PERSPECTIVES

The Arithmetic of "All-In" Investment Expenses

John C. Bogle

This article represents a rare (if not unique) attempt to estimate the drag on mutual fund returns engendered by "all-in" investment expenses, including not only expense ratios (until now, the conventional measure of fund costs) but also fund transaction costs, sales loads, and cash drag. Compared with costly actively managed funds, over time, low-cost index funds create extra wealth of 65% for retirement plan investors.

I read William Sharpe's essay "The Arithmetic of Investment Expenses" (2013) with interest and applause (of course!). It brought to my mind what was likely his first article on the subject of fund costs—"Mutual Fund Performance"—published way back in 1966. In that article, Dr. Sharpe was right in his conclusion that "all other things being equal, the smaller a fund's expense ratio, the better the results obtained by its stockholders" (p. 137).

Sharpe's credibility, objectivity, and quantification expertise are peerless. He was the 1990 recipient of the Nobel Prize in Economic Sciences and is now professor emeritus of finance at Stanford University, where he has taught thousands of students over some 43 years. He was right again in his 2013 article: "A person saving for retirement who chooses low-cost investments could have a standard of living throughout retirement more than 20% higher than that of a comparable investor in high-cost investments" (p. 34). However, as I will explain, he *understated* the gap in favor of low-cost investments.

The 1991 Article

Sharpe has taken up this subject often. In "The Arithmetic of Active Management" (Sharpe 1991), he analyzed mutual fund returns and found the same forces at work:

> Statements such as ["the case for passive management rests only on complex and unrealistic theories of equilibrium in capital markets"] are made with alarming frequency by investment professionals.

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In some cases, subtle and sophisticated reasoning may be involved. More often (alas), the conclusions can only be justified by assuming that the laws of arithmetic have been suspended for the convenience of those who choose to pursue careers as active managers.

If "active" and "passive" management styles are defined in sensible ways, it *must* be the case that (1) before costs, the return on the average actively managed dollar will equal the return on the average passively managed dollar and (2) after costs, the return on the average actively managed dollar will be less than the return on the average passively managed dollar. These assertions will hold for *any* time period. Moreover, they depend *only* on the laws of addition, subtraction, multiplication and division. Nothing else is required. . . .

Because active and passive returns are equal before cost, and because active managers bear greater costs, it follows that the after-cost return from active management *must* be lower than that from passive management.

. . . The proof is embarrassingly simple and uses only the most rudimentary notions of simple arithmetic.

Enough (lower) mathematics. . . .

. . . Properly measured, the average actively managed dollar must underperform the average passively managed dollar, net of costs. Empirical analyses that appear to refute this principle are guilty of improper measurement. (pp. 7–8)

The 1966 Article

Surprising as it may seem, Sharpe's 1991 article was published a quarter century after his first article on this subject. Although the role of costs in shaping the relative performance of mutual funds was integral to my career even before I founded Vanguard in 1974, it took me a while to pay adequate attention to that seminal article. The following are excerpts from Sharpe's 1966 article:

> Past performance [based on the ratio of annual fund returns to volatility in net asset values] appears to provide a basis for predicting future performance. . . . The high correlation among mutual fund rates of return suggests that most accomplish the task of diversification rather well. Differences in performance are thus likely to be due to either differences in the ability of management to find incorrectly priced securities or to differences in expense ratios. If the market is very efficient, the funds spending the least should show the best (net) performance. . . . The results tend to support the cynics: good performance is associated with low expense ratios. . . .

> . . . All other things being equal, the smaller a fund's expense ratio, the better the results obtained by its stockholders. . . . But the burden of proof may reasonably be placed on those who argue the traditional view—that the search for securities whose prices diverge from their intrinsic values is worth the expense required. (pp. 131–132, 137–138)[1]

The Arithmetic of "All-In" Investment Expenses

I enthusiastically endorse Sharpe's conclusions and his perceptive analysis, but the use of a mutual fund's expense ratio offers only a pale approximation of the total costs paid by investors in actively managed equity funds. Using only that measure, Sharpe compared the reported expense ratio of 1.12% for the average large-cap blend fund (unweighted by assets) with the ratio of 0.06% for the Vanguard Total Stock Market Index Fund. The advantage of the low-cost investment over the higher-cost investments was 1.06 percentage points per year. In this article, I shall provide careful, if inevitably imprecise, estimates of the additional costs that investors in actively managed equity funds incur—few, if any, of which are incurred by index fund investors.

Focusing on the issue of fees charged by brokers in his 1966 article, Sharpe perceptively referred to the fact that the costs included in mutual fund expense ratios fail to capture the all-in costs borne by fund investors:

> One reservation is in order. Expense ratios as reported do not include all expenses; brokers' fees are omitted. Thus the expense ratio does not capture all the differences in expenses among funds. It is entirely possible that funds with performance superior to that predicted by the traditional expense ratio engage in little trading, thereby minimizing brokerage expense. It was not feasible to attempt to measure total expense ratios for this study; had such ratios been used, a larger portion of the difference in performance might have been explained in this manner, and the apparent differences in management skill might have been smaller. (p. 134)

Despite the sharp decline in the commission *rates* charged by brokers, the costs of the portfolio transactions incurred by actively managed funds are substantial; fund portfolio turnover (based on aggregate industry data) has leaped almost fivefold since the early 1960s—from 30% to 140% today.[2]

In addition, Sharpe neglected to note that front-end sales loads were a major cost. But their impact on annual returns depends on the (unknowable) holding period of the investor. Furthermore, front-end loads are far less common today; they have typically been replaced by deferred sales loads and annual fees charged by brokers and advisers. Also, there are far more pure no-load funds in the fund industry of today.

Moreover, whereas index funds are fully invested at all times, portfolios of actively managed funds typically carry a cash position of about 5%, causing the funds to lose a portion of the long-term equity premium.

Finally, for most investors, relative tax efficiency is a critically important element of total costs. Funds with low expense ratios (notably, index funds), which operate with minimal portfolio turnover, are relatively tax efficient. Actively managed funds, with their far higher expense ratios, not only incur substantial transaction costs on their portfolio turnover but also realize capital gains, generating significant tax inefficiency. Taxes represent an additional drag on the returns earned by mutual fund investors in taxable accounts, but they are of no immediate concern to investors in tax-deferred retirement plans.

In this article, I shall estimate the impact of (1) the first three of these extra cost categories—transaction costs, cash drag, and sales loads—on the net returns that funds deliver to their retirement plan investors and, separately, (2) all four costs, including excess taxes, on the returns delivered to taxable fund investors.

Quantitative Imprecision

The issue of all-in fund costs has rarely, if ever, been subject to careful examination, likely because data on these costs are difficult, if not impossible, to quantify with precision. So, where is a business-man like me (albeit one educated in economics) to turn? The kind of quantitative precision that the academic community properly demands in most cases is simply not possible with respect to these four costs that fund investors incur over and above the expense ratio. I will provide reasonable esti-mates for each based on a variety of sources and data, buttressed by my industry experience. Lest I overstate the advantages of indexing, I have made these cost estimates for actively managed funds as conservative as possible.

Transaction Costs

The first "invisible" fund costs are the transaction costs incurred by the funds themselves. Two aca-demic studies have produced rather different esti-mates of the drain of fund trading costs in order to calculate their annual impact on fund returns. One study was conducted by Dr. John A. Haslem (2006). Brokerage commissions are now required to be specified by equity mutual funds, and from this source, Haslem identified a performance drag on fund annual returns of 39 basis points (bps). After taking into account implicit trading costs (timing delays, market impact, etc.), he estimated that the trading costs of actively managed funds produced an annual impact on fund returns of –60 bps.

Edelen, Evans, and Kadlec (2013) provided another extensive study of this issue. They exam-ined the annual expenditures on trading costs incurred by 1,758 domestic equity funds over 1995–2006 and calculated average annual trading costs of 1.44%, far in excess of the average expense ratio of 1.19% for the funds they examined.

That surprisingly large number astonished at least one independent expert. Don Phillips, presi-dent of the investment research division at the mutual fund data provider Morningstar, described it as "preposterous." But he conceded that "trading is a real cost and an activity that is often counter-productive in asset management." He presented his own estimate of annual transaction costs of "about

30 bps, which does not include certain other costs," such as the substantial market impact, which he did not quantify (Phillips 2013, p. 80).

I have been examining this issue for many years and have shown that high turnover is negatively correlated with fund performance (Bogle 2012, p. 148). In this article, I use the actual measure of fund trading: portfolio purchase of stocks *plus* portfolio sales as a percentage of fund average assets. For reasons lost in history, however, funds now cal-culate turnover as the *lesser* of portfolio purchases or sales as a percentage of fund average assets—a figure that obviously understates transaction activ-ity and is, therefore, irrelevant in the calculation of total transaction costs.

I am also aware that because mutual fund managers are trading largely with one another and with other institutional fund managers, market impact must resemble a zero-sum game for fund managers as a group (and their fund sharehold-ers). Because a fund "taking a haircut" on selling a large block of stock results in a better price for the buying counterparty, I am inclined to consider market impact costs to be close to zero. But for investors as a group, after accounting for bid–ask spreads and commissions that brokers pay to bro-kers and dealers, trading obviously becomes a loser's game.

So for my analysis, I use an estimate that is far more conservative than the 1.44% calculated by Edelen et al. (2013) and even lower than the Haslem (2006) estimates. My estimate is likely consistent with the expanded estimate provided by Phillips. Because precision here is impossible—and I do not want to risk overstating these costs—I opt for the ease of "rounding" and assume just 50 bps for the transaction costs of actively managed funds.

Although index funds obviously incur some transaction costs, they are so minimal that they have had no significant impact on the returns of those funds. That is, the annual returns of major large-cap index funds lag those of their target indices by only the amount of their expense ratios, meaning that net transaction costs are too small to affect the precision with which they track their tar-get indices. So, I assume zero total transaction costs for the index fund.

Cash Drag

Another additional cost is the drag of cash. Active funds fairly consistently carry cash in the range of 5% of assets, whereas index funds are normally fully invested. If we assume an annual long-term equity premium for stocks over cash of as little as 6%, there would be an additional 30 bp drag on active fund returns. Some of the larger active

equity funds doubtless "equitize" part of this cash by holding index futures. But data on that usage are simply not available. So, I will add a cost of just 15 bps to account for the cash holdings of active funds.

Sales Loads: Direct and Indirect

The costs paid directly by investors for fund distribution are rarely, if ever, taken into account in the analysis of fund expenses and returns. Nonetheless, these expenses incurred by most mutual fund "retail" investors represent a major drag on fund returns. That cost was once relatively easy to estimate because this industry originally grew through a "sales push" distribution system. From the inception of the fund industry in 1924 through the late 1970s, it was dominated by fund distributors that charged sales loads averaging about 8% of the dollar amount of shares purchased. (Then, few firms operated on a "no-load" basis.)

So in those days of yore, the math was fairly straightforward: For the typical investor who paid an 8% front-end load and held his shares for eight years, the amortized load was 100 bps per year; for a 16-year holder, 50 bps per year. (The norm was likely closer to 100 bps.) Today, however, the distribution system has undergone a radical transformation, and we can only make reasonable estimates based on limited data.

First, no-load funds have soared in importance: They now account for almost half of long-term industry assets (excluding assets of institutional funds).[3] Further, the typical front-end sales load has dropped from 8% to 5%. Also, the "retail" distribution system is rapidly changing from a front-end load model to an annual asset charge. And even load funds often waive sales charges for pension plans and corporate thrift plans, as well as for registered investment advisers and brokers, who charge their clients an annual fee, replacing the earlier front-end commission-based model. Recent estimates suggest that only 40% of the traditional "A" front-end load shares carry sales loads and 60% are sold at net asset value.

To further muddle the calculation of "distribution drag," some individual investors are DIY ("do it yourself") investors, incurring few, if any, extra costs. But most rely on brokers and advisers who charge fees for their services. A recent survey, based on a limited sample, placed the proportion of equity fund owners in this adviser-assisted category at 56% of total no-load fund sales.[4]

In this new environment, fees paid by investors to brokers and investment advisers typically run to about 1% per year, (indirectly) reflecting the costs of fund share distribution. Therefore, with some investors incurring almost no additional distribution costs and others subject to costs in the range of 1% or more, I will conservatively use an average annual distribution cost of 0.5% for individual investors in actively managed funds, which includes total annual broker and adviser costs and sales loads. Because no major index fund charges sales loads and because investors in traditional index funds are largely, but not entirely, DIY investors (often in defined contribution plans for which the sponsoring company provides the fund menu), I take the liberty of assuming in my basic analysis no such distribution costs for index funds.[5] (Readers who believe that I have overstated or understated the distribution costs for either actively managed funds or index funds may simply insert their own cost assumptions into **Table 1**.)

Note that investors in corporate defined contribution (DC) plans are a major force in retirement plan investing and may well be subject to lower distribution costs.[6] But individual retirement accounts (IRAs) have an even larger asset base ($5.4 trillion versus $5.1 trillion for DC plans at the end of 2012).[7] A significant portion of IRA assets are the result of DC plan rollovers at retirement, and such investors seem more likely to retain brokers and advisers for their IRAs, incurring the distribution costs noted above.

Table 1.   All-In Investment Expenses for Retirement Plan Investors

	Actively Managed Funds	Index Funds	Index Advantage
Expense ratio[a]	1.12%	0.06%	1.06%
Transaction costs	0.50	0.00	0.50
Cash drag	0.15	0.00	0.15
Sales charges/fees[b]	0.50	0.00	0.50
All-in investment expenses	2.27%	0.06%	2.21%

[a]Data are from Sharpe (2013).
[b]The 0.50% estimate for sales charges/fees is the midpoint of the range between 0% for DIY investors and 1% for investors who pay sales loads and fees to brokers and registered investment advisers. I have chosen not to include the "service charges" for loans, withdrawals, and so forth, often paid by investors in 401(k) retirement plans.

Putting It All Together

Table 1 details the all-in aggregate fund costs, beginning with Sharpe's data and then including the additional elements described previously. I will start by looking at these all-in costs from the perspective of Sharpe's 2013 article: the tax-deferred retirement plan of the individual investor.

Note that the pervasive acceptance of presenting expenses as a percentage of fund asset values, as in Table 1, greatly diminishes the perception of the substantial impact that costs have on fund annual returns. For example, assuming a 7% stock market return, the 2.27% estimated annual cost of the actively managed funds would consume almost 33% of the return, whereas the 0.06% annual cost of the index fund would consume less than 1% of the return—a dramatic difference.

Preparing for Retirement

What does this annual differential mean to an investor who prepares for retirement by owning mutual funds over the long term? For illustrative purposes, I have assumed that a 30-year-old investor begins to save for retirement at age 70, a span of 40 years, by investing in a tax-deferred 401(k) or IRA plan. She earns $30,000 annually at the outset, and I assume that her compensation will grow at a 3% annual rate thereafter. In **Table 2**, I present a comparison of the retirement plan accumulation if the investor were to invest 10% of her compensation each year in either (1) an actively managed large-cap equity fund or (2) the Vanguard Total Stock Market Index Fund, the subjects of Sharpe's 2013 analysis. The table summarizes the results over the four decades that follow.

The advantage provided by the index fund is substantial, and as time passes, it grows by leaps and bounds. By the time retirement comes, when the investor in the example is 70 years old, $927,000 would have been accumulated in the index fund versus $561,000 in the active fund, an astonishing gap of $366,000 and a 65% enhancement in capital. Even if we assume that the actively managed fund investor incurs no distribution costs, the 40-year accumulation would total $626,000. If the index fund investor incurs distribution costs of 0.5% per year, the accumulation would total $824,000 and the index fund investor would nonetheless maintain a $198,000 advantage over the investment lifetime— still a 32% enhancement.

When Sharpe considered only the difference in expense ratios for index and actively managed funds, he concluded that "a person saving for retirement who chooses low-cost investments could have a standard of living throughout retirement more than 20% higher than that of a comparable investor in high-cost investments" (2013, p. 34). But when all-in costs—which obviously (1) exist and (2) are substantial, whatever their precise amount—are considered, the assumed retirement wealth accumulation enhancement provided by the low-cost index fund as shown in Table 2 leaps to fully 65% higher, ranging (depending on the assumptions presented in the table) from 32% to 86% higher. Regardless of the assumptions used, the index fund would provide a truly remarkable potential improvement in the standard of living for retirees. For example, using my primary calculations and assuming a 4% annual withdrawal rate at retirement, the average active fund investor would receive a monthly check for $1,870 whereas the index fund investor would receive $3,090.

Taxes and Taxable Investors

For taxable fund investors, the gap widens even further. The high tax *efficiency* of the index fund gains a significant advantage over the painful tax *inefficiency* of the average actively managed fund.

Table 2. Total Wealth Accumulation by Retirement Plan Investors, Assuming a 7% Nominal Annual Return on Equities

	Actively Managed Fund	Index Fund	Index Enhancement	
Gross annual return	7.00%	7.00%	—	
All-in costs	2.27	0.06	–2.21%	
Net annual return	4.73	6.94	+2.21	
Accumulation period				% Increase
After 10 Years	$44,000	$50,000	$6,000	13%
After 20 Years	130,000	164,500	34,500	27
After 30 Years	286,000	412,000	126,000	44
After 40 Years[a]	561,000	927,000	366,000	65

[a]For the DIY investor in the active fund who incurs 0% distribution costs, the accumulation would amount to $626,000. For an active fund investor who incurs the full 1% distribution cost, the accumulation would total $504,000. For the index fund investor who incurs distribution costs of 0.5%, the accumulation would total $824,000.

Again, it is impossible to make precise calculations here. Therefore, for active managers and the index fund, I have used as a guideline the pretax and after-tax returns provided by Morningstar for the 10-year period ending 30 April 2013.

Over this period, the total stock market index had an average annual return of 8.7%. The return for actively managed large-cap blend funds was 7.5%, of which about 75 bps was lost to taxes; the broad market index fund lost about 30 bps to taxes.[8] So, I will use a conservative and rounded tax differential estimate of 45 bps, which likely understates the extra tax costs incurred by investors in actively managed funds. With taxes considered, the total all-in costs added by actively managed mutual funds amount to about 317 bps per year for taxable investors (**Table 3**).

This rough snapshot of the annual impact of taxes may suggest that tax costs are inconsequential. But when compounded over 40 years (as in the previous example), they bring the extra costs of actively managed funds to a truly overwhelming annual level of 3.02%. In **Figure 1**, I assume that a taxable fund investor begins with a $10,000 investment in (1) a tax-efficient index mutual fund and (2) a tax-inefficient actively managed fund and simply holds each for the subsequent four decades.

The calculated terminal value of the active fund grows steadily over time—$15,000 after 10 years, $22,000 after 20 years, and $48,000 after 40 years. The index fund grows far more swiftly, ending up with a value of $131,000, a remarkable enhancement of $83,000, or almost 175%. Indeed, taxes are a vital consideration.[9]

Table 3. All-In Fund Costs Including Tax Differential, 10 Years Ending 30 April 2013

	Actively Managed Fund	Index Fund	Index Advantage
Assumed stock market return	7.00%	7.00%	—
All-in costs (from Table 1)	2.27	0.06	2.21%
Tax inefficiency	0.75	0.30	0.45
Total costs[a]	3.02	0.36	2.66
Assumed net fund return	3.98	6.64	2.66

[a]Here, costs (including taxes) consume 43% of the returns for the active funds, compared with 5% for the index fund.

Figure 1. Growth of a $10,000 Investment Based on All-In After-Tax Costs, Assuming a 7% Gross Annual Return on Stocks
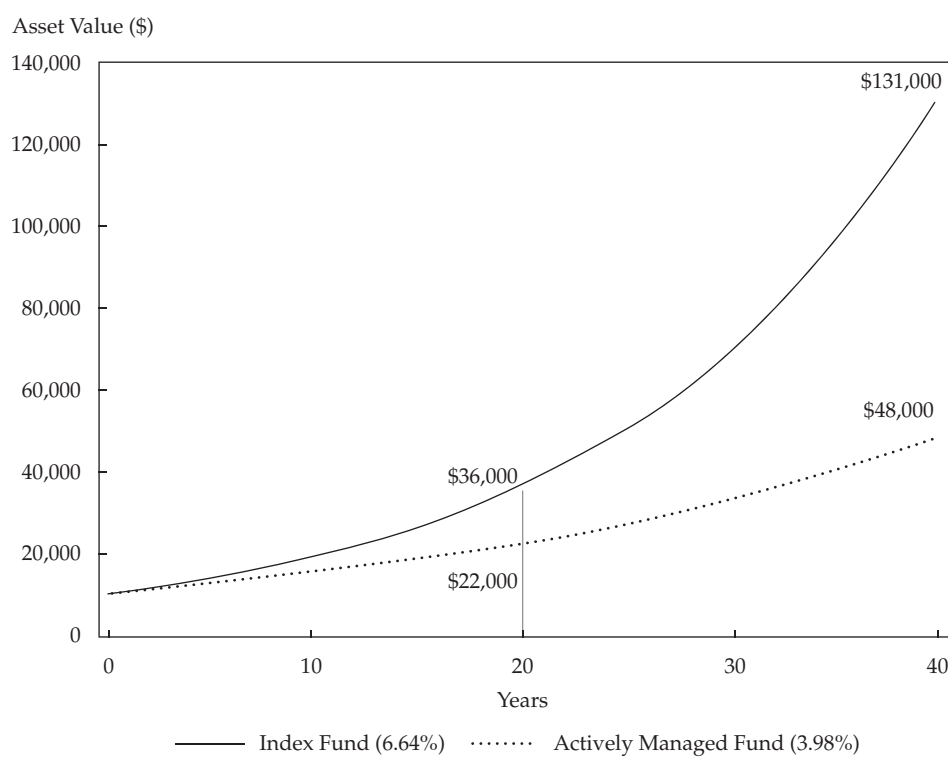
Real vs. Nominal Returns

So far, I have reported fund returns on a *nominal* basis, unadjusted for the impact of inflation. But investors must rely on *real* returns to maintain their standard of living. Although mutual funds almost exclusively report only their nominal returns, I believe that fund investors must consider their real returns as well. Making this adjustment has an important negative impact on both active funds and index funds.

For example, if we assume a future annual rate of inflation of only 2%—the approximate present spread between the inflation-adjusted 10-year Treasury Inflation-Protected Security and the 10-year US Treasury note itself—it reduces the assumed nominal annual market return of 7% to a real return of 5%. Thus, the real return after all-in costs for actively managed funds would fall to 1.98% from its nominal 3.98%, and the index fund real return would fall to 4.64% from a nominal return of 6.64%.[10] Compounded over 40 years, a $10,000 initial investment in active funds would grow to just $22,000 in real terms whereas the index fund would grow to $61,000—a nearly threefold enhancement. These numbers may be scary and almost unbelievable, but the data do not lie.

Counterproductive Investor Behavior

Throughout this article, I have presented the returns as reported by the mutual funds themselves—essentially, the percentage change in the funds' net asset values, adjusted for the reinvestment of all dividends and distributions. As the record makes clear, however, mutual fund investors are too often tempted to add to their equity holdings when markets are rising, to withdraw their investments when markets tumble, and to move into funds that have performed well in the recent past only to revert to the mean (or below) thereafter. Such counterproductive investor behavior proves to be another advantage for index fund investors.

For example, over the 15 years ending 30 June 2013,[11] the actively managed large-cap blend funds evaluated by Sharpe (2013) reported an average annual return of 4.50%—*for the funds that survived the period*. But Morningstar calculated that the asset-weighted return earned by *investors* over the same period was just 2.59%, a "behavior gap" of 1.91 percentage points in return per year. (As it happens, in this particular period, investors in the Total Stock Market Index Fund exhibited moderately productive timing, earning a slightly *higher* annual return than the fund reported.) A loss of almost 2 more percentage points of annual return for active investors—over and above fund expense ratios, other costs, and taxes—is a high penalty to pay for the combination of high costs and counterproductive movement of their money from one fund to another.[12]

Reconciliation

Now I will explore how consistent these all-in cost estimates are with the returns earned by large-cap equity funds relative to the returns earned by the Total Stock Market Index Fund. First, let us assume, as so many academic studies indicate, that active equity mutual funds as a group provide, before costs, a return equal to that of the stock market itself at the same level of risk ("zero alpha"). Therefore, the subtraction of direct all-in fund expenses should essentially reflect the difference between the market return and the managed fund return. The exercise is a bit complex because some of the expenses I have reviewed so far are internal to the funds themselves and others are paid directly by the fund investors. **Table 4** should clarify this distinction.

The concept is that the net returns achieved by large active funds should lag the returns earned by the Total Stock Market Index Fund by the amount of direct costs paid out of fund gross returns—1.77 percentage points annually. The costs of sales and distribution fees, extra taxes, and imprudent (or opportunistic) investment behavior—another 2.15 percentage points in aggregate—are not included here because they are borne directly by the investors themselves. How does that theory work in practice? Quite nicely, as it turns out. For example, over the two decades ending 31 December 2012, the average actively managed large-cap core fund earned a compound annual return of 6.50% (adjusted for survivorship bias, as described later in this section), falling short of the 8.3% return of the Total Stock Market Index Fund by 1.80 percentage points per year. That shortfall is remarkably close to the annual differential between index fund

Table 4. Allocation of Costs of Actively Managed Funds (from Tables 1 and 2)

	Costs Borne by Fund	Costs Borne by Investor
Expense ratio	1.12%	—
Transaction costs	0.50	—
Cash drag	0.15	—
Sales charges	—	0.50%
Tax inefficiency	—	0.45
Investor behavior	—	1.20[a]
Total	1.77%	2.15%

[a]A conservative estimate, well below the 1.91 percentage point lag realized over the past 15 years.

direct costs and active fund direct costs of 1.77 percentage points, as shown in Table 4.

This near precision, I must report, is no more than a happy coincidence, simply because the calculations of costs and returns presented in this article are, as noted earlier, inevitably imprecise. Even a larger difference in the results for the past two decades—say, plus or minus 50 bps—would nonetheless confirm the strong relationship between fund costs and fund returns. The costs are based on the results over the past two decades, using limited data and some experienced judgment. Therefore, take this fragile precision only as proof, in principle, that the influence of costs must dominate the relationship between the returns earned by active funds and the returns earned by index funds.

One of the principal challenges in calculating the average returns of the funds is the need to eliminate what is called "survivorship bias"—that is, to take into account not only the returns of funds that survived a given period but also those that failed to do so. Obviously, data that are not free of survivorship bias are inappropriate (after all, funds with poor records are less likely to survive), but there are myriad methods of calculating the difference. I have found the data provided by Lipper to be quite reliable. Using its data for the two decades ending 31 December 2012, for example, the *surviving* large-cap core funds earned an annual return of 7.86%. But, as shown above, all the funds in that category, including those that did not survive, earned only 6.50%, or 1.36 percentage points less. Given the persistent high failure rate of equity mutual funds,[13] this adjustment for survivorship bias is essential.

Earlier studies of the relative returns of actual mutual funds and the broad market indices confirm the reasonableness of these estimates of the impact of direct costs incurred by investors. For example, in his book *Unconventional Success: A Fundamental Approach to Personal Investment*, Yale endowment fund manager David Swensen (2005) summarized research conducted by Robert Arnott, Andrew Berkin, and Jia Ye and reported that for the 20 years ending 31 December 1998, the average actively managed fund underperformed a broad stock market index fund by 2.1 percentage points per year before taxes. (Numerous other studies confirm a spread in this range.) Current data also confirm a shortfall of this magnitude. As noted earlier in this section, over the 20 years ending 31 December 2012, the underperformance of the active funds relative to the index was almost identical—1.8 percentage points per year. Broadly speaking, *the reality confirms the theory.*

Conclusion

By examining mutual fund expense ratios, Dr. Sharpe began the saga of how much the draining impact of expense ratios erodes the returns delivered to fund investors over the long term. My analysis in this article builds on that foundation, but I estimated the *all-in* costs incurred by mutual funds—expense ratios *plus* the other fund costs—which are numerous and substantial in the case of actively managed funds but far less numerous and less substantial for index funds. It is simply a story that must be told.

I re-emphasize the inevitable imprecision of my data, even as I reiterate that I have tried to use conservative estimates—selecting the lowest reasonable number in each case and, in all likelihood, understating the confiscatory impact of the additional transaction costs, cash drag, sales loads, distribution costs, tax inefficiency, and counterproductive investor behavior. Others will no doubt find fault with my data and estimates, and I urge industry participants and academics alike to offer constructive criticism of my data, including their own estimates of these costs.

I also urge mutual fund investors not only to consider the conventional *annual* impact of expense ratios and other costs but also to recognize how much these differences matter as time horizons lengthen. In the short term, the impact of costs may appear modest, but over the long run, investment costs become immensely damaging to an investor's standard of living. *Think long term!* For those who are investing for their retirement and for their lifetimes, understanding the cost issue is vital to success in investing. An increase of 65% in the wealth accumulated by retirement plan investors is not trivial! After analyzing the data over many years, I feel confident in reaffirming the warning that I have consistently given to fund investors over the years: *Do not allow the tyranny of compounding costs to overwhelm the magic of compounding returns.*

This article qualifies for 0.5 CE credit.

Notes

1. Sharpe's assignment of the "burden of proof" to fund managers echoes Paul Samuelson's "Challenge to Judgment" (1974). In that article, he demanded "brute evidence" of the superiority of active management. As far as we know, no such evidence was ever produced.

2. These turnover measures represent the total portfolio purchases and sales of equity funds each year as a percentage of assets, not the traditional—albeit inexplicable—formula that is in general use today: the lesser of purchases and sales as a percentage of assets. My recent speech "Big Money

in Boston—The Commercialization of the 'Mutual' Fund Industry" details my methodology and is available at www.johncbogle.com.

3. Investment Company Institute, *2013 Investment Company Fact Book*, 53rd ed. (2013, p. 86, Figure 5.11).

4. Strategic Insight, "The Strategic Insight 2012 Fund Sales Survey: Perspectives on Intermediary Sales by Distribution Channel and by Share Class" (May 2013, p. 27).

5. In Table 2, I provide a footnote that illustrates the impact on the returns of index funds assuming the same 50 bp distribution cost estimate used for active funds.

6. It seems likely that many corporate DC plans (especially those with substantial assets) would fall on the lower side of the 50 bp distribution cost estimate, whereas most IRAs (which cannot take advantage of the economies of scale available to large DC plans) would fall on the higher side.

7. Investment Company Institute, *2013 Investment Company Fact Book*, 53rd ed. (2013, p. 114, Figure 7.4).

8. The loss to taxes by active funds is *increased* by the capital gains realized by their high turnover but *reduced* by their high expense ratios, which consume almost 60% of their dividend income. (For 2012, gross dividend yield was 2.1%, the average expense ratio was 1.2%, and the net taxable yield was 0.9%.) In contrast, the low turnover of the index fund leads to a far *smaller* capital gain tax burden, but its low expense ratio, 0.06%, confiscates only 3% of income, leaving its 2.1% gross yield barely impaired.

9. Note that taxes on both the active funds and the index fund are based on "pre-liquidation, after-tax returns" as provided by Morningstar. That is, each fund is assumed to be held through the end of the period. On a post-liquidation basis (i.e., when sold at the end of the period), the index fund advantage still exists but is smaller.

10. Again, relative to the assumed *real* return on stocks of 5%, active fund costs would consume 60% of the return, compared with 7% of the return of the index fund.

11. As of this writing, this is the date of the most recent and comprehensive available Morningstar data on investor returns.

12. Alas, even the 1.98% real return for investors in actively managed equity funds is *before* the (conservative) estimate of 1.20% lost annually to counterproductive investor behavior. I leave it to the reader to do the subtraction.

13. A recent study by Vanguard found that of 1,540 managed US equity funds in 1998, only 842 survived through 2012, or barely 55% of those in existence at the beginning of the period. In addition, only 275, or 18% of the total, both survived *and* outperformed their benchmarks—further confirmation of the proven success of index funds.

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