



C A M B R I D G E   A S S O C I A T E S   L L C

## U.S. EQUITY INDEXING

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**ABSTRACT**

1. After an investor has selected an index benchmark, the choice of manager should be based on the firms' asset-base and experience with that benchmark, the availability of the investor's preferred vehicle structure, auxiliary client services, and fees.
2. Fees for index management are highly competitive and are negotiable for clients of all sizes.
3. In general, a larger amount of assets under management, in total and in a particular benchmark, connotes greater experience and resources.
4. Securities lending, transition services, customized contracts, extra meetings, customized reports, the clients' intentions regarding the time-horizon of the relationship, and the possibility of hiring the firm for custody or for other index or active investment strategies all come into play in fee negotiations.
5. Because indexing is a game of minimizing costs, we encourage clients to opt for commingled funds, in lieu of separate accounts, where they will benefit from economies of scale in the fund management and from the inclusion of custody services.

## U.S. EQUITY INDEXING

### Introduction

Investors index in order to achieve portfolio diversification at the lowest possible cost. The index manager's mandate is therefore to construct a portfolio that delivers the same return as the benchmark with zero tracking error and minimal expense. The benchmark, however, is a theoretical construct, a virtual portfolio "pie in the sky." Recreating it in reality involves transaction costs and management fees that detract from the gross return. The lower these costs, the more closely the manager can realize the mandate. Assuming the benchmark in question is a standard, capitalization-weighted index (e.g., S&P 500, Russell 3000®, Wilshire 5000), transaction costs will be low compared to those incurred by active managers because the appropriate weight of each portfolio holding will be maintained as a consequence of its changing price in the market without the manager's needing to buy or sell shares—as would be necessary, for example, if the benchmark were equal-weighted. However, the composition of all indexes shifts with additions, deletions, and mergers and acquisitions, and such changes trigger transactions, which cannot be effected without cost. As regards to management fees, indexing is widely perceived as a commodity business in which there is little distinction among vendors, and this has driven fees down relentlessly such that for, say, a \$50 million account, these are now approximately one-tenth the average fee of an active manager. We have long argued that asset management fees paid to active managers should match those paid to index managers, with any additional compensation predicated solely on value added (i.e., performance-based fees). However, this has consistently fallen on deaf ears, despite the persistent failure of most active managers to outperform market indexes over extended periods—an outcome now documented repeatedly over four decades and still ignored by most investors.

### Benchmarks

Exhibit 1 lists the general characteristics of several U.S. equity benchmarks, some of which cover virtually the whole investable market (e.g., Russell 3000®, Wilshire 5000), and others that cover more specific segments of the market. Some are relatively easy to match, while others are much more difficult.

Liquidity is the first barrier. The greater the representation of small-cap stocks in a given index, the less the liquidity and the higher the likely transaction costs. At the bottom end of the Wilshire 5000, for example, there is virtually no liquidity among the approximately 4,000 micro-cap and penny stocks that constitute only a small fraction of the total capitalization of this comprehensive, 7,000+ stock index. The liquidity problem is lower with larger-capitalization stocks, but even smaller mid-cap names in the S&P 500 are less liquid than Microsoft, GE, and Cisco. Because the smallest capitalization deciles have almost no impact on the performance of the portfolio (since their weight is so inconsequential), failing to hold them has a negligible effect on a manager's tracking error, and the relatively high cost of buying and selling can be avoided. Nevertheless, not holding all the stocks in the benchmark index raises a number of management questions (discussed below).

A second benchmark-related problem for index managers is the weighting of stocks in the various indexes. In the Russell benchmarks, stocks are weighted by their "float-adjusted market capitalization." However, in the various Wilshire and S&P indexes, they are weighted simply by total market capitalization, without regard to the size of the float. Russell's view is that if a large quantity of the outstanding shares are not actively traded (because they are held as restricted stock by the founders of the company, or by a related foundation, for example), then they should be excluded from the calculation of the market weighting of that stock in the index. This approach makes the Russell indexes easier to recreate than those who ignore this issue—if the capitalization of shares outstanding are computed as \$60 billion, for example, but the actively traded float is in fact only about \$10 billion, these shares will be somewhat harder to acquire.

A third issue is how benchmarks change over time. While corporate actions, like M&A, change the makeup of benchmarks, the creators of the indexes have different rules about other changes. Standard & Poor's studies the market on an ongoing basis, periodically announcing that Company X is going to be replaced by Company Y. Russell defers all changes to June 30 of each year. These additions, deletions, and reconstitutions require trades by all index managers, causing spikes in market prices when everyone has to scramble to buy or sell the same names. The bottom line is that transaction costs, whether incurred as a result of illiquidity or of market demand, chip away at managers' ability to deliver the same return as the cost-free index.

### **Indexing Methods: Replication, Sampling, and Optimization**

Index managers take three approaches to reproducing index returns: replication, sampling, and optimization depending on the nature of the benchmark.

**Replication** involves holding all of the index stocks in their exact weights, with no compromises. This is the way most managers reproduce indexes that have relatively few and relatively liquid holdings, like the S&P 500. However, even with the S&P 500, a manager running a \$30 million separate account may choose not to replicate in full, because the account is too small to permit cost-effective replication among the smallest names. Similarly, even for larger accounts, managers will not necessarily mirror changes in the benchmark holdings on exactly the same date as they are effected in the index itself. For example, when a stock is added to the S&P 500, the price typically spikes following both the announcement and following the implementation of its addition to the index. On the one hand, managers avoid tracking error by buying the added stock precisely when it is added to the index, at whatever happens to be the price at that point (typically, the closing market price). However, transaction costs are likely to be higher at this point because of heavy demand for the stock. Consequently, managers tend to allow themselves a few days to complete a single add or delete, and allow anywhere from two to six weeks to complete a reconstitution of a Russell portfolio. We have met only one manager who interprets "full replication" as requiring market-on-close changes.

**Sampling** means that the manager divides the benchmark stocks into buckets based on characteristics like market capitalization, price-earnings, price-to-book, earnings growth, and dividend yield, and picks representative stocks from each bucket to hold in lieu of all the stocks in that category. Managers tend to use sampling to reproduce broader indexes, like the Russell 3000® or the Wilshire 5000. (In fact, Wilshire Associates has written a widely used computer program to implement such sampling.) The largest stocks in the benchmark end up being held in their exact weights—because they

are so big that they are the only stocks in their buckets—just as if the manager were replicating that portion of the benchmark. On the small end, however, there may be 20 stocks, similar in characteristics, from which a manager might pick. Because these smaller stocks are less liquid, a manager can reduce transaction costs by buying whichever stocks happen to be available when the characteristics it represents need to be added to the portfolio.

**Optimization** is really a way of determining how thorough sampling must be to ensure that the index is reproduced at the lowest possible cost. In other words, what is being optimized are the trade-offs between perfect/imperfect reproduction, tracking error, and cost. A computer is programmed to analyze all the characteristics of all the index stocks simultaneously indicating the names and weights that will comprise the optimal trade-off in matching or not matching each of the benchmark characteristics. Many managers use a risk analyzer (e.g., BARRA's E3 program) in conjunction with an optimizer, or with their sampling program, to provide an independent study of the characteristics and the prospective tracking error of the final portfolio. Some managers have also written features into their optimization programs to minimize estimated stock-specific transaction costs simultaneously with all the other choices the program makes. This is, of course, a more difficult task.

### **Transaction Costs, Crossings and Transitions**

Managers minimize trading costs by employing experienced traders with a good sense of how market prices are moving, how they can pay the least, or get paid the most, and how to minimize market impact.<sup>1</sup> Managers with sufficient assets can also exploit their scale by using three kinds of crossing networks. External crossing through POSIT, Instinet, or one of the newer networks costs from one to three cents a share, in contrast to five to six cents a share for conventional brokerage. In addition, shares can be crossed internally, if two or more clients have offsetting purchases and sales of sufficient volume, with an external broker paid one-half to one cent a share for handling the paper work. Finally, managers can also apply for exemption from the Department of Labor's regulations that normally prevent them from trading directly between client accounts. In this case, no broker or external network is involved, and consequently no commissions and no market impact incurred because the trade is invisible to the market. (The price booked to clients' accounts is the public market price at the time of the trade.) On the other hand, whether and when to cross internally is a fiduciary matter to which managers should be sensitive to. For example, a trade at a market-on-close spike may be advantageous to the selling client but disadvantageous to the purchasing client. Sophisticated managers with experienced traders will use all of these tools in an effort to minimize the commissions paid and the market impact of their own actions.

Crossing is only possible when offsetting clients are moving in and out of a fund. If the manager's client base is predominantly institutional, cash flows may be larger in volume but less frequent, which means fewer offsetting clients at precisely the same time when, due to the volume involved, a cross would be most welcome. Institutional managers ease this problem by informing their clients whether waiting a day or a week might create a crossing opportunity, or by having a rule that entrances and exits are only permitted monthly or semi-monthly. If the client base consists primarily of smaller institutions or retail clients (e.g., in a mutual fund), the higher proportion of cash flows will allow daily entrances and

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<sup>1</sup> See our 1998 report, *Soft Dollars, Directed Brokerage and Related Trading Practices* for a detailed discussion of the component costs of U.S. equity market transactions.

exits, as are usual in mutual funds. In this environment, however, managers often hold a higher percentage of their assets in cash instead of index stocks as a residual from net inflows at the end of each day or in preparation to meet net outflows the next day. Though such cash may comprise only 2% of assets, it acts as a drag on return and for this reason most managers equitize the cash by buying index futures, and must have some experience and skill in managing these derivatives.

Index fund managers should also attempt to ensure an equitable distribution of transition costs (i.e., those generated by entrances to and exits from the fund) among clients. In a conventional mutual fund, all costs are allocated equally among all clients through the expense ratio, regardless of whether a specific client had several or no cash flows during the period in question. The costs generated by relatively active clients are consequently borne equally by those that are relatively passive. In an institutional commingled fund, however, managers typically set up an adjunct trading account within which as many transactions as possible are crossed, and each client's impact is identifiable. This enables managers to allocate costs only to those responsible for their generation, which is far more equitable. Some managers simplify this process by charging clients a flat fee for this transition service, while others provide it without charge under certain circumstances.

## **Client Service**

In addition to distinctions in methodology, several other features differentiate managers and their suitability for a given client. For example, although larger firms may be able to hire the smartest traders and write the best computer programs, they are not necessarily equipped to provide the same level of customized service to smaller clients as they provide to larger clients. Similarly, the largest firms (some of which are connected to custody banks), may be able to cross more trades internally, but can't offer separate accounts to clients with less than \$100 or \$500 million dollars. Smaller clients for whom a separate account is important can find firms that will take the business, but custody and securities lending will not be included and the manager may have to use sampling instead of replication in an S&P 500 account. Smaller firms are also more likely to offer customized features, like socially responsible screens, to clients with modest assets.

Firms also vary in their style and culture. Some will make portfolio managers available for questions; some will visit clients whenever asked to do so; some have better informational materials for clients. In general, a larger amount of assets under management in the client's chosen benchmark is an excellent guide to the skill, experience, and suitability of a manager. However, less tangible client service capabilities can prove more important.

## **Fees**

Exhibit 2 indicates the range of fees charged by index fund managers. Efficiency of scale is the bottom line; however, clients of all sizes should not regard the posted fee as given, but should negotiate aggressively since managers know that—in contrast to the situation among active managers—fees are often the single most important determinant of manager selection. Managers take into account whether there might be other revenue opportunities through securities lending, transition services, or other relationships as well as other expenses for customized contracts or services. The

obvious point is that the larger the fee, the greater the tracking error risk a manager has to incur in an effort to ensure that performance net of fees and transaction costs matches that of the index as closely as possible. Some managers claim that by accepting a slightly higher monthly tracking error, they can achieve the same long-term tracking error as their competitors, while consistently realizing an excess return in the order of five to 15 basis points. However, we would characterize this as enhanced indexing rather than indexing—whatever the managers themselves say—and that is a different topic entirely, to be covered in our paper, *Enhanced Indexing*.

## Exhibit 1

## COMPARATIVE INDEX MATRIX

As of December 31, 1999

(\$ billions)

	<u>Number of Stocks</u>	<u>Average</u>	<u>Market Capitalization Median</u>	<u>Range</u>	<u>Weighting Method</u>	<u>Index Rebalancing</u>
<b>S&amp;P 500</b>	500	\$24.5	\$7.8	\$602.4 - \$0.36	Market Cap	As Needed
<b>Russell 1000®</b>	975	\$14.1	\$4.0	\$602.4 - \$0.16	Float	Annually
<b>Russell 3000®</b>	2,832	\$5.3	\$0.77	\$602.4 - \$0.01	Float	Annually
<b>Wilshire 5000</b>	7,088	\$2.2	\$0.13	\$602.4 - <\$0.001	Market Cap	Daily
<b>S&amp;P MidCap 400</b>	400	\$2.2	\$1.6	\$37.1 - \$0.16	Market Cap	As Needed
<b>Russell 2000®</b>	1,857	\$0.63	\$0.45	\$13.2 - \$0.01	Float	Annually
<b>Wilshire 4500</b>	6,600	\$0.63	\$0.10	\$75.3 - <\$0.001	Market Cap	Daily
<b>S&amp;P SmallCap 600</b>	600	\$0.61	\$.47	\$4.1 - \$0.03	Market Cap	As Needed

Source: Prudential Benchmark Study.



**Exhibit 2**  
**COMPARATIVE FEE MATRIX**

**As of December 31, 1999**

<u>Asset Size (\$M)</u>	<u>S&amp;P 500</u>			<u>Russell 2000®</u>			<u>Wilshire 5000</u>			<u>EAFE/ dev mkts</u>		
	<u>Lowest</u>	<u>Median</u>	<u>Highest</u>	<u>Lowest</u>	<u>Median</u>	<u>Highest</u>	<u>Lowest</u>	<u>Median</u>	<u>Highest</u>	<u>Lowest</u>	<u>Median</u>	<u>Highest</u>
\$5	0.050	0.065	0.200	0.080	0.120	0.250	0.080	0.090	0.200	0.120	0.150	0.400
\$10	0.050	0.065	0.150	0.080	0.120	0.200	0.080	0.090	0.150	0.120	0.150	0.400
\$20	0.050	0.065	0.115	0.080	0.120	0.153	0.080	0.090	0.125	0.120	0.150	0.400
\$35	0.050	0.061	0.100	0.080	0.114	0.139	0.080	0.084	0.120	0.120	0.139	0.400
\$50	0.050	0.060	0.100	0.080	0.105	0.133	0.080	0.081	0.120	0.120	0.135	0.400
\$75	0.047	0.053	0.087	0.073	0.095	0.129	0.073	0.077	0.107	0.100	0.125	0.400
\$100	0.045	0.050	0.075	0.070	0.088	0.127	0.060	0.074	0.105	0.090	0.118	0.400
\$150	0.025	0.033	0.060	0.040	0.053	0.120	0.010	0.053	0.100	0.060	0.088	0.400
\$200	0.023	0.030	0.035	0.035	0.046	0.120	0.010	0.045	0.100	0.060	0.085	0.400
\$400	0.019	0.025	0.025	0.028	0.039	0.120	0.010	0.038	0.100	0.058	0.080	0.400

Source: Cambridge Associates, Inc. Investment Manager Database.

## Exhibit 3

## DESCRIPTIVE CHARACTERISTICS OF REPRESENTATIVE MAJOR INDEX MANAGERS

Data as of December 31, 1999

<u>Firm</u>	<u>Total Assets Under Management</u>	<u>Total Assets in Equity-Index Products</u>	<u>Assets in Major Benchmarks (by mandate)</u>		<u>Inception Date of Oldest Index Product</u>	<u>Affiliations &amp; Notes</u>
Barclays Global Investors	\$687 billion	\$472 billion (11/30/99)	S&P 500 Russell 2000 Wilshire 5000 EAFE/ dev mkts	\$300 billion \$2.2 billion \$43 billion \$30 billion	August, 1973 (Equity Index Fund)	The first index fund was created in 1971 by Wells Fargo, subsequently bought by Barclay's.
State Street Global Advisors	\$672 billion	\$365 billion	S&P 500 Russell 2000 Wilshire 5000 EAFE/ dev mkts	\$173 billion \$2.5 billion \$3.7 billion \$31 billion	January, 1978 (S&P 500 Flagship Fund)	Affiliated with State Street Bank, a major custodian.
Deutsche Asset Management (formerly Bankers Trust)	\$580 billion	\$193 billion	S&P 500 Russell 2000 Wilshire 5000 EAFE/ dev mkts	\$91 billion \$850 million \$0 \$6 billion	May, 1977 (Pyramid Equity Index Fund)	Affiliated with Deutsche Bank, which purchased Bankers Trust, a major US custodian and investment bank, in June 1999.
Mellon Capital	\$86 billion	\$60 billion	S&P 500 Russell 2000 Wilshire 5000 EAFE/ dev mkts	\$37 billion \$1.7 billion \$2.2 billion \$1.9 billion	October, 1983 (EB Stock Index Fund)	Chairman of Mellon Capital is Bill Fouse, who started the first index fund in 1971 when he was at Wells Fargo. Mellon Capital is also known for Tactical Asset Allocation products.

## Exhibit 3 (continued)

## DESCRIPTIVE CHARACTERISTICS OF REPRESENTATIVE MAJOR INDEX MANAGERS

Data as of December 31, 1999

<u>Firm</u>	<u>Total Assets Under Management</u>	<u>Total Assets in Equity-Index Products</u>	<u>Assets in Major Benchmarks (by mandate)</u>		<u>Inception Date of Oldest Index Product</u>	<u>Affiliations &amp; Notes</u>
Vanguard Group	\$579 billion	\$242 billion	S&P 500 Russell 2000 Wilshire 5000 EAFE/ dev mkts	\$155 billion \$4 billion \$22 billion \$135 million	August, 1976 (Vanguard 500 Index Fund)	Known for their retail mutual funds of all types.
Northern Trust	\$139 billion	\$50 billion	S&P 500 Russell 2000 Wilshire 5000 EAFE/ dev mkts	\$35 billion \$4.4 billion \$5.7 billion \$500 million	September, 1973 (NTQA EB S&P 500)	Affiliated with Northern Trust Bank, a major custodian.
Rhumblin Advisors	\$4.2 billion	\$4.2 billion	S&P 500 Russell 2000 Value	\$2.2 billion \$120 million	December, 1990 (S&P 500)	Minority owned.