). This result implicate that, in general, better performed funds are more expensive than their counterparts. However, it does not mean that all good performed funds are expensive funds. Thus, investors should not reject all of the expensive funds absolutely, since the high additional expenses might be covered by their high returns.

Controversial results are found on fund size. First two coefficients are positive related to the fund performance, which is measured by the fund net returns and the benchmark-adjusted returns by S&P500 index. But, it is negatively relate to the benchmark-adjusted return by Russell 2000 index. Given the result that fund size is negative related to the fund expenses in the last subsection. Investor can benefit from larger size, since they are able to achieve economies of scale and thus improve the fund performance. Similar result can be found from Fan and Addams (2012), who claim that large funds can explore the scale economies and attract skilled managers, then have significantly better market performance than small funds. However, the negative relation from performance 3 reflects that risk adjusted return by Russell 2000 index capture other information than the two other measures, concerning the fund performance.

Fund age is significantly positive related to fund performance at 1% level. This result suggests that mature funds perform better than younger funds. In addition, it verifies the exists of learning curve, which points that older funds can generate more experiences in the longer operation period and then achieve greater operating efficiency (Umamaheswar Rao, 2001).

The results of regression (6) indicate that 12b-1 fee, front-end load, and redemption fee deteriorate the fund performance, which should be avoided by investors for a given expenses. Moreover, deferred load does not significantly relate to the fund performance. However, investors can benefit from bigger and older funds, because of the economies of scale and operating efficiency. Last but not least, investors do not need to avoid all expensive funds, since the result indicates that better performing funds also associate with high expenses.

Table VI

Results of fixed effects panel regression for funds' characteristics and performance

The funds that bigger than $20 million are pooled together for testing the relationship between the funds' characteristics and performance based on the fixed effect regression. The performance 1 is the fund net return, which is the gross return after fees, expenses, and brokerage commissions, but before any front-end or rear loads. Performance 2 is the risk adjusted return based on S&P500 index. Performance 3 is the risk adjusted return based on the Russell 2000 index. D front-end load and D def. Load are the dummy variables for the front-end load and deferred load respectively. [Examine HII (b) - HV (b); HVII]

	Performance 1	Performance 2	Performance 3
Intercept	-6.973	-11.554	-0.861
(t-value)	*(-5.38)****	*(-8.43)****	*(-1.14)*
Management fee	-4.007	-4.718	-2.163
	*(-4.46)****	*(-4.94)****	*(-4.12)****
12B-1fee	-3.105	-3.249	-1.188
	*(-3.06)****	*(-3.05)****	*(-2.03)***
D front-end load	-2.330	-2.642	-0.360
	*(-2.14)***	*(-2.31)***	*(-0.57)*
D def. load	-1.285	-1.560	0.858
	(-0.96)	*(-1.15)*	*(1.12)*
Red. Fee	-5.714	-6.162	2.440
	*(-1.66)**	*(-1.67)**	*(1.20)*
Expenses	6.342	7.340	2.360
	*(10.69)****	*(11.51)****	*(6.73)****
Fund size	0.255	0.259	-0.416
	*(2.00)***	*(1.93)**	*(-5.60)****
Age	0.140	0.332	0.148
	*(4.85)****	*(10.88)****	*(8.84)****
F probability	0.000***	0.000***	0.000***
R^2	0.007	0.012	0.009

Note: The t statistics are in parentheses. ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10 levels respectively.

C. Active management, mutual fund expense and performance

Following the methodology given in section II, I conduct the cross-sectional analysis based on the data from the latest year 2012 for studying the relations between mutual fund active management, fees and performance in this subsection. The active management is measured by active share and tracking error that defined before. I sorted all funds in 2012 by the two dimensions of active management. Table VII presents the number of mutual funds, the average net asset, management fee and 12b-1 fee according to the scales of active share and tracking error in panel A, B, C and D respectively.

As we can see, most of the US retail mutual funds are located in the range with active share between 40% and 60%, and smaller than other funds. Looking at the funds in the first column that have tracking error smaller than 1.5%, I find the average net asset of funds that hold active share below 10 % is 31836 million dollars, which is 40 times of its counterparts with active share larger than 90%. Surprisingly, the most expensive management fees are not charged by the funds with biggest active share, but the funds hold active share between 70% and 80%. They also charge highest 12b-1 fee. With the tracking error becomes bigger, fund number decreases and fees increase. These results support the findings from Cremers and Petajisto (2009), which indicate the funds with high active share tend to be smaller in size and more expensive than their counterparts that hold low active share.

According to the different types of active management in the 5×5 grid of active share and tracking error that presented in table I, I summarize some statistics of US retail mutual fund characteristics and performance in table VIII. This table includes the mean value and standard deviation of funds' net assets, expense ratio, management fee, rule 12b-1fee, active share, tracking error, net return and information ratio for all of the US equity-retail-domestic open-end funds during the period from 2005 to 2012. Each year, I calculate the mean and standard deviation of each variable, and then compute average across the years. Because the number of funds in each category varies over the years, I present the percentage of funds instead of their actual number. Among all of the funds, almost 17% are stock pickers that mainly focus on stock picking strategy, 3% are

concentrated funds which combine stock picking with the exposure to systematic risk; around 10% are factor bets that mainly focus on the exposure to systematic risk; and about 16% are closet index funds. The most popular funds are moderately active funds, which occupied 54% of total funds.

Table VII

U.S. retail mutual funds in 2012

According to the distribution of the active share and tracking error, the four panels display the number of mutual funds, fund net assets, management fee and 12b-1 fee respectively. The active share is defined as the percentage of the fund's stockholdings that differ from the benchmark index. It calculated based on the CRSP mutual fund holdings data and index composition data from S&P500 index and Russell 2000 index. The tracking error is defined as the standard deviation of the fund excess return over the index return. It is computed based on daily returns of one year.

	Tracking error (% per year)							
Active share (%)	<1.5	1.5-2	2-2.5	total	<1.5	1.5-2	2-2.5	total
	Panel A: No. of funds				Panel C: Manage. Fee (%)			
90-100	33	4		*37*	0.54	0.28		*0.52*
80-90	5			*5*	0.55			*0.54*
70-80	5	1		*6*	0.84	1.00		*0.87*
60-70	2			*2*	0.45			*0.45*
50-60	126	18		*144*	0.59	0.44		*0.59*
40-50	416	61	10	*487*	0.54	0.51	0.65	*0.54*
30-40	81	2		*83*	0.49	0.15		*0.49*
20-30	26	1		*27*	0.32			*0.30*
0-10	7	1		*8*	0.14	1.00		*0.25*
Total	*701*	*88*	*10*	*799*	*0.54*	*0.49*	*0.65*	*0.54*
	Panel B: Mean net assets ($M)				Panel D: 12b-1 fee (%)			
90-100	784	32		*702*	0.32	0.20		*0. 31*
80-90	1313			*1313*	0.12			*0.12*
70-80	3229	93		*2706*	0.84	1.00		*0.86*
60-70	3250			*3250*	0.45			*0.45*
50-60	368	198		*345*	0.42	0.28		*0.40*
40-50	571	196	189	*511*	0.45	0.47	0.42	*0.45*
30-40	1210	185		*1185*	0.41	0.15		*0.40*
20-30	4286	2613		*4147*	0.42	0.00		*0.42*
0-10	31836	24.9		*27859*	0.14	1.00		*0.25*
Total	*1036*	*189*	*189*	*929*	*0.43*	*0.42*	*0.42*	*0.43*

Table VIII

Sample statistics of U.S. retail mutual fund in five categories 2005 - 2012

This table shows some sample statistics for five fund categories that defined in table I. The NA is the fund net asset, AS is the active share that measures the fraction of a fund that differs from benchmark index. TE is the tracking error; manage. Fee is the management fee, R*i* is the fund net return, and IR is fund information ratio. The mean value of each variable is equally weighted over the years from 2005 to 2012.

Panel A: Mean value

Group	Label	No.(%) of total funds	NA ($M)	Expense (%)	Manage. Fee (%)	12B-1 fee (%)	AS (%)	TE (%)	R*i* (%)	IR (%)
5	Stock pickers	16.98	393	1.64	0.61	0.41	59	1.38	7.36	-0.03
4	Concentrated	3.01	403	1.84	0.49	0.44	63	2.26	-4.05	2.17
3	Factor bets	9.92	938	1.67	0.56	0.41	33	2.38	-22.97	1.35
2	Moderately active	54.13	586	1.70	0.58	0.45	45	1.37	9.68	1.40
1	Closet indexers	15.96	2188	1.36	0.54	0.41	13	1.09	10.8	1.40
	Total	100	841	1.64	0.57	0.43	42	1.45	5.81	1.18

Panel B: Standard deviation

Group	Label	NA ($M)	Expense (%)	Manage. Fee (%)	12B-1 fee (%)	AS (%)	TE (%)	R*i* (%)	IR (%)
5	Stock pickers	1362	3.30	1.20	0.42	17	0.32	12.72	2.74
4	Concentrated	848	3.81	0.39	0.40	19	0.47	37.77	3.67
3	Factor bets	4039	3.42	0.70	0.42	9	0.41	29.93	2.63
2	Moderately active	1830	3.16	0.80	0.42	4	0.55	17.90	3.33
1	Closet indexers	8382	0.77	0.68	0.40	12	0.41	10.96	3.72
	Total	3927	3.00	0.85	0.42	18	0.60	21.19	3.30

The results present that average expense ratio of US retail mutual funds is 1.64% per year, and comparable across all categories. The stock pickers are the smallest funds which hold the second biggest active share and charge the highest management fee. However, they are not the most expensive funds and generate positive net returns. The concentrated funds are the most expensive funds among the five groups which hold the biggest active share and the second biggest tracking error. But the high expenses cannot be covered by their net returns which are negative. The factor bets are the worst performers, which hold the biggest tracking error. The largest group which occupies 54% of total funds is the moderately active funds. They are relatively more expensive compared with other groups. However, their high expenses are covered by their positive net returns. The best performers are the closet index funds, which are the biggest and cheapest funds among the five categories. The results indicate that not all actively managed funds are expensive and some expensive active funds can also generate positive net returns.

Given the fund characteristics of US retail mutual funds among the five categories of active management, I investigate the relations between fund size, active management, and fund expense ratio; as well as their relations with fund performance. Then, I study fund performance across the five categories of active management based on five performance measures, which are the funds' net returns, two benchmark-adjusted returns (based on S&P500 index and Russell 2000 index), and two information ratios (based on S&P500 index and Russell 2000 index).

Table IX shows how the size and level of active management of mutual fund affect fund expense ratio. Looking at the total expense ratio across the five groups of active management, closet index funds on average are the cheapest funds with smallest standard deviation. However, among the smallest funds, closet index funds charge highest expense ratio. On the contrary, stock pickers as the most active funds are the cheapest funds. With the size grows bigger, most expense ratios decrease. Only the largest stock pickers and moderately active funds are more expensive than their smaller counterparts. Moreover, the largest stock pickers are the most expensive funds in the total sample, followed by the biggest moderately active funds. It is inspiring to

find that the small stock pickers located from quintile 1 to 3 are cheaper than the closet indexers, although active funds are more expensive than closet index funds generally. It indicates that either the small closet index funds charge too high expenses or the smaller most active funds are not expensive as assumed.

Table IX

Fund size, Active management and Expense ratio

The table displays the annual expense ratio of US retail mutual funds for fund size quintiles within five categories of active management from 2005 to 2012. The five categories of funds are defined in table I. The average expense ratio of mutual fund in the middle of the table is expressed in percent of fund's net assets per year, followed by the standard deviation of fund expense ratio in parenthesis. Funds with less than $20 M in net assets have been excluded. [Examine HIV (a)]

		5 quintiles of fund size						
Group	Label	1	2	3	4	5	*Total*	5-1
5	Stock pickers	1.52	1.41	1.31	1.17	2.64	1.55	1.11
		(0.58)	*(0.65)*	*(0.53)*	*(0.47)*	*(10.27)*	*(3.90)*	
4	Concentrated	1.72	1.74	1.14	1.42	1.16	1.43	-0.56
		(0.65)	*(0.85)*	*(0.39)*	*(0.60)*	*(0.66)*	*(0.69)*	
3	Factor bets	1.74	1.53	1.48	1.25	1.45	1.48	-0.29
		(0.51)	*(0.52)*	*(0.48)*	*(0.46)*	*(7.13)*	*(3.38)*	
2	Moderately active	1.70	1.60	1.49	1.36	1.78	1.58	0.08
		(0.62)	*(0.60)*	*(0.50)*	*(0.45)*	*(7.28)*	*(3.22)*	
1	Closet indexers	1.78	1.54	1.39	1.15	0.62	1.25	-1.16
		(0.53)	*(0.54)*	*(0.57)*	*(0.52)*	*(0.47)*	*(0.67)*	
	Total	1.68	1.56	1.43	1.30	1.55	1.51	-0.13
		(0.59)	*(0.61)*	*(0.51)*	*(0.48)*	*(6.70)*	*(3.04)*	
5-1	Difference	-0.26	-0.13	-0.08	0.02	2.02	0.31	

Table X

Fund size, Active management and Performance

The table displays the annual performance of US retail mutual funds for fund size quintiles within five categories of active management from 2005 to 2012. The fund categories are defined in table I. Returns in the middle of the table are net returns to the investor after fees and transaction costs. The numbers are expressed in percent per year, followed by standard deviation of the net returns in parenthesis. Funds with less than $20 M in net assets have been excluded. [Examine HIV (b)]

		5 quintiles of fund size						
Group	Label	1	2	3	4	5	*Total*	5-1
5	Stock pickers	7.45	7.65	8.79	7.07	9.53	8.03	2.08
		(13.52)	*(11.51)*	*(12.24)*	*(13.37)*	*(13.73)*	*(12.80)*	
4	Concentrated	-2.78	-3.10	-9.75	1.38	-9.27	-5.20	-6.49
		(35.03)	*(41.28)*	*(34.61)*	*(44.15)*	*(37.63)*	*(37.85)*	
3	Factor bets	-27.29	-26.34	-18.72	-18.44	-20.16	-21.97	7.13
		(26.68)	*(24.50)*	*(36.16)*	*(32.37)*	*(30.35)*	*(30.46)*	
2	Moderately active	8.06	10.53	10.48	10.59	10.58	10.07	2.52
		(18.86)	*(17.87)*	*(17.70)*	*(19.96)*	*(16.27)*	*(18.23)*	
1	Closet indexers	13.33	12.38	10.01	10.63	10.26	11.31	-3.07
		(13.92)	*(12.31)*	*(10.66)*	*(9.86)*	*(9.81)*	*(11.41)*	
	Total	5.33	6.39	6.72	6.82	6.39	6.33	1.05
		(21.48)	*(21.13)*	*(21.44)*	*(22.60)*	*(20.55)*	*(21.45)*	
5-1	Difference	-5.88	-4.73	-1.22	-3.56	-0.73	-3.28	

Table X shows how the fund size affects fund performance net of all fees within each of the five active management categories. As we can see, the average net returns of total retail mutual funds increase with size. Although the average net return of the biggest funds is relatively lower than its neighbor, it is still 1% higher than the smallest funds. Moreover, the bigger funds associate with lower volatility compared with the smallest funds which indicate that bigger funds are less risky than smaller funds. However, the result becomes controversial among the active management categories across fund sizes. Two out of three categories show negative relation between the size and performance. For example, the bigger closer indexers tend to perform poorer than smaller ones as well as the concentrated funds. However, bigger closet index funds are less risky measured by volatility; while the bigger concentrated

funds are much more risky than their smaller counterparts. These findings indicate that the effect of fund size on performance is correlated with the type of active management, although on average it is positive related to the fund performance.

Combining the results from table IX and X, the most expensive moderately active funds and stock pickers on average generate positive return after all fees, as did the cheapest index funds.

Table XI

Fund performance 2005-2012

The table displays the annual performance of U.S. retail mutual funds for five categories of active management from 2005 to 2012. The fund categories are defined in table I. There are five kinds of returns which are the net returns, benchmark adjusted returns (adjusted from S&P500 index and Russell2000 index), and the information ratio (adjusted from S&P500 index and Russell2000 index). The numbers are expressed in percent per year, followed by standard deviation in parentheses. The Z-statistic is the result of the Two-sample Wilcoxon rank-sum (Mann-Whitney) test that tests whether the difference between group 1 and group 5 is statically significant. Funds with less than $20 M in net assets have been excluded. [Examine HVI (b)]

		Net return	Risk-adjusted return		Information ratio	
Group	Label	Funds	S&P500	Russell 2000	S&P500	Russell 2000
5	Stock pickers	7.90	7.51	4.78	-0.14	0.48
		(12.78)	*(13.02)*	*(9.00)*	*(2.15)*	*(4.13)*
4	Concentrated	-5.20	-9.56	7.96	1.53	3.28
		(37.85)	*(40.68)*	*(18.64)*	*(1.44)*	*(6.50)*
3	Factor bets	-21.97	-27.66	1.96	0.88	2.03
		(30.46)	*(32.98)*	*(15.79)*	*(1.20)*	*(4.78)*
2	Moderately active	9.94	8.12	7.14	0.77	2.18
		(18.32)	*(19.21)*	*(13.38)*	*(2.06)*	*(5.17)*
1	Closet indexers	11.31	8.17	6.96	1.04	2.31
		(11.41)	*(11.67)*	*(10.00)*	*(2.82)*	*(4.86)*
	Total	6.26	3.99	6.26	0.70	1.96
		(21.43)	*(22.92)*	*(12.85)*	*(2.17)*	*(5.02)*
5-1	Difference	-3.41	-0.66	-2.18	-1.18	-1.83
	Z-statistic	*5.06***	*-0.63*	*2.30***	*8.99***	*8.11***

Note: ***, **, * denote statistical significance at the 0.01, 0.05 and 0.10 levels respectively.

Table XI shows the fund performance varies across the five categories of actively managed funds during the period from 2005 to 2012. The fund performance is measured by five returns as explained before. The returns are equally-weighted across all groups. Looking at the funds' net returns across the five categories of active funds, the group 1, 2, and 5 all achieved positive returns, while the concentrated funds and factor bets generated negative returns. Same results are presented in the second column when fund performance is measured by the risk adjusted returns based on S&P500. However, all of the funds beat Russell 2000 index by at least 1.96 % per year on average. When it comes to the performance among groups, the closet indexers are the best performers when it is measured by the net returns and Russell 2000 index adjusted returns. However, the result from the second column indicates that the S&P 500 index adjusted returns of stock pickers is indifferent from that of index closets.

The information ratio identifies the performance of a fund manager relative to its benchmark. Looking at the information ratios, concentrated funds hold highest value among the groups, followed by the closet indexers. The result indicates that mangers of these two categories of funds provide consistent returns during the sample period. However, I believe that investors would choose the closet indexers with consistent positive returns; rather than concentrated funds with negative returns.

To sum up, the empirical results are different from most prior studies. Since they find that the active funds underperform their benchmarks and cannot beat index funds (see, e.g. Gruber, 1996; Wermers, 2000). I find that the stock pickers, moderately active managed funds, and the closet index funds generate positive net returns on average. In addition, there is no significant evidence that index funds beat the most active funds in their benchmark-adjusted returns by S&P500 index.

V. Conclusion

This article investigates the effects of fees, size, age, and active management on mutual funds' expense ratio and performance based on the data of 997 U.S. equity-retail-domestic open-ended funds from 2005 to 2012. It is found that the average net assets of U.S. retail mutual funds increased by more than 100 million dollars, although it fluctuates strongly during the period from 2007 to 2009. Moreover, almost half of expense ratio is eaten by the management fee. But both equally-weighted and asset-weighted average expenses and management fees follow a decreasing trend over this period. However, the asset-weighted average 12b-1 fees tend to increase after 2012.

There is only 12% of U.S. retail mutual funds charge front-end load and/or deferred load. The empirical analysis finds that the loaded funds are more expensive and smaller than no-load funds; front-end load destroys fund performance, and no relation between the deferred load and fund performance. However, the deferred load as a sales charge reduces investors' welfare at selling, it is a dead weight loss for short time investors while has no effect to the long term investors.

The redemption fee is another sales charge that is paid to the fund by investors. I find no relation between the redemption fee and fund expenses, while it erodes the fund performance. Therefore, investors should avoid it for a given expenses.

Three-fourths of U.S. retail mutual funds are 12b-1 funds, which are more expensive and bigger than non 12b-1 funds. The 12b-1 fee including marketing and distribution costs which increases expense ratio and undermines performance. It implicates that in general, 12b-1 fee helps increasing the fund size, but the cost cannot be covered by their returns.

The economies of scale in the retail mutual fund industry have been verified in this study. The size on average is negatively related to the expense ratio and positively related to the performance. It indicates that larger funds benefit from operating efficiencies. However, this relation diverges with regard to the active management. It is found that closet index funds, as well as the funds concentrate on both stock selection and

systematic risk, present negative relation between the size and performance. While, the bigger stocker pickers, factor bets and moderately active funds generates better returns.

I also find that older funds charge lower expenses and work more efficiently than younger funds. This informs that the older funds would be a better choice for retail investors, since they may pay higher expense either because of the start-up costs, or lack of efficiency in operation.

The results point out that the actively managed funds are much more expensive and smaller than index funds generally, although the smallest index funds are more expensive than the smallest active funds. Among the five active management groups which are categorized based on the combination of active share and tracking error, I find that most of U.S. retail mutual funds are moderately active managed. In addition, the concentrated funds and factor bets underperform after fees. Whereas, the stock pickers, moderately active funds, and closet index funds outperform their benchmarks after fees. Moreover, there is no significant difference between the most actively managed funds and the index funds in their average S&P500 index adjusted returns.

In conclusion, to the investors, all else being equal, the front-end load, redemption fee and 12b-1 fee deteriorate fund performance that should be avoided. Next, it is better to choose older and bigger funds, since they work more efficiently and cheaper than newly issued funds. However, with regard to the active management, smaller index funds would be more attractive because of their high returns. In addition, closet index funds are cheaper and better-performing than actively managed funds generally. Nevertheless, not all actively managed funds are expensive and underperforming, as the most active and moderately active funds also generate positive returns after fees.

To the mutual fund companies, it is important to realize that the stock pickers which focus on stock picking outperform the benchmarks, as well as the moderately active funds and closet index funds. Whereas, the factor bets and concentrated funds underperform. The results indicate that stock selection as indicated by high active

share is rewarded in the stock market. By contrast, market timing as indicated by high tracking error is not rewarded by the stock market. Therefore, it would be better to pay more attention on stock selection in the long run, rather than focusing on the exposure to systematic factor risk.

Limitations and further research

Although this research was carefully prepared, I am still aware of its limitations and shortcomings. First of all, study on the interrelations between variables is not deep enough. This study investigates the effects of nine mutual funds' characteristics on fund expenses and performance based on all U.S. Equity-Retail-Domestic Open-ended Funds during the period from 2005 to 2012. It is a big project that worked on a huge database within two months. I studied the effect of each variable on funds' expenses and performance without deep investigating the interrelations between the variables. For example, the interrelations between the 12b-1 fee, fund size, expenses and performance. Secondly, I only used the net returns and risk adjusted net returns for measuring the fund performance, without comparison in the funds' gross return. It would be better to have both and compare the fund performance before and after expenses in this study. Lastly, I pooled all mutual funds together for analyzing the relations between their active management, expenses and performance without considering the change or adjustments within each fund during the period.

This thesis provides an overview of the fees of U.S. retail mutual funds, active management, fund expense and performance during the period from 2005 to 2012. There are various other aspects of mutual funds that can be studied further. One possible suggestion is study a specific characteristic of mutual fund deeply. For instance, the interrelations between the active management, fund expenses and performance, then link to the management compensation and investment decision making. Secondly, the same study can also be done in the institutional funds, and compare the difference between the retail and institutional funds. Finally, the same study can also be done in the developing

financial markets and compare the difference between the developing and developed markets in the mutual fund field.

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APPENDIX A: Description of quarterly data in years from 2005 to 2012

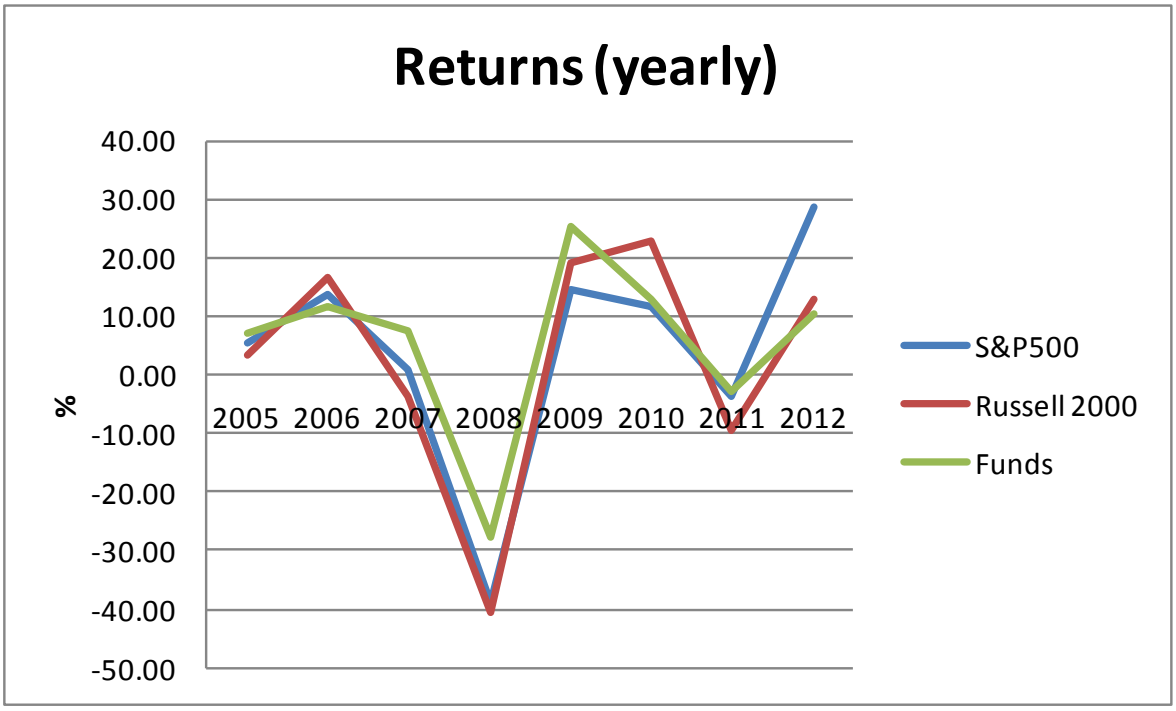
	2005	2006	2007	2008	2009	2010	2011	2012
Fund size ($M)	754.4101	850.9223	954.3763	798.3851	631.2929	709.0298	783.8455	814.8696
(Standard dev.)	(3446)	(3602)	(3945)	(3281)	(2761)	(3298)	(3707)	(4042)
Fund age (year)	11.5565	12.5564	13.5565	14.5565	15.5565	16.5565	17.5565	18.5565
	(10.3429)	(10.3441)	(10.3429)	(10.3429)	(10.3429)	(10.3429)	(10.3429)	(10.3429)
Expense (%)	1.4855	1.4622	1.4483	1.4385	1.4739	1.4695	1.4393	1.4300
	(2.2869)	(2.2265)	(2.2357)	(2.2462)	(2.3981)	(2.5276)	(2.6570)	(2.8786)
Management fee (%)	0.6445	0.6364	0.6326	0.6271	0.6250	0.6257	0.6197	0.5815
	(0.3622)	(0.0000)	(0.3717)	(0.3816)	(0.5090)	(0.6579)	(0.6971)	(0.3256)
12b-1 fee (%)	0.3685	0.3679	0.3620	0.3603	0.3568	0.3517	0.3523	0.3473
	(0.4077)	(0.4066)	(0.4035)	(0.4004)	(0.4018)	(0.4064)	(0.4205)	(0.4250)
Front-end load (%)	0.0201	0.0193	0.0183	0.0171	0.0162	0.0155	0.0150	0.0148
	(0.0723)	(0.0681)	(0.0635)	(0.0590)	(0.0571)	(0.0561)	(0.0551)	(0.0549)
Redemption fee (%)	0.0643	0.0642	0.0637	0.0633	0.0620	0.0587	0.0575	0.0575
	(0.0933)	(0.0930)	(0.0923)	(0.0920)	(0.0914)	(0.0903)	(0.0899)	(0.0899)
Deferred load (%)	0.0089	0.0081	0.0072	0.0068	0.0059	0.0049	0.0048	0.0048
	(0.0538)	(0.0474)	(0.0412)	(0.0404)	(0.0372)	(0.0336)	(0.0335)	(0.0334)
R Fund (%)	1.7600	2.8165	1.7700	-7.9698	6.0988	3.3119	-0.2559	2.6511
	(4.0001)	(4.9054)	(4.3120)	(10.6077)	(10.2971)	(8.5021)	(9.8428)	(6.3824)
R (S&P 500) (%)	0.8095	3.2460	0.9760	-11.3633	5.8955	3.4498	0.2867	3.2910
	(2.0976)	(3.0681)	(3.4286)	(7.6222)	(10.4348)	(9.2570)	(9.7121)	(5.7550)
R (Russell 2000) (%)	2.2965	3.9237	-0.6965	-10.6930	5.6215	5.6395	-1.4018	3.4145
	(1.8356)	(7.0564)	(3.6789)	(12.3391)	(14.1635)	(9.7548)	(11.1996)	(5.5470)
No. of funds	*997*	*997*	*997*	*997*	*997*	*997*	*997*	*997*

APPENDIX B (a): Description data for active management 2005 to 2012

	2005	2006	2007	2008	2009	2010	2011	2012
Fund AS	32.40	27.69	33.31	39.93	42.94	49.12	49.49	48.21
	(18.38)	(20.09)	(18.66)	(14.63)	(14.34)	(13.77)	(14.78)	(14.00)
TE (S&P 500)	0.95	1.03	1.30	3.34	2.64	1.65	1.95	1.32
	(0.19)	(0.26)	(0.25)	(0.71)	(0.38)	(0.30)	(0.42)	(0.19)
TE (Russell 2000)	0.63	0.67	0.78	1.67	1.30	1.02	1.13	0.84
	(0.25)	(0.28)	(0.36)	(0.86)	(0.66)	(0.56)	(0.65)	(0.20)
IR (S&P 500)	1.34	0.09	1.75	0.64	1.16	-0.02	-0.28	0.17
	(2.85)	(3.21)	(2.43)	(0.35)	(2.07)	(1.29)	(1.45)	(2.30)
IR (Russell 2000)	3.31	-2.36	5.81	1.17	2.82	-0.04	2.14	0.39
	(4.19)	(5.18)	(5.64)	(3.99)	(5.13)	(3.28)	(3.86)	(3.19)
Observations	*491*	*507*	*801*	*811*	*823*	*827*	*819*	*799*
No. of funds	*491*	*507*	*801*	*811*	*823*	*827*	*819*	*799*

APPENDIX B (b): Returns

This table displays the compounded yearly return of S&P 500 index, Russell 2000 index, and US retail mutual funds from 2005 to 2012, based on their daily returns in each year. The yearly return of funds is the average return of all funds in each year.



APPENDIX C: Results of Normality tests

H0: the variable is normally distributed

Variable	Observations	Pr(Skewness)	Pr(Kurtosis)
Fund expenses	32000	0.0000	0.0000
Management fee	31000	0.0000	0.0000
12b-1fee	32000	0.0000	0.0000
Net assets	32000	0.0000	0.0000
Net return	32000	0.0000	0.0000

APPENDIX D: Results of Hausman tests for regression (1)

The result rejectes H0 hypothesis, suggests that random effects model is preferable.

	---- Coefficients ----			
Expense ratio	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
lnta	-0.0120	-0.0121	0.0000	0.0002
age	-0.0030	-0.0030	0.0000	0.0001
managfee	1.3511	1.3514	-0.0003	0.0003
b12fee	0.4486	0.4529	-0.0042	0.0027
frontendload	-0.0733	-0.0747	0.0014	0.0078
redepfee	-0.2862	-0.2740	-0.0122	0.0090
deffload	-0.0336	-0.0314	-0.0021	0.0030

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 6.43

Prob>chi2 = 0.4907

APPENDIX E: Results of Hausman tests for regression (6)

The results reject all H0 hypotheses, and suggest that fixed effects model is preferable.

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
Performance 1	fixed	random	Difference	S.E.
expense	6.3813	0.0333	6.3480	0.5926
lnta	0.2537	0.0048	0.2488	0.1214
age	0.1458	0.0008	0.1450	0.0284
managfee	-3.9960	0.7390	-4.7350	0.8780
b12fee	-3.1370	-0.1803	-2.9567	1.0001
frontendload	-1.4262	1.0293	-2.4555	2.8812
redepfee	-5.9556	-1.4540	-4.5015	3.3705
deffload	0.9115	-0.3902	1.3017	2.9353

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 134.63
Prob>chi2 = 0.0000

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
Performance 2	fixed	random	Difference	S.E.
expense	7.3916	0.0293	7.3623	0.6370
lnta	0.2575	-0.0173	0.2749	0.1281
age	0.3393	0.0091	0.3302	0.0300
managfee	-4.7069	0.5333	-5.2402	0.9325
b12fee	-3.2883	-0.1923	-3.0960	1.0522
frontendload	-1.1112	0.0990	-1.2102	3.0206
redepfee	-6.4699	-1.4592	-5.0107	3.6211
deffload	0.9991	-0.7902	1.7893	3.0793

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
chi2(8) =(b-B)'[(V_b-V_B)^(-1)](b-B)=234.97

	---- Coefficients ----			
Performance 3	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
expense	2.3544	0.0271	2.3273	0.3503
lnta	-0.4127	-0.0098	-0.4030	0.0704
age	0.1472	0.0044	0.1428	0.0165
managfee	-2.1597	0.7137	-2.8734	0.5127
b12fee	-1.1987	-0.1340	-1.0647	0.5786
frontendload	-1.6469	0.5903	-2.2372	1.6601
redepfee	2.4298	-1.0769	3.5067	1.9910
deffload	1.7221	0.5221	1.2000	1.6912

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(8) =(b-B)'[(V_b-V_B)^(-1)](b-B)=199.84

Prob>chi2 = 0.0000