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Are retail S&P 500 index funds a financial commodity? Insights for investors

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Abstract

We examine whether retail S&P 500 Index funds are a financial commodity by comparing the expense-performance relation for index versus actively managed funds. The presumed commodity-like nature of index funds suggests that price competition should be more evident than with actively managed funds. Thus, expenses should not vary widely among funds tracking the same benchmark. We find a high level of dispersion in expense ratios across retail S&P 500 Index funds. Funds with higher expenses generally underperform because of 12b-1 fees. We conclude that expenses are just as important to determining performance for index funds as they are for actively managed funds.

JEL classification: G23; G18

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1. Introduction

Mutual funds have become the investment vehicle of choice for many investors. According to the Investment Company Institute (2005), 92 million individuals in 54 million U.S. households owned mutual funds in 2004. Investors face a complex array of choices among

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thousands of mutual funds with different objectives, risk, and performance. Notwithstanding the growth of index mutual funds, actively managed mutual funds dominate both the number of funds and dollar value of assets.

A long-standing debate exists about whether a fund's performance is because of the quality of management, other fund attributes, or just luck. Some evidence suggests that managers of actively managed funds have some stock-picking talent (Grinblatt & Titman, 1989, 1993; Grinblatt, Titman & Wermers, 1995; Daniel, Grinblatt, Titman & Wermers, 1997; Frank, Poterba, Shackelford & Shoven, 2004). These studies base their analyses on the gross returns of the portfolio holdings of mutual funds and typically do not account for transaction costs or expenses. In his analysis of the performance of U.S. equity mutual funds from 1975 to 1994, Wermers (2000) finds that mutual fund managers hold stocks that beat the market portfolio by almost enough to cover their expenses and transactions costs.

The bulk of the evidence, however, suggests that actively managed funds, on average, underperform benchmark portfolios with equivalent risk by a statistically and economically significant margin (Jensen, 1968; Malkiel, 1995; Gruber, 1996; Carhart, 1997). That is, after accounting for expenses and transactions costs, active managers typically destroy value. An implication of the underperformance of most actively managed funds is that investors would be better off in low-cost passively managed index funds. Investors often assume that trying to beat the market average over the long run is futile. They also assume that investments in index funds would at least match some index such as the Standard and Poor's (S&P) 500. Given the availability of sufficient index funds to span most investors' risk choices, these relatively low cost, passively managed index funds provide an alternative to actively managed funds.

The presumed commodity-like nature of index funds suggests that price competition should be more evident than with actively managed funds. Fund managers operate index funds not to beat their benchmarks or actively managed funds, but to mimic benchmark portfolios and performance, less expenses. Therefore, fund expenses should be singularly important in explaining and predicting differences in index fund performance. With active price competition, there should be only nominal size-adjusted differences in index fund expenses for the same benchmarks.

Elton, Gruber and Busse (2004) identify S&P 500 Index funds as among the simplest of financial vehicles. Yet, the returns and expenses of these financial commodities with virtually the same portfolios differ significantly. Moreover, in contrast to actively managed funds, the important performance characteristics of index funds are highly predictable. These performance characteristics are (1) overall fund performance, (2) management performance, (3) fund risk, and (4) tax efficiency.

Elton et al. (2004) find that fund characteristics, including performance, do not primarily determine the cash flows accruing to different S&P 500 Index funds. They find that a large amount of new cash flow goes to the poorest-performing funds that often come with high marketing costs, loads, and 12b-1 fees. Although past expenses are almost perfect predictors of future expenses, evidence shows that fund managers typically do not exert much effort to reduce them. Fund returns decline point for point with increases in expenses. Elton et al. (2004) further find that the market for mutual funds provides no arbitrage opportunities by which the actions of informed investors make the market efficient. To do so, all investors

would have to be informed and rational. The reality underlying the market for S&P 500 Index funds must be the presence of uninformed investors and fund distributors with economic incentives to sell inferior funds.

One could argue that some investors, presumably uninformed ones, are simply paying for advice in the form of a direct commission (front-end load), an asset management fee, or other types of loads (contingent deferred sales loads or level loads) funded with 12b-1 fees. The issue of whether the return for such investors is higher than if they had not gone to the advisor and paid the load/fee is an empirical one. Elton et al. (2004) contend, however, that financial advisors are often compensated using a system that is incompatible with investors' interests. Thus, our finding of large differences in expense ratios across funds should not be surprising.

Given the presumed commodity-like nature of index funds, they should be priced competitively like commodities. If the market viewed index funds as financial commodities, their prices (expense ratios) should be highly similar and have almost no variation even with fund size differences. In contrast to actively managed funds, index fund management fees and expenses should not rise with outperformance.

In this study, we examine whether retail S&P 500 Index funds are a financial commodity. Specifically, we investigate whether expense ratios (measured gross and net of 12b-1 fees) have a larger negative impact on performance for retail S&P 500 Index funds than for actively managed large-cap blend funds. We hypothesize that expenses matter significantly for both groups, but that the effect is greater for index funds, the more commodity-like investment.

This study is important for several reasons. First, it is the first to focus on the characteristics of retail index funds tracking the S&P 500 Index with diverse expense ratios. A premise of the study is that expense ratios affect S&P 500 Index fund performance. Prior research by Malkiel (1995), Carhart (1997), and others shows that expenses matter to performance of mutual funds in general. Haslem (2003) discusses issues of fund expenses in detail, while Haslem (2004, 2006) reports evidence of a lack of fund price competition and excessive expenses. Unlike actively managed funds, index funds, especially S&P 500 Index funds, should be essentially a commodity. Consequently, expenses should be particularly important for index funds.

Second, understanding how specific characteristics affect fund performance can help investors make informed decisions. For example, we examine in a multivariate framework whether factors affecting expense ratios for actively managed funds have a similar level of impact on index funds. Understanding such relationships could give investors "keys" to look for when selecting an S&P 500 Index fund.

Third, an ongoing debate exists about the maximum level of expenses that could still permit a mutual fund board to claim compliance with its fiduciary duties to fund holders. While we do not address this question directly, we use a method that can help provide insights into the governance debate. We characterize each fund's expenses as the number of standard deviations they stand from the mean for peer funds. Using this or similar methods can help mutual fund investors, researchers, and regulators to classify funds as relatively cheap or expensive. Our evidence runs contrary to the notion that funds tracking the same index share similar low cost qualities.

2. Index fund issues

Index funds employ so-called passive rather than active portfolio management. Passive refers to a distinct form of portfolio management, not the lack of management. Index fund portfolio managers do not select the stocks in their portfolios, but rather work to mimic the exact "portfolio" of the particular benchmark index, such as the S&P 500 Index. Funds commonly fail, however, to mimic the returns on their benchmark indexes, less fund expenses and transaction costs. The returns also differ among the various indexes that may be benchmarked in a given investment category, such as large-cap blend.

The size of the tracking error between benchmark index returns and fund portfolio returns varies with the skill of portfolio managers in benchmarking their portfolios. Tracking error also reflects portfolio turnover costs, including brokerage fees, market impact costs, and soft dollar arrangements. Further, the size of the tracking error reflects the size of index mutual fund expenses. Index funds commonly have management fees and expense ratios (including any 12b-1 fees) that appear excessive given the potential for low expenses demonstrated by Vanguard. Fidelity's recent reductions in index expense ratios provide after-the-fact evidence of just how excessively high the ratios can be.

Another issue concerns the value that investors receive by paying 12b-1 and other fees. According to Malhotra and McLeod (1997), proponents of 12b-1 plans contend that paying brokers a recurring distribution fee provides them with an incentive to keep investors in these funds and to sell them additional shares. Such action by retail brokers increases the stability and size of these funds, resulting in lower per-share operating costs. However, some investors who buy funds with a 12b-1 plan and other fees do not need advice. For these shareholders, the additional costs do not provide service benefits and, therefore, represent a deadweight cost.

Further, a common assumption is that mutual fund investors who do need advice should use funds with brokered distribution. These choices should reasonably include funds with low 12b-1 and other fees and low expense ratios. However, this assumption carries a premise that investors use intermediate distribution channels to buy valued services. This is the initial hypothesis in the research by Bergstresser, Chalmers and Tufano (2005) on the value of services provided by brokered fund distribution. The five potential service benefits they analyze include (1) assistance in selecting funds that are difficult to find or analyze, (2) access to funds with lower costs, excluding distribution costs, (3) access to high performance funds, (4) access to superior asset allocation, and (5) limits on investor use of adverse behavioral biases. The major, relatively unambiguous findings of this research follow:

> The bulk of . . . evidence fails to identify tangible advantages of the broker channel. In the broker channel, consumers pay extra distribution fees to buy funds with higher nondistribution fees [and] expenses. The funds they buy underperform those in the direct channel even before deductions of any distribution related expenses. They exhibit no superior asset allocation. With respect to behavioral biases, funds sold by brokers exhibit substantially greater trend-chasing behavior. Finally, realized flows of money into individual funds appear to flow into funds with larger front-end loads.

The authors conclude that ". . . if broker channel investors were likely to have placed their money in direct funds in the absence of the broker channel, the likely magnitude of the broker channel's welfare enhancement seems smaller."

Multiple share classes with pooled portfolios also have the potential for excessive management fees and expense ratios among index funds. Fund companies introduced multiple share classes to broaden the appeal for fund shares. In turn, this would increase fund assets, generate savings from economies of scale, and thereby reduce fund expenses. Evidence suggests that savings have generally gone to the fund advisers, not the shareholders.

Lesseig, Long and Smythe (2002) find that funds with multiple share classes have higher expenses than single class funds. Their sample shows expense ratios of 1.03%, "other" expenses of 0.35%, and management fees of 0.69%. Although share class funds have smaller "other" expenses (%) than single class funds, share class funds have even larger management fees (%). Further, a larger proportion of share class funds imposes 12b-1 fees (%), and these fees are larger than for single-class funds. Finally, advisors of larger and better performing share class funds impose larger management fees (%), which mean higher expense ratios. A classic argument for charging higher management fees is better performance.

3. Data and methodology

In this section, we discuss our sample, components of the expense ratio, and methodology.

3.1. Sample

As Table 1 shows, the initial sample comprises all 498 U.S. domestic equity and bond funds (share class equals one fund) identified as index mutual funds by Morningstar (2005) as of December 31, 2004, and their 239 distinct portfolios. Since each share class counts as a "fund," the number of unique portfolios is fewer than the number of "funds." These totals contain both retail and institutional index funds. As Panel A indicates, 350 (70.3%) of the 498 funds track only eight benchmark indexes. We define these eight "primary" benchmarks as indexes tracked by 10 or more funds. Of the 350 funds tracking the primary benchmarks, 202 track the S&P 500 Index.

As Panel B of Table 1 shows, the remaining 148 index funds track 56 other benchmarks. Fewer than 10 funds track each of these "secondary" benchmarks. The results show that while the traditional benchmark indexes such as the S&P 500 Index remain dominant, many specialty benchmarks have become popular vehicles for index funds.

We focus on funds tracking the S&P 500 Index because only those funds have an adequate number of observations for statistical analysis. To maintain both an emphasis on decisions faced by individual investors, and also data homogeneity within this index group, we omit institutional funds from the 202 funds tracking the S&P 500 Index. Thus, our final sample consists of 106 funds tracking the S&P 500 Index available to retail investors.

Table 1
Frequency distribution of benchmarks for Morningstar-designated retail and institutional index funds as of December 2004

Benchmark index	Number of funds	Distinct portfolios
Panel A: Primary benchmark indexes		
S&P 500	202	83
MSCI EAFE	34	18
Russell 2000	26	12
Lehman Brothers Aggregate	22	15
S&P 400	22	12
Wilshire 5000	16	7
NASDAQ 100	14	5
S&P 600	14	7
Total	350	159
Panel B: Secondary benchmark indexes		
56 benchmark indexes with fewer than 10 funds each	148	80
Grand total	498	239

Note: This table shows the frequency of use of various benchmarks by U.S.-based index mutual funds at year-end 2004, according to Morningstar Principia. The last two columns show the total number of funds including all classes and the number of distinct portfolios. For example, a fund offered in four classes is counted four times in the ″Number of funds″ column but only once in the ″Distinct portfolios″ column. The totals include both institutional and retail funds. Of the 202 S&P 500 Index funds, 106 are retail funds.

3.2. Components of the expense ratio

The U.S. Securities and Exchange Commission (2000) defines the expense ratio as total expenses divided by mutual fund average net assets. The ratio excludes sales loads and fees directly charged to shareholder accounts and security transaction costs (brokerage fees, bid-ask spreads, and market impact costs) that reduce portfolio returns.

The expense ratio has three components: (1) management fees, (2) Rule 12b-1 fees, and (3) "other" expenses. First, management fees typically constitute the largest part of the expense ratio. They include investment advisory fees for portfolio management services and administrative or other fees paid to the investment adviser or its affiliates for services. Second, Rule 12b-1 fees include marketing, distribution, and other fees adopted pursuant to this rule. Such fees, rather than sales loads, increasingly serve as the basis for paying fund distribution and marketing expenses. Third, "other" expenses are a residual component that may include transfer agent fees, securities custodian fees, shareholder accounting expenses, legal fees, auditor fees, and independent director fees.

3.3. Methodology

We begin by using the simple, probabilistic method as applied in Haslem, Smith and Baker (2006) to identify index funds with varying degrees of expense ratios based on their standard deviation. This approach is conceptually similar to putting funds in quintiles or deciles by expenses, which Carhart (1997) and Malkiel (1995) have already done. The

standard deviation provides an objective way to classify the mutual funds. We apply the distribution free Chebyshev's inequality as discussed in DeFusco, McLeavey, Pinto and Runkle (2004) because there is no certainty that a normal distribution applies for the financial variables under consideration. The likelihood of observing expense ratios two or three standard deviations above the mean is relatively small, even if the variable is not normally distributed. We identify six standard deviation classes of expense ratios and define each relative to the mean expense ratio: -1σ (low), within -1σ (below average), within $+1\sigma$ (above average), $+1\sigma$ (high), $+2\sigma$ (very high), and $+3\sigma$ (extremely high).

Next, we examine the association of statistical classes of expense ratio and expense ratio net of 12b-1 fees to selected performance measures. Because the correct measure of performance is a matter of debate, we use four common methods. These measures are three-year Sharpe ratios, Jensen's alphas, Morningstar ratings, and annualized total returns over multiple periods (1, 3, 5, and 10 years). By taking several measures together, we can draw more definitive conclusions.

The Sharpe ratio assesses risk-adjusted portfolio returns using standard deviation as the measure of total risk. Jensen's alpha assesses risk-adjusted portfolio returns using systematic risk (beta). Morningstar ratings are risk-adjusted measures of fund performance over time. Morningstar provides a five-star mutual fund rating service that many investors use as a guide in their mutual fund selections. For example, the top 10% of funds in an investment category receive five stars, the next 22.5% receive four stars, and the next 35% receive three stars. Morningstar calculates these ratings from the fund's 3-, 5-, and 10-year average annual returns in excess of 90-day Treasury bill returns with appropriate fee adjustments, and a risk factor that reflects subaccount performance below 90-day T-bill returns. Morningstar revised its methodology in 2004 to reflect performance by investment category.

Blake and Morey (2000) examine the Morningstar rating system as a predictor of mutual fund performance for U.S. domestic equity funds. Their results indicate that low ratings from Morningstar generally indicate relatively poor future performance. However, their findings show little statistical evidence that Morningstar's highest-rated funds outperform the next-to-highest and median-rated funds.

We examine each of the four performance measures across expense ratio and net (of 12b-1 fees) expense ratio standard deviation classes. We use the Kruskal-Wallis one-way analysis of variance by ranks to identify whether the independent samples represented by the standard deviation classes are from different populations. The Kruskal-Wallis technique tests the null hypothesis that the six standard deviation classes of (net) expense ratios come from identical populations. Where the Kruskal-Wallis test has judged the medians to differ across the six standard deviation classes, we use the Wilcoxon two-sample test to determine the specific pairs for which values differ at the 10% level of significance.

Because of small sample sizes in the $+2\sigma$ (1 fund) and $+3\sigma$ (2 funds) classes for the 106 retail S&P 500 Index funds, we restrict the two-sample tests to four classes: -1σ (low), within -1σ (below average), within $+1\sigma$ (above average), and $+1\sigma$ (high). Thus, we drop one index fund in the $+2\sigma$ class and two in the $+3\sigma$ class from the sample for purposes of testing. The sample sizes for the remaining expense ratio net of the 12b-1 fee standard deviation classes are -1σ ($n = 9$), within -1σ ($n = 58$), within $+1\sigma$ ($n = 25$), and $+1\sigma$ ($n = 11$). Using our univariate tests, we hypothesize that performance, on average, as

measured by the median Sharpe ratio, Jensen's alpha, annualized return, and Morningstar rating, is statistically greater in the -1σ (low) class than in the $+1\sigma$ (high) class for (net) expense ratios.

We also use a multivariate model to examine whether mutual funds characteristics, specifically expenses and variables related to it, are useful in explaining fund performance. For this portion of the analysis, we augment our index fund sample with all 656 retail, actively managed, large-cap blend mutual funds from Principia. Of these 656 funds, we use the 645 that are in standard deviation classes -1σ through $+1\sigma$. We assign these classes based on the mean and standard deviation of (net) expenses for actively managed large-cap blend funds only (i.e., no indexes). We use only large-cap blend funds because Morningstar classifies the S&P 500 Index in the large-cap blend cell in its equity style box.

Our purpose behind including actively managed funds as a control sample is to examine whether (net) expense ratio class has a greater effect on performance for that group of funds than for S&P 500 Index funds. We hypothesize that expenses matter significantly for both groups, but that the effect is greater for index funds, the more commodity-like investment.

Our model follows in the spirit of that proposed by Dellva and Olson (1998). Their performance model contains a dummy variable indicating the presence or absence of a 12b-1 plan. Our model includes this variable and five other variables that control for fund size, cash holdings, portfolio turnover, and the magnitude of front-end and deferred loads. To facilitate the pooling of disparate funds for the regression, our model also includes a dummy variable indicating whether funds are index funds or actively managed funds.

Transforming our (net) expense ratio standard deviation classes into an OLS-ready variable is not perfectly straightforward because of the existence of "within $\pm1\sigma$" classes. For the regression, we define a new variable that takes on a value of 1 for class -1σ, 2 for class "within -1σ", 3 for class "within $+1\sigma$", and 4 for the $+1\sigma$ class. For each of our two types of funds (S&P 500 index funds and actively managed large-cap blend funds), we assign standard deviation classes based only on the mean and standard deviation values for that type.

We use the following regression model to estimate the characteristics that might explain performance.

$$\begin{aligned} Performance_{pi} &= b_0 + b_1(\text{Net expense ratio class}_{ei}) + b_2\ln(\text{Net assets}_i) \\ &+ b_3(\text{Cash}_i) + b_4(\text{Turnover}_i) + b_5(\text{Front-end load}_i) + b_6(\text{Deferred load}_i) \\ &+ b_7(\text{12b-1}_i) + b_8(\text{Index vs. active}_i) + b_9[(\text{Net}) \text{ expense ratio class}_{ei} \\ &\times \text{Index versus active}_i] + e_i \end{aligned}$$

where

$Performance_{pi}$ = Value for performance measure p, measured net of expenses, for fund i. Performance measures are annualized return, Sharpe ratio, and Jensen's alpha, each measured over three years.

(Net) expense ratio class_{ei} = For expense type e, standard deviation class for fund i's annual expense ratio, where expenses between -2σ and -1σ produce a class value of 1, and so on

Table 2
Median, mean, and standard deviation of expense and net expense ratios for 106 retail S&P 500 Index funds

Benchmark index: S&P 500	For median fund	For median dollar invested	Mean (unweighted)	Mean (asset-weighted)	Standard deviation
Panel A: Expense ratio					
	0.70	0.18	0.85	0.28	0.47
Panel B: Expense ratio net of 12b-1 fees					
	0.45	0.18	0.45	0.23	0.25

Note: This table presents the median and mean expense ratios and expense ratios net of 12b-1 fees, as well as their standard deviations for retail S&P 500 Index funds. Column 2 shows the median fund's ratio of expenses and the expense ratio net of 12b-1 fees, while Column 3 shows the ratio for the median dollar invested. Column 4 shows the unweighted (equally weighted) mean ratio, and Column 5 shows means weighted by funds' net assets as of December 31, 2004. Column 6 shows the standard deviations.

through 4 for expenses between $+1\sigma$ and $+2\sigma$. Standard deviation classes are identified for two expense types: expenses gross of 12b-1 fees and net of 12b-1 fees. All standard deviation classes are defined relative to the fund's peer group mean for that type of expense, depending on whether the fund is an index or actively managed fund.

$ln(net\ \text{assets})_i$ = Natural logarithm of fund i's size of net assets ($ millions).

$Cash_i$ = Cash holdings as a percentage of fund i assets.

$Turnover_i$ = Annual portfolio turnover as a percentage for fund i.

$Front\text{-}end\ load_i$ = Sales charge as a percentage for buying fund i.

$Deferred\ load_i$ = Deferred sales charge as a percentage for fund i.

$12b\text{-}1_i$ = Dummy variable that equals 1 if fund i has a 12b-1 plan in place and 0 otherwise.

$Index\ versus\ active_i$ = Dummy variable that equals 1 if fund i is an S&P 500 Index fund and 0 if fund i is an actively-managed large-cap blend fund.

$(Net)\ expense\ ratio\ class_{ei}$ = Interaction term, calculated as the product of the variables × Index versus $active_i$ (net) expense ratio $class_{ei}$ and index versus $active_i$.

4. Empirical results

Tables 2 through 6 contain our empirical results. In several tables, we present findings based on expense ratios and net expense ratios, defined as an expense ratio net of 12b-1 fees.

Table 3
Frequency distributions, mean expense ratios, and expense ratios net of 12b-1 fees for 106 retail S&P 500 Index funds

Benchmark index: S&P 500	-1σ	Within -1σ	Within $+1\sigma$	$+1\sigma$	$+2\sigma$	$+3\sigma$	Total or mean
Expense ratio standard deviation class							
Panel A: Frequency by expense ratio							
	16	43	25	20	1	1	106
Panel B: Mean (unweighted) expense ratio (%)							
	0.25	0.57	1.12	1.44	1.80	2.71	0.85
Net expense ratio standard deviation class							
Panel C: Frequency by expense ratio net of 12b-1 fees							
	9	58	25	11	1	2	106
Panel D: Mean (unweighted) expense ratio net of 12b-1 fees (%)							
	0.14	0.35	0.55	0.78	0.98	1.71	0.45

Note: This table presents the frequency distributions and the mean expense ratios (%) for 106 retail S&P 500 Index funds, by standard deviation class for expense ratio and expense ratio net of 12b-1 fees.

We show both types of expense ratios because 12b-1 fees may not be a complete deadweight cost if investors receive a service. In such cases, the 12b-1 fee compensates financial advisors for a service provided to investors. Thus, the entire fee may not go to profit the fund company.

Table 2 presents the median and mean (net) expense ratios and their standard deviations for 106 retail S&P 500 Index funds. As Panel A shows, the median fund's ratio of expenses is 0.70% and the unweighted mean expense ratio is 0.85%. Because the mean is higher than the median, this indicates a positively skewed distribution of expense ratios. As Panel B shows, the median and unweighted mean of the expense ratio net of 12b-1 fees are 0.45%.

In addition, Table 2 shows that the asset-weighted mean is less than the unweighted mean. Given these results, we conclude that most investors are in no-load, low cost funds. This strengthens our argument for why people going to advisors should not be in index funds with 12b-1 fees and loads. On an asset-weighted basis, the evidence shows that they are not.

Table 3 summarizes the number of mutual funds and mean (net) expense ratios (%) for S&P 500 Index funds in each of the six standard deviation classes. As Panel A shows, 22 of the 106 funds (20.8%) have expense ratios that are high to varying degrees. Panel B summarizes the mean expense ratios (%) for S&P 500 Index funds across the standard deviation classes. The expense ratios increase with each higher standard deviation class from 0.25% in the -1σ class to 2.71% in the $+3\sigma$ class. Panels C and D show similar data for expense ratios net of 12b-1 fees. As Panel C shows, only 14 of 106 funds (13.2%) fall into one of the "high" net expense classes. By definition, net expense ratios decrease relative to expense ratios across the standard deviation classes. Panel D indicates that net expense ratios range from 0.14% in the -1σ class to 1.71% in the $+3\sigma$ class.

Data presented in Table 3 provide a powerful argument that retail S&P 500 Index funds are not priced as if they are a financial commodity. With active price competition, such funds should have little variation in their (net) expense ratios. Yet, the results show a wide dispersion of (net) expense ratios across the standard deviation classes. Moreover, 47 of 106

Table 4
Correspondence between expense ratio class and expense ratio net of 12b-1 fees class for 106 retail S&P 500 Index funds

Expense ratio net of 12b-1 fees class	Expense ratio class						
	-1σ	Within -1σ	Within $+1\sigma$	$+1\sigma$	$+2\sigma$	$+3\sigma$	Total
-1σ	7	2					9
Within -1σ	9	31	9	9			58
Within $+1\sigma$		8	10	7			25
$+1\sigma$		2	5	3	1		11
$+2\sigma$			1				1
$+3\sigma$				1		1	2
Total	16	43	25	20	1	1	106

Note: This table shows the joint frequency distributions for S&P 500 Index funds' expense ratio and expense ratio net of 12b-1 fees classes. Blank cells represent sample sizes of zero.

funds and 39 of 106 funds in the expense and net expense categories, respectively, are above the mean.

Table 4 shows the joint frequency distributions for retail S&P 500 Index funds' expense ratio and expense ratio net of 12b-1 fees classes. The results show that 52 of 106 funds (49.1%) appear in the same class whether classified by expense ratio or expense ratio net of 12b-1 fees. Compared with using the expense ratio, fewer funds fall into one of the high expense classes using the net expense ratio. Similar to Table 3, the results in Table 4 provide compelling evidence that retail S&P 500 Index funds are not priced as a commodity-like investment.

Table 5 summarizes the median performance characteristics of the retail S&P 500 Index funds by (net) expense ratio standard deviation class for -1σ (low) to $+1\sigma$ (high). We report the results using medians instead of means because the underlying variables tend to be non-normally distributed. We exclude standard deviation classes $+2\sigma$ and $+3\sigma$ from our Wilcoxon two-sample tests because of the small sample size of one or two funds.

Panel A of Table 5 shows the results of our univariate tests involving the implied impact of expenses on returns for the S&P 500 Index funds. Eliminating a total of two funds in the $+2\sigma$ and $+3\sigma$ standard deviation classes reduces the number of funds to 104. We hypothesize that performance, on average, as measured by the median Sharpe ratio, Jensen's alpha, annualized return (1, 3, 5, and 10 years), and Morningstar rating is statistically greater in the -1σ (low) class than in the $+1\sigma$ (high) class for expense ratios. The evidence supports this hypothesis for all performance measures. Thus, these performance measures show that funds in the -1σ (low) expense ratio class significantly outperform those in the $+1\sigma$ (high) expense ratio class. Except in the case of the Morningstar rating, performance decreases monotonically when moving across classes from the -1σ (low) to the $+1\sigma$ (high) expense ratio class.

Panel B of Table 5 reports similar results for the same four performance measures using net expense ratio standard deviation classes. A total of 103 retail index funds tracking the S&P 500 Index fall within the -1σ to $+1\sigma$ classes because we eliminate a total of three funds in the $+2\sigma$ and $+3\sigma$ classes. The evidence shows that funds in the -1σ (low) net

Table 5
Median performance characteristics of retail S&P 500 Index funds for expense ratio and net expense ratio standard deviation classes -1σ through $+1\sigma$

Expense ratio standard deviation class					
Characteristic	-1σ	Within -1σ (w−)	Within $+1\sigma$ (w+)	$+1\sigma$	Wilcoxon two-sample tests for classes -1σ through $+1\sigma$
Panel A: Relation of expenses on returns (performance)					
Sharpe ratio	0.13	0.11	0.07	0.05	−1>w−, −1>w+, **−1>1**, w−>w+, w−>1, w+>1
Jensen's alpha (%)	−0.21	−0.57	−1.09	−1.36	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1, w+>1
1-year return (%) (n = 104)	10.61	10.23	9.71	9.39	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1, w+>1
3-year return (%) (n = 104)	3.37	3.00	2.46	2.18	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1, w+>1
5-year return (%) (n = 81)	−2.49	−2.83	−3.19	−3.58	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1, w+>1
10-year return (%) (n = 42)	11.85	11.32	11.04	10.54	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1, w+>1
Morningstar rating	3.00	3.00	3.00	2.50	−1>w−, −1>w+, **−1>1,** w−>1
Panel B: Relation of net expenses on returns (performance)					
Sharpe ratio	0.13	0.10	0.07	0.08	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1
Jensen's alpha (%)	−0.18	−0.61	−1.13	−0.99	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1
1-year return (%) (n = 103)	10.70	10.20	9.67	9.75	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1
3-year return (%) (n = 103)	3.40	2.95	2.40	2.56	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1
5-year return (%) (n = 79)	−2.47	−2.87	−3.23	−3.11	−1>w−, −1>w+, **−1>1,** w−>w+, w−>1
10-year return (%) (n = 41)	11.85	11.15	10.84	10.79	−1>w−, −1>w+, **−1>1**
Morningstar rating	3.00	3.00	3.00	3.00	w−>1

Note: This table presents three-year Sharpe ratios, Jensen's alphas, annualized returns for multiple periods, and Morningstar ratings for retail S&P 500 Index funds. Where the Kruskal-Wallis test has judged the medians to differ across the (net) expense ratio classes, the rightmost column lists the specific pairs for which values differ at the 0.10 level of significance, according to Wilcoxon two-sample tests. Net expense ratio is Morningstar's reported expense ratio less 12b-1 fees.

Table 6
Association between characteristics and 3-year performance measures for retail large-cap blend (growth and value) equity mutual funds

	Dependent variable		
Explanatory variable	Annualized return	Sharpe ratio	Jensen's alpha
Panel A: Expense ratio class (n = 738)			
Intercept	2.6242***	0.0793***	−0.9145**
Expense ratio class	−0.3351**	−0.0218**	−0.3101**
Log of net assets	0.1280***	0.0075***	0.1297***
Cash (%)	0.0463*	0.0047***	0.0562**
Turnover (%)	0.0023**	0.0002**	0.0028***
Front-end load (%)	−0.0787*	−0.0045	−0.0769*
Deferred load (%)	−0.1586**	−0.0099**	−0.1578**
12b-1 dummy	−0.1668	−0.0143	−0.1470
Index vs. active dummy	0.2298	0.0214	0.1569
Interaction: Expense ratio class × Index/active	0.1466	0.0085	0.1230
F value	7.5580***	7.5311***	7.5063***
Adjusted R^2	0.0741	0.0739	0.0736
Panel B: Net (of 12b-1 fees) expense ratio class (n = 730)			
Intercept	2.5947***	0.0784**	−1.0110**
Net expense ratio class	−0.1825	−0.0124	−0.1437
Log of net assets	0.1271***	0.0073***	0.1302***
Cash (%)	0.0440*	0.0046***	0.0547**
Turnover (%)	0.0025**	0.0002**	0.0031***
Front-end load (%)	−0.0527	−0.0028	−0.0532
Deferred load (%)	−0.2096***	−0.0132***	−0.2063***
12b-1 dummy	−0.5411**	−0.0385**	−0.4935*
Index vs. active dummy	0.4973	0.0404	0.4831
Interaction: Net expense ratio class × Index/active	0.0294	0.0004	−0.0152
F value	7.6200***	7.5791***	7.5880***
Adjusted R^2	0.0755	0.0751	0.0752

Note: This table presents, for retail funds categorized by Morningstar as large-cap blend, the results of multiple regressions of three-year annualized returns, Sharpe ratios, and Jensen's alphas on various mutual fund characteristics. *, **, and *** denote statistical significance at the 0.10, 0.05, and 0.01 levels, respectively.

expense ratio class have significantly greater performance than those in the $+1\sigma$ (high) net expense ratio class for the Sharpe ratio, Jensen's alpha, and annualized return (1, 3, 5, and 10 year). Performance generally decreases when moving across classes from the -1σ (low) to the $+1\sigma$ (high) expense ratio class but this decrease is not monotonic, except for the 10-year annualized return.

Table 6 presents the results of a multivariate model, as depicted by Eq. (1), used to examine the relation between fund performance and various explanatory variables. Fund performance is measured by three-year annualized return, Sharpe ratio, and Jensen's alpha. As in Table 5, we restrict our analysis to standard deviation classes -1σ (low) through $+1\sigma$ (high). We present the results in two panels: Panel A for expense ratio class and Panel B for net expense ratio class. As Table 6 shows, the adjusted R^2 ranges between 0.071 and 0.076. By the normal measures of cross-sectional analysis, our model performed adequately in explaining fund returns. F values are significant for all of the regressions.

In Panel A of Table 6, a strong negative relation exists between performance and expense ratio class for all three performance measures. In their study of equity mutual funds, Dellva and Olson (1998) also find a significantly negative relation with expense ratio for each of their performance measures. Although the expense variable is negative and significant, the 12b-1 fee dummy is not, probably because the 12b-1 fee is a component of the expense ratio. In contrast, Panel B shows that none of the various performance measures is significantly related to net expense ratio class. Although the net expense class coefficients are not statistically significant, the 12b-1 fee coefficients are. The combination of these two variables suggests that distribution fees are driving the result in Panel A. Given this evidence, the extra costs clearly hurt investors. This finding is consistent with evidence by Bergstresser et al. (2005) who fail to identify tangible advantages from using the broker channel.

The overall results suggest that superior funds incur lower costs than other funds. In Panel A of Table 6, the negative and significant coefficient for expense ratio class indicates that when all annual fees are taken into account, those funds with lower total expenses have better returns. The magnitudes of the regression coefficients also suggest economic significance. For example, using the performance model based on annualized return, the coefficient for expense ratio class is −0.3351, meaning that even after controlling for other major fund characteristics, an increment of 1 in the expense ratio standard deviation class is associated with about a 34 basis point lower annual return. This apparent economic and statistical significance supports investors' use of expense ratio standard deviation class as an indicator of relative investment prospects.

As Panel B of Table 6 shows, distribution fees, not operational fees, cause a drag on performance when defining expenses by their operational nature (net expenses and 12b-1 fees). An implication of these findings is that investors should generally try to minimize expenses when comparing S&P 500 Index funds because additional expenses do not provide economic benefit.

Because we have controlled for (net) expenses, we include fund size, cash holdings, portfolio turnover, loads (front-end and deferred), and 12b-1 fees for measuring an independent effect of these factors on returns. Based on the results in Panels A and B of Table 6, fund size is a distinguishing variable for explaining performance because the coefficient on the size variable is significant at the 0.01 level for all three measures of performance. Apparently, larger retail index funds can achieve economies of scale, but we intend to capture this factor in the expense ratio class variable. Hence, the strong positive size-performance relation is independent. Although Shawky and Li (2006) show that small-cap actively managed funds experience deterioration in performance as fund size increases beyond a certain point, this is clearly not the case, on average, for large cap blend funds. Our results also differ from those reported by Dellva and Olson (1998). They find that fund size is not a useful explanatory variable for three performance measures.

As Panels A and B of Table 6 show, the effects of mutual fund cash holdings on performance is positive and significant for all three regressions. These findings are consistent with Dellva and Olson (1998) for their three performance measures. Mutual funds can meet investor redemptions by liquidating securities holdings or holding cash. Liquidating security holdings increases transaction costs while holding cash decreases gross expected returns.

Chordia (1996) finds that mutual funds raise their level of cash and cash equivalents as uncertainty about investor redemptions increases.

Portfolio turnover activity can have a positive or negative effect on performance depending on whether it provides an economic benefit (Taylor & Yoder, 1994; Wermers, 2000; Jan & Hung, 2003). Both Panels A and B of Table 6 indicate that turnover has a significantly positive effect on performance in all three regressions. These findings differ from those of others. For example, Dellva and Olson (1998) find that higher turnover increases fund expenses but does not necessarily lead to better performance.

As Panels A and B of Table 6 show, the coefficients for the load charge variables (front-end and deferred) are negative for each of the three regressions. Panel A indicates that front-end loads are significant at the 0.10 level when measuring performance based on annualized return and Jensen's alpha. Panel B shows that front-end loads are not statistically significant at normal levels for any of the three regressions. Dellva and Olson (1998) report that load charges have a significant negative effect on performance measures. Their evidence shows that as funds increase their load charges as a percentage of assets, risk-adjusted performance declines. Carhart (1997) also reports a negative relation between fund load and performance. Panels A and B indicate that deferred loads have a significant negative effect for all three regressions. Overall, we conclude that loads, especially deferred loads, are destructive to investment returns.

The coefficients for the 12b-1 variable are all negative, but statistically significant only for the regressions shown in Panel B of Table 6. Thus, if the net expense ratios of two funds are the same, the fund with the 12b-1 plan is found to have lower performance relative to the fund without the plan. The 12b-1 coefficient is statistically significant and the net expense ratio class coefficient is insignificant only when 12b-1 fees are deducted from expenses. Overall, we find no statistical support for the idea that 12b-1 plans provide a wealth-enhancing benefit to fund holders. By contrast, Dellva and Olson (1998) find that the coefficient for the 12b-1 variable is significant and positive for their performance measures.

As Panels A and B of Table 6 show, the results are insignificant for the variable that controls for whether a fund is an index versus actively managed fund. This result holds regardless of the performance measure used. After holding major fund characteristics constant, we conclude that active mutual fund managers perform as well as index fund managers.

The final variable in the model is a multiplicative interaction term, calculated as the product of (net) expense ratio class and the index versus active fund dummy. The purpose of this interaction term is to establish whether expense ratio class is of greater importance for one type of fund than for another. We expect that for a presumed commodity-like instrument such as S&P 500 Index funds, the expense ratio class should have a more dramatic impact on performance than is the case for actively managed funds. Specifically, if expenses matter more for index funds, the interaction term should be negative and significant. In regressions featuring all three performance measures, as well as (net) expense ratio classes, the coefficient on the interaction term is positive and statistically insignificant. Thus, we conclude that expense ratio class is just as important to determining performance for actively managed large-cap blend funds as it is for retail S&P 500 Index funds. This result is surprising given the commonly held belief that index funds are more commodity-like in nature than actively managed funds.

5. Summary and conclusions

Conventional wisdom suggests that index funds are commodity-like in nature. If this presumption is accurate, price competition should be more evident with index funds than with actively managed funds. Thus, expenses should not vary widely among index funds using the same benchmark. In this paper, we investigate whether retail S&P 500 Index funds are a financial commodity. Specifically, we test whether expenses matter more for retail S&P 500 Index funds than for actively managed funds.

Our analysis of 106 retail S&P 500 Index funds shows a wide disparity in (net) expense ratios. In addition, we find large performance differences among funds within diverse (net) expense ratio classes. Based on this evidence, we conclude that retail S&P 500 Index funds with low (net) expense ratios, on average, outperform those with high (net) expense ratios. Specifically, our univariate analysis shows that Sharpe ratios and Jensen alphas tend to increase as (net) expense ratios decline across standard deviation classes. Thus, lower (net) expense ratios result in improved risk-adjusted returns. Retail S&P 500 Index funds with low (net) expense ratios also tend to have higher annualized returns compared with those with (net) expense ratios that are high. Thus, lower costs mean larger returns.

Our multivariate model provides evidence on characteristics that investors can use to explain performance. In this OLS model, we pool the funds and use dummies and interactions for testing the relative significance of variables across retail S&P 500 Index funds and actively managed large-cap blend funds used as a control group. We find evidence that (net) expense ratio class helps to explain performance. In addition, fund size is a distinguishing variable for performance. Cash holdings and portfolio turnover generally have a positive relation with performance but loads, especially deferred loads, and 12b-1 fees typically have the opposite relation. In addition, our results show that expenses do not matter more for retail S&P 500 Index funds than for actively managed funds.

What are the implications of our findings? Mutual fund investors are likely to view index funds as financial commodities because of the common belief that such funds do not differ in any significant way, especially when tracking the same benchmark index. Evidence of large differences in (net) expense ratios across index funds casts serious doubt on using "commodity" as a descriptor. Further, this finding becomes more serious because price competition should be even more competitive among index funds, especially in the pricing of (net) expense ratios. Apparently, it does not. This implies that some uninformed investors are paying high costs without receiving commensurate benefits.

This study provides an important lesson for mutual fund investors who are interested in retail S&P 500 Index funds. Namely, (net) expense ratios have a direct negative impact on performance. Low cost does not characterize all retail S&P 500 Index funds. Some funds charge fees and incur expenses that are too diverse along the range of outcomes to be consistent with commodities. Thus, when comparing mutual funds, investors should generally seek to minimize expenses because additional fees provide no apparent economic benefit.

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