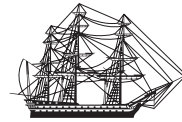


The Case for Indexing

Vanguard Investment Counseling & Research



Vanguard[®]

Executive summary

An index is a group of securities designed to represent a broad market or a portion of the broad market. By reflecting the performance of a particular market, an index provides investors with a benchmark for that market's performance. Because indexes are, by definition, intended to mirror the market, they are constructed to be market-capitalization-weighted. An indexed investment strategy such as an index mutual fund or an index-based exchange-traded fund (ETF) tracks the performance of an index by assembling a portfolio that invests in the same group of securities, or a sampling of the securities, that compose the index. By investing in a product designed to replicate the performance of a broad market such as the U.S. stock market, an investor can participate, at low cost, in the aggregate performance of that market at all times. By the same token, investing in products designed to replicate the performance of indexes with a narrower focus, such as European stocks or long-term bonds, allows an investor to participate in the purest exposure to a specific market segment within a low-cost framework. As a result of these features, indexing has gained in popularity over time. Estimates of index fund assets, including ETFs, are as high as \$865 billion, or 15.6% of the \$5.5 trillion U.S. stock and bond mutual fund industry.¹

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¹ Source for index fund assets figure: Investment Company Institute, 2006, *2006 Investment Company Factbook*, 46th ed. (Washington, D.C.: ICI), p. 30; source for assets in U.S. mutual fund industry (excludes money market mutual funds): Board of Governors of the Federal Reserve, 2006, "Flow of Funds Accounts of the United States: Flows and Outstandings, Third Quarter 2006" (Washington, D.C.: GPO), Dec. 7.

Historically over time, an indexing investment strategy has performed favorably in relation to actively managed investment strategies, as a result of indexing's low costs, broad diversification, minimal cash drag, and, for taxable investors, the potential for tax efficiency. Combined, these factors represent a significant hurdle that an active manager must overcome just to break even with a low-cost index strategy over time, in any market. Of course, skilled active managers who have overcome these hurdles do exist, but as our research and other empirical evidence suggests, the likelihood of outperformance by a majority of managers dwindles over time as the compounding of these costs becomes more difficult to surmount.

This paper explores both the theory underlying index investing and evidence to support its advantages. To balance data integrity with a robust analysis, we have limited the time period in most of the tables and figures to ten-year windows. We acknowledge that indexing as an investment strategy increases in effectiveness as the time period lengthens. As a result, where data permit, we present longer time periods

in conjunction with the ten-year periods. For example, when using a broad definition of the market, the large number of funds permits us to analyze periods beyond the decade ended December 31, 2006. However, for analysis that splits the broad market into style and size buckets (or maturity and quality for bonds), the number of funds quickly tails off beyond ten years, limiting our ability to extend the analysis. In addition, when we explore the impact of cyclicalities, we shorten the window further to five years, to amplify its impact.

We first examine investing as a "zero-sum game" and relate it to the "index funds versus active funds" debate. We emphasize the importance of costs in investment management and their impact on index and active strategies. We then offer a broader perspective on relative performance, including sub-asset classes, market cyclicalities, and benchmark differences. We discuss, as well, excess returns as an alternate perspective on relative success. Finally, we address common myths regarding indexing as an investment strategy.

Notes about risk

Investments in bond funds are subject to interest rate, credit, and inflation risk.

Foreign investing involves additional risks, including currency fluctuations and political uncertainty.

Funds that concentrate on a relatively narrow market sector face the risk of higher share-price volatility.

Prices of mid- and small-cap stocks often fluctuate more than those of large-company stocks.

U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent share-price fluctuations.

Because high-yield bonds are considered speculative, investors should be prepared to assume a substantially greater level of credit risk than with other types of bonds.

Diversification does not ensure a profit or protect against a loss in a declining market.

Stocks of companies in emerging markets are generally more risky than stocks of companies in developed countries.

Introduction

An index is a group of securities chosen to represent a market or a portion of a market. An investment in conventional or exchange-traded index funds (hereafter, “index funds”) seeks to track the returns of that market or market segment by assembling a portfolio that invests in the same group of securities, or a sampling of the securities, that compose the market with weights proportionate to their market

value. Indexing uses quantitative risk-control techniques to replicate the benchmark’s return with minimal expected tracking error (and, by extension, with no expected alpha, or excess return versus the benchmark).² In fact, the best index is not necessarily the one that provides the highest return, but the one that most accurately measures the performance of the investing style strategy or market it is intended to track.

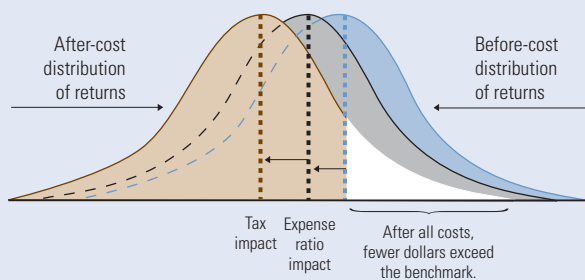
Notes on market-cap weighting

Indexes should reflect the market—or market portion—that they are intended to measure. They are therefore weighted according to market capitalization, where: $\text{Market Cap} = \text{Price per Share} \times \text{Number of Shares Outstanding}$. Market-cap-weighted indexes reflect the consensus estimate of each company’s value at any given moment. In any efficient market, new information—economic, financial, or company-specific—affects the price of one or more securities and is reflected instantaneously in the index via the change in its market capitalization. Thus, a continuously updated market index gives an indication of how well a market is performing, and of the market’s structural and risk characteristics at any given point in time. Since, according to capital market theory—specifically, the Capital Asset Pricing Model—current prices (and, hence, company values) are set based on current and expected events, cap-weighted indexes represent the expected, theoretically mean-variance-efficient portfolio of securities in a given asset class. In addition, market-cap-weighted indexes are continuously reweighted, and turnover is limited to changes in the constituents or in their shares outstanding due to corporate events such as share buybacks or issuances. Recognizing that market-cap-weighted indexes represent the market proxy for a given market, this analysis focuses on market-cap-weighted indexes and the index funds that track them.

Portfolios that are not market-cap-weighted won’t reflect the average return of the money invested in that market. Such portfolios are therefore not indexed to a specific market and may be considered either actively managed or a rules-based passive strategy designed to deliver a return that differs from the market’s. Both active managers and those who oversee rules-based passive strategies believe that they possess information not represented in the market capitalization of a specific stock. For example, an active manager may view a highly valued company as overvalued, or a passive manager may design a program to invest only in stocks that pay the highest dividends. Each believes his or her strategy is a formula for success relative to the benchmark. Investment strategies not indexed to the market-cap-weighted benchmark can therefore be viewed as taking specific bets against the index and should be evaluated based on the quality and success of those bets.

² For more on management styles, see *Active Equity Management: Examining the Differences Between Fundamental and Quantitative Strategies*, 2005 (Valley Forge, Pa.: Investment Counseling & Research, The Vanguard Group).

Figure 1. Impact of cost on distribution of market returns



Source: Vanguard Investment Counseling & Research.

Understanding the zero-sum game

Before considering the particulars of one investment strategy versus another, it is instructive to consider the market as a whole, where outperformance is often referred to as a “zero-sum game.” The concept of a zero-sum game starts with the understanding that at any given point in time, the holdings of all investors in a particular market, such as the U.S. stock or bond market, aggregate to form that market (Sharpe, 1991). Because all investors’ holdings are represented, if one investor’s dollars outperform the aggregate market over a particular time period, another investor’s dollars must underperform, such that the dollar-weighted performance of all investors sums to equal the performance of the market.³ The aggregation of all investors’ returns can be thought of as a bell curve (see Figure 1), with the market return as the mean. In Figure 1, the market is represented by the blue curve, with the market return as the blue vertical dashed line. Of course, this holds for any market, such as foreign stock and bond markets, or even specialized markets such as commodities or real estate.

Over any given period, the dollar-weighted excess performance to the right of the market return in Figure 1 equals the inverse of the dollar-weighted excess performance to the left of the market return, such that the sum of the two equals the market return. However, in reality, investors are exposed to costs such as commissions, management fees, bid-ask spreads, administrative costs, market impact,⁴ and, where applicable, taxes—all of which combine to reduce realized returns over time. The aggregate result of these costs shifts the curve in Figure 1 to the left. We represent the adjustment for costs in two separate moves, with the gray curve representing the impact of management expenses and transaction costs, and the brown curve representing the impact of taxes.

Although a portion of the after-cost dollar-weighted performance continues to lie to the right of the market return, represented by the white region in Figure 1, a much larger portion is now to the left of the blue dashed line, meaning that after costs, most of the dollar-weighted performance of investors falls short of the aggregate market return. By minimizing costs, therefore, investors can help ensure that their return is *closer* to the market return on average, giving them a greater chance of outperforming investors who incur higher costs. For example, investors whose fund has a 0.20% expense ratio—a cost hurdle substantially below the average mutual fund’s expense ratio (see Table 1, on page 8)—stand a greater chance of outperforming a majority of the dollar-weighted, higher-cost investors. This principal is just as relevant in markets often thought to be less “efficient,” such as small-cap or international equities (Waring and Siegel, 2005). We further explore this aspect of indexing in a later section of this paper.

3 Dollar weighting gives proportional weight to each holding, based on its market capitalization. Compared to equal weighting, which helps ensure against any one fund dominating the results but also implicitly makes relatively large bets on smaller constituents, dollar weighting more accurately reflects the aggregate equity and bond markets.

4 In this context, *market impact* refers to the effect of a market participant’s actions—that is, buying or selling—on a stock’s price.

Applying zero-sum game to mutual fund performance

The zero-sum framework refers to broad markets, but may also be loosely applied to long-term mutual fund performance. Although mutual funds account for only about 24% of the overall U.S. equity market and 6.8% of the overall fixed income market,⁵ we can still show a result similar to that of Figure 1, where the long-term net returns of the aggregate diversified actively managed mutual fund universe shift to the left of the market benchmark (see **Figure 2**, on page 6). However, it's instructive to note that even using net returns, a wide distribution of active managers exists. Several factors contribute to this wide performance distribution, in addition to differences in cost and any skill the managers may exhibit: The time period analyzed, the benchmark used, and the type of funds included can all affect the return distribution and the conclusions drawn.

Overall, we expect the magnitude of dispersion in equity returns to be much greater than that of fixed income securities. For example, the performance distribution in Figure 2 is twice as broad as that in **Figure 3** (on page 7). As is typical, performance is concentrated in the middle bars. The cost advantage of indexing means that an indexed vehicle again had an edge versus active funds in long-term performance. This advantage exists because the

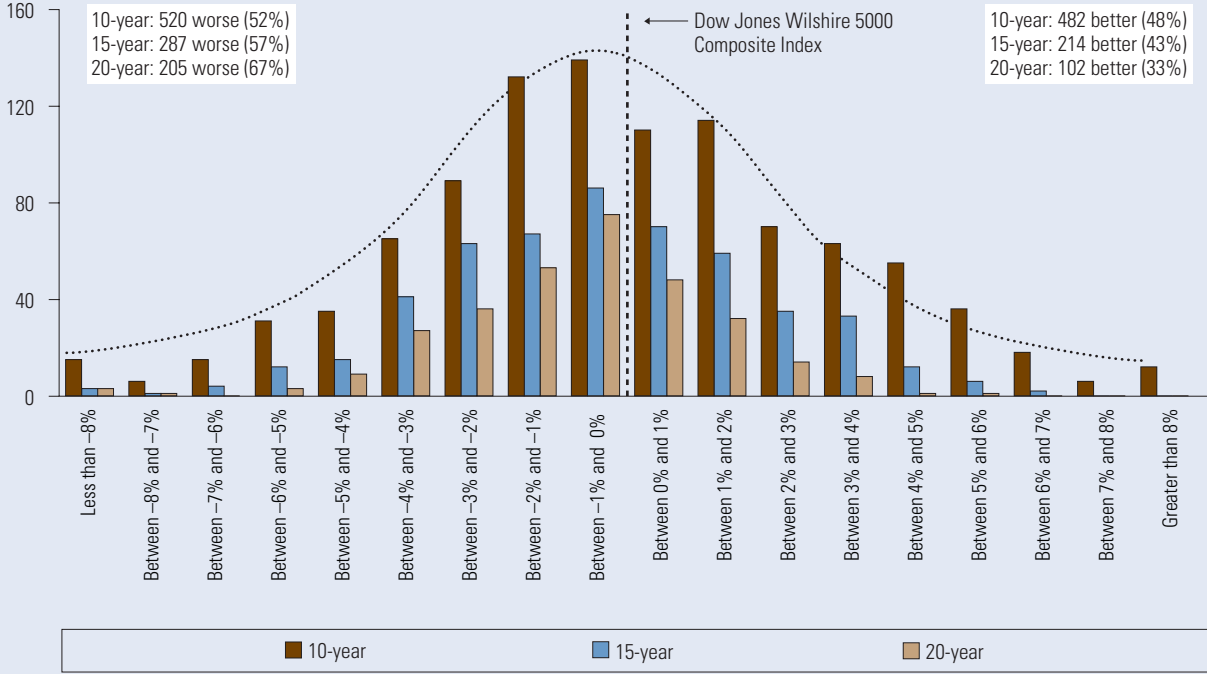
relatively narrow range of returns between the best and worst performers in this asset class magnifies the benefits of a low-cost strategy. This narrow distribution occurs because a large portion of bond returns is determined by interest rate fluctuations, movements of the yield curve, and changes in credit quality, as well as by an active manager's positioning of a fund relative to its peers and benchmarks. These factors represent the primary differences between the relative performance of actively managed bond funds and their benchmarks. This is in contrast to the equity markets, where return dispersion is much wider and risk-factor differentials such as size and style under- or overweights to peers and benchmarks amplify return dispersion. The equity universe also has a much wider security distribution, in which returns are unique to company and sector, which can further affect relative performance.

Although active management in the fixed income arena is significantly affected by costs, indexing with bonds may not be as straightforward as indexing with equities. Unlike equities, bonds do not trade on exchanges that are liquid and efficient. Instead, the bond market is dominated by bond brokers, leading to relative illiquidity and higher costs. As a result, bond index funds may incur a larger performance drag relative to equity index funds.

5 Source: Board of Governors of the Federal Reserve, 2006, "Flow of Funds Accounts of the United States"—see footnote 1.

Figure 2. After-cost distribution of excess returns of U.S. active equity mutual funds

Annualized excess returns versus U.S. stock market: As of 12/31/2006



The performance data shown represent past performance, which is not a guarantee of future results. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

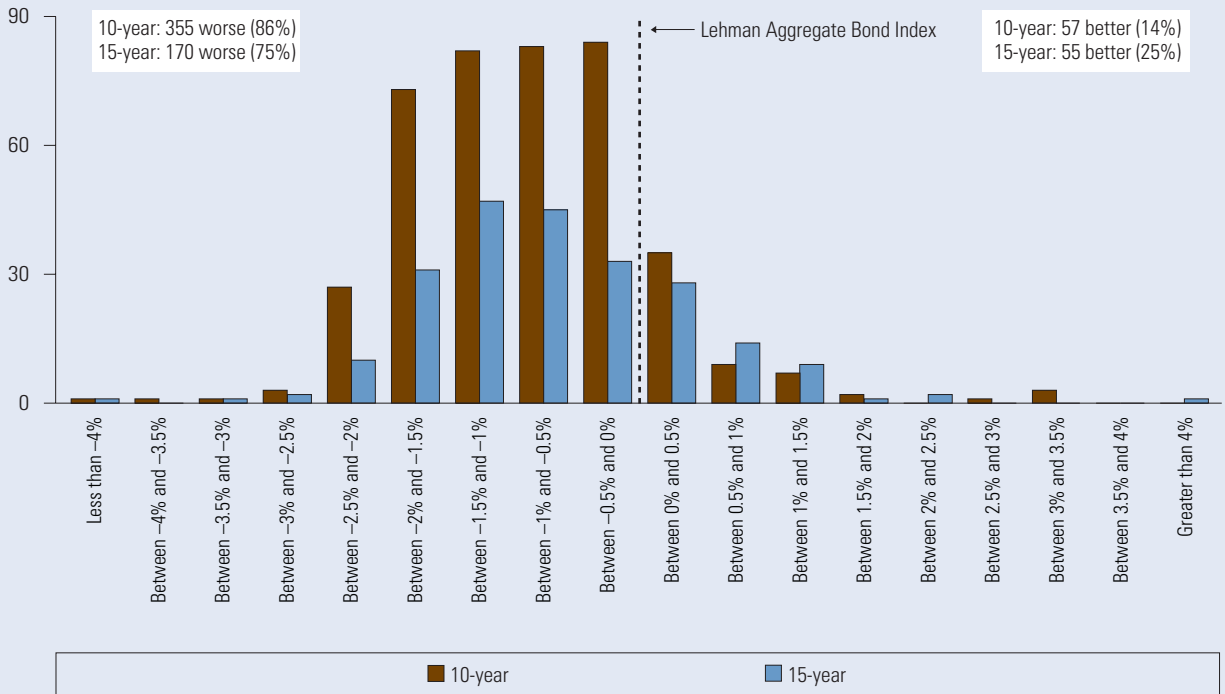
Notes:

- a. Does not account for front- or back-end sales loads or taxes.
- b. U. S. stock market” refers to all funds, including those focused on a particular style or market capitalization such as large growth or small value. However, we excluded sector funds, specialty funds such as bear market funds, and real estate funds. We also combined all share classes, using the class with the longest history. For this comparison we evaluated active funds after cost against a costless market benchmark. When implementing with an index fund or ETF, transaction costs, expense ratios, and tracking error must be accounted for.
- c. Notes on mutual fund database survivor bias. Survivorship bias tends to overstate the average long-term returns reported by active manager databases. Survivorship bias results when mutual fund returns are not adjusted for those funds that no longer exist. Most commercial databases exclude the records of extinct funds, which have usually closed or merged with other funds because of sub-par records. This causes the average returns to rise because as underperformers are removed, new funds replace them. For example, the ten-year distributions in Figures 2 and 3 represent only funds that are currently alive and have a ten-year track record as of December 31, 2006. In fact, when survivorship bias is combined with fees and benchmark mismatching (i.e., holding onto winners), it has been shown that active managers, particularly small-cap managers, tend to underperform a given benchmark (Malkiel and Radisich, 2001; Ennis and Sebastian, 2002).

Sources: Vanguard calculations using data from Dow Jones Wilshire and Lipper Inc.

Figure 3. After-cost distribution of excess returns of U.S. fixed income mutual funds

Annualized excess returns versus U.S. bond market: As of 12/31/2006



Notes:

- a. Does not account for front- or back-end sales loads or taxes.
- b. "U.S. bond market" refers to all funds, including those focused on a particular style or capitalization such as short-term government or long-term corporate. However, we excluded municipal funds, money market funds, and any specialty funds. For this comparison, we evaluated active funds after cost against a costless market benchmark. When implementing with an index fund or ETF, transaction costs, expense ratios, and tracking error must be accounted for.

Sources: Vanguard calculations using data from Lipper Inc. and Lehman Brothers.

The indexing cost advantage

Minimizing cost is critical to achieving long-term investment success. A crucial factor to bear in mind is that costs, unlike future performance, are both more predictable and more controllable. Also, contrary to the typical economic relationship between price and value, higher costs do not lead to higher returns. Every dollar paid for management fees, trading costs, and taxes is a dollar less of potential return. Research bears this out. For example, Financial Research Corporation evaluated the predictive value of different

fund metrics, including a fund's past performance, Morningstar rating, alpha, and beta.⁶ In the study, a fund's expense ratio was the most reliable predictor of its future performance, with low-cost funds delivering above-average performances in all of the periods examined. A fund's expense ratio is a valuable predictor of its performance because it is one of the few performance factors that are known in advance. Table 1, on page 8, provides evidence for the inverse relationship between investment performance and cost within the mutual fund universe.

⁶ See Financial Research Corporation, 2002, *Predicting Mutual Fund Performance II: After the Bear* (Boston, Mass.). Alpha: A portfolio's risk-adjusted excess return versus its effective benchmark. Beta: A measure of the magnitude of a portfolio's past share-price fluctuations in relation to the ups and downs of the overall market (or appropriate market index).

Table 1. Higher costs correlate with lower returns: Lipper-category quartile rankings by expense ratio

	Large-cap funds		Mid-cap funds		Small-cap funds	
	Median expense ratio	Median return	Median expense ratio	Median return	Median expense ratio	Median return
Quartiles, sorted by expense ratio						
Quartile 1	0.75%	8.16%	0.90%	10.80%	0.96%	11.15%
Quartile 2	1.02	7.04	1.18	10.25	1.22	11.17
Quartile 3	1.33	6.69	1.48	8.86	1.47	10.54
Quartile 4	1.92	6.09	2.07	7.85	2.12	8.52
	Large-cap funds		Mid-cap funds		Small-cap funds	
	Russell 1000 Index	MSCI US Prime Market 750 Index	Russell Midcap Index	MSCI US Mid Cap 450 Index	Russell 2000 Index	MSCI US Small Cap 1750 Index
Benchmark total return	8.64%	8.57%	12.14%	12.14%	9.44%	11.88%

Notes: All returns are ten-year annualized. Data as of December 31, 2006.

MSCI started calculating and maintaining these equity indexes on December 2, 2002, with a base level of 1,000 as of November 29, 2002. The initial construction of these indexes used the market capitalization of November 25, 2002, and no buffer rules were applied to the size or style indexes. Although the indexes were not available until December 2, 2002, MSCI calculated daily price and total return index levels for all U.S. equity indexes from May 31, 1992, to November 29, 2002. The methodology used for the historical calculation shares most of the features of the ongoing methodology. The main difference is the use of full-market-capitalization weights for the historical indexes, as opposed to the free-float-adjusted market-capitalization weights for the ongoing indexes.

Sources: Vanguard calculations using data from Lipper Inc., Russell, and MSCI.

Compared with index funds, actively managed mutual funds typically have higher management fees coupled with higher transaction costs. The higher fees often result from a portion of the management fee that must cover the research process. Higher transaction costs are attributable to the generally higher turnover associated with active management's attempt to outperform the market. **Table 2**, on page 9, shows the average dollar-weighted expense ratios for actively managed equity and bond mutual funds. For example, as of December 31, 2006, investors in actively managed large-cap equity mutual funds were paying an average of approximately 0.84% annually, and those in actively managed bond funds were paying 0.68% annually, versus 0.20% and 0.22% for the respective index funds. Index funds generally operate with lower costs, regardless of asset class or sub-asset class.

Index funds derive their low-cost structure from their low management fees and low turnover. Turnover, or the buying and selling of securities within a fund, results in transaction costs such as commissions, bid-ask spreads, market impact, and opportunity cost. These costs, although incurred by every fund, are generally opaque, but are realized in net returns. A mutual fund with abnormally high turnover would thus likely incur large trading costs. All else equal, the impact of these costs would reduce total returns realized by the investors in the fund. A mutual fund's expense ratio, however, is visible and represents shareholder payments to fund managers.

To summarize, a shareholder's net return equals the gross return less the expense ratio and transaction costs. The lower the cost drag, the greater the net return. Over time, lower costs can mean outperformance relative to similar higher-cost funds. Index funds typically maintain lower average costs than actively managed funds. As a result, over time, index funds stand a greater chance of outperforming similar higher-cost funds and delivering a return much closer to the benchmark return.

Impact of cost on mutual fund performance

Over the long term, the cost drag for actively managed mutual funds can detract significantly from actual performance relative to a benchmark. Although cost is important in the long run, at any given point in time, relative cost differentials may have less of an impact on a fund's or category's relative performance, since active funds' returns vary widely. Depending on the dispersion of returns of active managers, costs may be a small factor over shorter time frames such as one, three, five, or even ten years. As time goes by, however, costs become more important. The relative cost advantages of indexing compound and, when combined with tighter distributions and a lack of strong manager persistence, these advantages become more stable, with an edge toward relative net outperformance. For example, Figures 2 and 3 show that active fixed income managers experience narrower return dispersion relative to equity managers. We would therefore expect costs to play a more important role over both the short term and long term for fixed income managers and less so for equity managers. But as the time period extends further, Figures 2 and 3 also show that costs become a primary determinant of relative performance for equity funds as well.

To help quantify the impact of costs in the short term versus the long term, **Figure 4** shows the one- and ten-year excess returns for large-cap value and large-cap growth funds. Excess returns were used here to better correlate with costs, which detract directly from returns. As we would expect, costs compound consistently through time, while in the short term there is much greater volatility. Of course, this does not indicate that active management is more likely to win in the short term—only that portfolio construction decisions play a much greater role in short-term relative performance. For example, the outperformance of specific market segments may lead to active manager outperformance, as these managers may then outpace the index. In a market with wide return dispersion, such managers benefit directly from the segments' outperformance, far overshadowing the potential cost disadvantage.

Table 2. Asset-weighted expense ratios of active and index mutual funds (as of December 31, 2006)

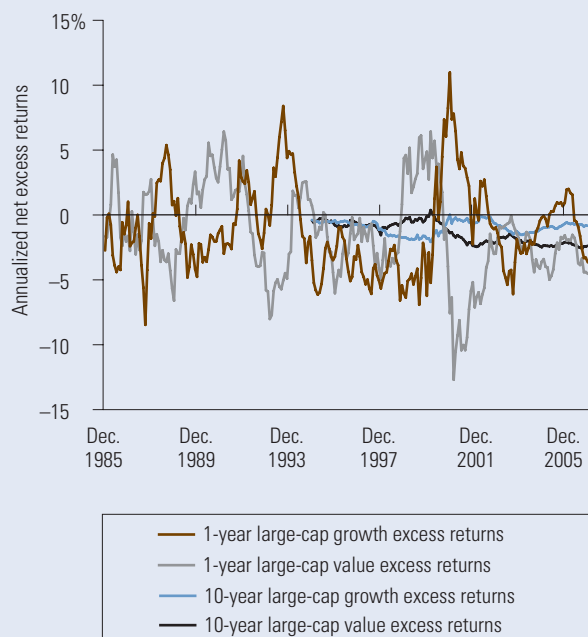
	Actively managed funds (bps)	Index funds (bps)	Difference (bps)
Large-cap U.S. equity	84	20	64
Mid-cap U.S. equity	100	30	70
Small-cap U.S. equity	112	34	78
U.S. sector funds	96	44	52
U.S. real estate funds	109	25	84
International developed markets	102	32	70
International emerging markets	134	42	92
U.S. fixed income funds	68	22	46

Note: bps, basis points.

Sources: Vanguard calculations using data from Morningstar, Inc.

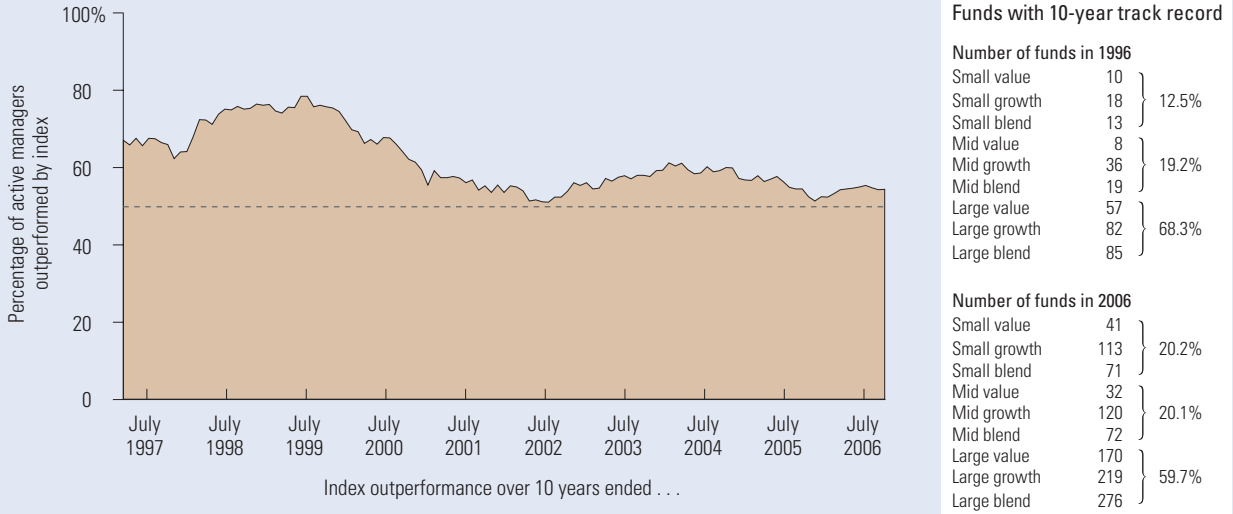
Figure 4. Manager costs matter less in short-term outperformance

Rolling excess returns for large-cap growth and large-cap value funds versus style benchmarks



Notes: Large-cap growth stocks represented by Russell 1000 Growth Index from 1984 through May 1992 and MSCI US Prime Market Growth Index thereafter. Large-cap value stocks represented by Russell 1000 Value Index from 1984 through May 1992 and MSCI US Prime Market Value Index thereafter. Sources: Vanguard calculations using data from Lipper Inc., Russell, and MSCI.

Figure 5. Broad market benchmark's historical outperformance of active managers



Sources: Vanguard calculations using data from Morningstar, Inc., and Dow Jones Wilshire.
Broad market represented by Dow Jones Wilshire 5000 Composite Index.

Table 3. Index outperformance is cyclical over five-year periods

Percentage of funds outperformed by indexes

	Index outperformance over five years ended . . .									
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Large value	91%	90%	89%	80%	72%	62%	57%	55%	62%	83%
Large blend	68	87	94	72	62	48	42	24	54	68
Large growth	72	94	93	62	44	31	20	15	36	50
Mid value	100%	77%	83%	77%	78%	67%	64%	81%	89%	94%
Mid blend	74	61	81	63	39	35	39	27	57	81
Mid growth	54	55	72	38	25	29	31	24	60	77
Small value	81%	69%	44%	74%	49%	45%	49%	73%	64%	77%
Small blend	58	73	75	64	62	55	50	40	48	65
Small growth	55	49	57	40	45	45	44	52	62	63

Note: Large-cap stocks represented by MSCI US Prime Market 750 Index, MSCI US Prime Market Growth Index, and MSCI US Prime Market Value Index; mid-cap stocks represented by MSCI US Mid Cap 450 Index, MSCI US Mid Cap Growth Index, and MSCI US Mid Cap Value Index; small-cap stocks represented by MSCI US Small Cap 1750 Index, MSCI US Small Cap Growth Index, and MSCI US Small Cap Value Index.

Sources: Vanguard calculations using data from Morningstar, Inc., and MSCI.

Deepening the discussion of relative outperformance

Relative performance over time

Traditionally, to illustrate the relative performance of indexing and active strategies, *point-in-time* statistics (referring to one specific time period) such as those presented in Figures 2 and 3 are used. However, alternative analyses can enhance the discussion, potentially leading to a more robust answer regarding relative performance. Over time, the actual percentage of active funds underperforming a *particular index* will vary, but historically, the long-term return distribution of active managers has been skewed toward underperformance of the broad market, largely owing to the cumulative effect of costs. For example, **Figure 5** on page 10 shows the percentage of managers underperforming the U.S. stock market over a rolling ten-year window. The figure also inherently suggests how the ten-year distribution in Figure 2 changes over time. Although most actively managed portfolios are shown to underperform the broad market historically, Figure 5 also depicts the volatility associated with the reported group of outperformers. In fact, although we would expect a zero-sum game in the long term, even ten-year periods may be considered short enough for certain market cycles to affect the distribution.

This volatility occurs primarily because of the broad definition of *outperformance*, where the results of all active funds are compared with that of the broad market and where each active manager is given the same weight and importance in determining relative out- or underperformance versus the market. For example, there were many more small-cap funds with a ten-year history in 2006 than in the 1990s. As a result of their significant outperformance relative to large-cap funds since 2000, small-cap funds play a much greater role in the aggregate outperformance numbers versus a broad market benchmark, which is market-cap-weighted. If and when market

leadership changes to large-cap, we would expect the overall percentage of active managers outperformed to increase to levels closer to those observed during the late-1990s. On the other hand, if market leadership does not change and small-cap stocks continue to outperform large-caps, we would expect the percentage of managers outperformed to continue to fall, perhaps even below the 50% line.

Examining market segments and benchmark choice

Traditionally, the percentage of the universe of active managers outperforming a broad benchmark has been the most common measure of the effectiveness of indexing or active management over time. However, evaluating the success of active managers based simply on this percentage assumes that funds are identical and disregards both market and style cyclicity.

Evaluating each fund as identical does not address the cyclicity of the markets or the distribution of fund count. Figure 5 touches on this cyclicity, but **Table 3**, on page 10, digs deeper, in two ways. First, instead of comparing all funds to the same broad benchmark, it compares funds to style benchmarks. Thus, the performance of small-cap value managers, for instance, can be compared with that of a small-cap value benchmark, while results of large-cap blend managers can be compared with returns of a large-cap blend benchmark. The use of a style-box approach in Table 3 addresses the fund-distribution concern. The second point is that current statistics (as exhibited in the table's highlighted 2006 results) may not be representative of all time periods. As the table demonstrates, even within style boxes, market cyclicity is an important factor in determining the relative success of indexing or active management.

Table 4. Extent of index outperformance depends on which index is used

Russell benchmarks

	10-year return	Percentage of managers outperformed
Russell 1000	8.64%	74%
Russell 1000 Growth	5.44	37
Russell 1000 Value	11.00	84
Russell Midcap	12.14%	51%
Russell Midcap Growth	8.62	47
Russell Midcap Value	13.65	88
Russell 2000	9.44%	23%
Russell 2000 Growth	4.88	17
Russell 2000 Value	13.27	63

MSCI benchmarks

	10-year return	Percentage of managers outperformed
MSCI US Prime Market 750	8.57%	72%
MSCI US Prime Market Growth	6.05	47
MSCI US Prime Market Value	10.81	81
MSCI US Mid Cap 450	12.14%	51%
MSCI US Mid Cap Growth	8.12	40
MSCI US Mid Cap Value	14.84	100
MSCI US Small Cap 1750	11.88%	62%
MSCI US Small Cap Growth	8.97	52
MSCI US Small Cap Value	13.74	71

Standard and Poor's benchmarks

	10-year return	Percentage of managers outperformed
S&P 500	8.42%	68%
S&P 500/Citigroup Growth	7.22	64
S&P 500/Citigroup Value	9.44	54
S&P MidCap 400	13.47%	80%
S&P MidCap 400/Citigroup Growth	12.88	88
S&P MidCap 400/Citigroup Value	14.48	100
S&P SmallCap 600	11.57%	58%
S&P SmallCap 600/Citigroup Growth	9.46	57
S&P SmallCap 600/Citigroup Value	13.38	63

Dow Jones Wilshire benchmarks

	10-year return	Percentage of managers outperformed
Dow Jones Wilshire U.S. Large-Cap	8.53%	71%
Dow Jones Wilshire U.S. Large-Cap Growth	6.25	50
Dow Jones Wilshire U.S. Large-Cap Value	10.40	77
Dow Jones Wilshire U.S. Mid-Cap	11.06%	34%
Dow Jones Wilshire U.S. Mid-Cap Growth	7.65	34
Dow Jones Wilshire U.S. Mid-Cap Value	12.89	72
Dow Jones Wilshire U.S. Small-Cap	10.76%	45%
Dow Jones Wilshire U.S. Small-Cap Growth	7.17	35
Dow Jones Wilshire U.S. Small-Cap Value	13.52	68

Notes: Data as of December 31, 2006. For several reasons, outperformance numbers may differ when using mutual fund databases provided by Lipper Inc. or Morningstar, Inc. A primary reason for potential differences is the actual style boxes used. Lipper classifies U.S. stock funds across 12 categories, including 3 categories for multi-cap growth, value, and blend funds, while Morningstar uses 9 categories. A second difference stems from the way in which each database provider sorts funds across capitalization and style groups. Both use median market capitalization to determine size. However, to determine style, Morningstar uses more metrics (price/earnings, price/book, price/sales, price/cash flow, yield, and growth—EPS Growth, historical EPS growth, sales growth, CF growth, and book-value growth), while Lipper uses price/earnings, price/book, and three-year operating-cash-flow growth, thus resulting in categorization differences.

Two primary biases exist when using either Lipper or Morningstar mutual fund databases: instability and historical performance.

- Instability results from the frequent reclassifications of peer groups. For example, of the 934 funds in Morningstar's large-cap blend category at the end of 1999, only 696 were still there as of May 31, 2001. Eighty-nine funds left the category because they were merged or liquidated, but 149 were reclassified into other categories. Of the 491 funds in Lipper's multi-cap core category at the end of 1999, only 162 were still there as of May 31, 2001, due to reclassification or removal.
- Complicating the instability of a given style box, each time a fund is put into a new style box, its historical performance is related to the new group, regardless of what style box it came from. A fund that is large value today is measured against large-cap value funds. If it is reclassified as large growth, its entire performance history will now be evaluated relative to that new set of peer funds. This can lead to a dramatic shift—positive or negative—in a fund's relative ranking, even though actual performance did not change.

Sources: Vanguard calculations using data from Lipper Inc., MSCI, Standard & Poor's, Dow Jones Wilshire, and Russell.

Market cyclicity is more obvious in short (three- or five-year) periods, because as the time lengthens, market cycles tend to wash out and costs become the primary factor affecting relative performance. To illustrate market cyclicity within the style boxes, we focused on periods of five-year performance. Even within this time frame, Table 3 shows how the percentage of managers that a particular style index outperforms can change substantially over time. In fact, in most style boxes, the range of outperformance by the benchmark indexes shifts rather significantly.

Style-box cyclicity is further influenced by the relative performance of one style benchmark versus another. First, because many managers have holdings that fall within other boxes, when there is large return dispersion across all nine style boxes, managers in the lower-performing boxes can be expected to stand a greater chance of outperforming their respective style box. For example, if mid-cap value outperforms large-cap value by 300 basis points, and mid-cap value stocks constitute 20% of a large-cap value manager's portfolio, the large-cap manager would realize 60 basis points of excess return relative to the large-cap value benchmark, which could result in that manager outperforming the large-cap value benchmark. Second, the effect of holdings that fall outside the style box combined with cash drag means that, on average, active managers have a beta of less than 1 relative to their style box. Since the style box necessarily has a beta of 1, during strong performance within that style, the index will tend to outperform a greater percentage of managers within that style box, and vice versa. For example, large-cap growth managers fared poorly during the growth-dominated bull market of the late-1990s, small-cap managers underperformed their benchmark during the small-cap bull market of the 2000s, and Asia/Pacific managers lagged their benchmark during the Japan-led bull market in international equities in the mid-1980s.

It's also important to note the vital role of benchmark selection in gauging the success of certain market segments (Sauter, 2002). **Table 4**, on page 12, uses the same universe of active managers, covering the same ten-year period ended 2006, and demonstrates that the perception of active manager success can vary substantially, depending upon which benchmark is used. Although small-cap performance stands out for the period, different benchmarks led to changes in relative outperformance across the board. This is because different benchmarks cover varying ranges of stocks, have different selection criteria for growth versus value, and are even maintained and rebalanced differently (Philips, 2003). The point is significant, because selecting one benchmark over another can mean the difference between an outperforming manager and an underperforming manager.

Excess returns provide additional insight

Evaluating managers using the percentage outperforming an index assumes that a manager who outperforms a benchmark by 0.01% has achieved a result as significant as one who outperforms a benchmark by 10%. In other words, there is no information on the *magnitude* of out- or underperformance.

To account for the magnitude of performance, we can look at average excess returns of active managers versus a benchmark. Such a statistic provides investors with a sense of how active management has performed on average—whether delivering positive or negative excess returns and *how much*. **Table 5**, on page 14, calculates the average excess returns for active managers in both equity and fixed income segments. For example, it shows that the average active large-cap growth fund underperformed the benchmark by 83 bps, whereas mid-cap value funds underperformed by 342 basis points. Even small-cap managers, on average, underperformed their benchmark in terms of excess returns.

Table 5. Excess returns help quantify relative performance of active managers

10-year annualized as of 12/31/2006

	Value	Blend	Growth
Large	8.43%	6.48%	5.22%
	10.81	8.57	6.05
	(2.38)	(2.10)	(0.83)
Medium	11.43%	11.63%	7.23%
	14.84	12.14	8.12
	(3.42)	(0.51)	(0.90)
Small	12.46%	11.73%	7.30%
	13.74	11.88	8.97
	(1.28)	(0.15)	(1.67)

10-year annualized as of 12/31/2006

	Government	Corporate	GNMA	High yield
Short	4.32%	4.46%	5.18%	5.06%
	5.09	5.79	6.10	6.59
	(0.77)	(1.33)	(0.92)	(1.53)
Intermediate	4.91%	5.48%		
	5.27	6.04		
	(0.36)	(0.56)		

 Equal-weighted average fund returns	 Index total returns	 Actively managed fund underperformance
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Note: We excluded long-term government and long-term corporate funds from the analysis, as Lipper Inc. does not have a reasonable benchmark for average long-term funds. Any discrepancies in underperformance figures are due to rounding.

Sources: Average active fund returns from Lipper—Monthly returns of average fund category, linked and annualized. Equity benchmarks represented by MSCI US Prime Market 750 Index, MSCI US Mid Cap 450 Index, and MSCI US Small Cap 1750 Index. Fixed income benchmarks represented by Lehman Brothers indexes: 1–5 Year Government Index, 1–5 Year Credit Index, Intermediate Government Index, Intermediate Credit Index, GNMA Index, and High Yield Index.

When evaluating Table 5 and the distribution of returns from Figures 2 and 3, we see that excess returns are not evenly distributed, with more outperforming managers ranging close to the index than underperforming managers. For example, Table 4 shows that 52% of active small-cap growth managers were outperformed by the MSCI US Small Cap Growth Index. If returns were evenly distributed, one would expect average excess returns to be only slightly negative. However, this was not the case with ten-year excess returns for the same small-cap growth universe. For example, as shown in Table 5, small-cap growth managers underperformed the MSCI benchmark by 167 basis points, resulting in a negatively skewed performance distribution.

Although excess returns add additional perspective, we want to emphasize that as the time period lengthens, excess returns should converge closer to the average cost drag of active managers. For example, mid-cap value funds would not be expected to underperform a mid-cap value benchmark by 300 basis points or more for an extended period. Most likely, the performance gap is cyclical and will tend to narrow in the future. Similarly, we would not expect such a narrow gap as reported by small-cap core funds to last indefinitely.

Benefits of indexing in portfolio makeup

Although active managers must manage a portfolio in ways that are different from a benchmark if they are to try to outperform it, investors primarily interested in obtaining the market return or in reducing a fund's volatility around a benchmark should strongly consider indexing. Historically, broad diversification and style consistency have helped to provide more predictable returns relative to the targeted benchmark. As a result, index funds and ETFs play an important role in the portfolio construction process. An indexed mandate also allows greater control of the risks in a portfolio. For example, filling a recommended equity allocation with a concentrated portfolio would result in an allocation that will likely differ at any given point in time from the risk-and-return characteristics of the equity market.

Diversification

Index funds typically are more diversified than actively managed funds, a by-product of the way indexes are constructed. Except for index funds that track narrow market segments, most index funds must hold a broad range of securities to accurately track their target benchmarks, whether by replicating them outright or by a sampling method. The broad range of securities dampens the risk associated with specific securities and removes a component of return volatility. Actively managed funds, on the other hand, tend to hold fewer securities with varying degrees of return correlation.

Style consistency

An index fund maintains its style consistency by attempting to closely track the characteristics of the index. An investor who desires exposure to a particular market and selects an index fund that tracks that market is assured of a consistent allocation. An active manager may have a broader mandate, causing the fund to be a "moving target" from a style point of view. Many active managers can choose to vary their investments among small-, medium-, or large-cap stocks, betting on whichever segment is expected to perform best. Even if a manager has a well-defined mandate, the decision to hold more or less of a security than the index will lead to performance differences.

The tax advantage

From an after-tax perspective, broad index funds and ETFs may provide an additional advantage over actively managed funds. Because of the way index funds are managed, they rarely realize and distribute capital gains to shareholders.

According to Bergstresser and Poterba (2002), the typical mutual fund distributed, on average, 50% of its annual price appreciation in the form of capital gains. It should be noted that very few conventional broad index funds or broad ETFs have distributed capital gains in past bull or bear market cycles. Historically, approximately one-third of the distributions from actively managed funds have been in the form of short-term gains and two-thirds in the form of long-term gains. Index funds, on the other hand, distribute far less (an estimated 0.50%) as long-term gains, primarily because selling occurs only when the composition of the market index changes. This can result in return advantages over the long term because the majority of the investment compounds over time instead of being lost to taxes.

Table 6. Indexing has been effective across asset classes and sub-asset classes

Percentage of managers outperformed by benchmark and equal-weighted excess returns of active managers

U.S. fixed income sectors: 10-year annualized as of 12/31/2006

International: 10-year annualized as of 12/31/2006

	Government	Corporate	GNMA	High yield		Developed	Emerging
Short	83%	92%	93%	71%	Short	46%	46%
	-0.77	-1.33	-0.92	-1.53		-0.44	0.65
Intermediate	63%	54%					
	-0.36	-0.56					

■ Percentage outperformed	■ Fund excess returns
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Notes: Similar to Table 5, we used ten years of history to enhance statistical significance. For many fixed income and international sectors, there are too few funds for reliable results previous to the early 1990s. That said, in many instances, the number of funds with at least ten years of history remains small. Number of funds in each Morningstar sector is as follows: short government, 52; intermediate government, 84; short credit, 104; intermediate credit, 189; GNMA, 42; high yield, 63; international, 249; emerging, 39.

As in Table 4, benchmark selection can lead to different results when evaluating fixed income managers. Because duration is the dominant return factor, small differences in duration between a fund (or group of funds) and an index can lead to significant out- or underperformance, independent of cost differentials. When evaluating a single fund, the most appropriate benchmark should be one with the most similar duration and yield-curve characteristics. However, when evaluating a group of active managers, there will be a range of duration and yield-curve exposures, making such a comparison more difficult. For example, substituting the Lehman 5–10 Year Government (5.86-year duration) or Credit (5.95-year duration) benchmarks for the respective Lehman Intermediate benchmarks (3.27- and 4.29-year durations, respectively) results in outperformance statistics of 98% and 96%, respectively.

Sources: Vanguard calculations using data from Morningstar, Inc., Lipper Inc., MSCI, Lehman Brothers. Fixed income benchmarks include the following Lehman indexes: 1–5 Year Government Index, 1–5 Year Credit Index, Intermediate Government Index, Intermediate Credit Index, GNMA Index, High Yield Index. International benchmarks include the following MSCI indexes: EAFE Index and Emerging Markets Index. We calculated the percentage outperformance on a bottom-up basis, using ten-year annualized returns for each fund provided by Morningstar. Average active fund returns from Lipper—Monthly returns of average fund category, linked and annualized.

Debunking some misconceptions regarding indexing

Although the indexing strategy has proven to be successful over time, indexing has also been continually criticized. These criticisms have given rise to a number of misconceptions, which persist despite research that has refuted them and despite the historical performance of index mutual funds.

The first myth regarding the viability of indexing is that indexing only works in markets traditionally viewed as highly efficient. For example, the government bond market is considered one of the most efficient markets, meaning there is not a great deal of room for active managers to add value. In such a market, it would be expected that an overwhelming majority of active managers would fail to beat a benchmark. On the flip side, markets such as high-yield bonds or international markets are often viewed as much less efficient. Investors tend to view these markets as better suited for active management. As a result, indexing would be expected to underperform a large majority of active managers.

Table 6, on page 16, counters these arguments by showing the percentage of active managers that beat a relevant benchmark over the ten years ended December 31, 2006. For example, in the highly efficient intermediate-term government bond market, the percentage of managers that have added value over the past decade (37%) is larger than would be expected (generally, fewer than 10%). Similarly, in the less-efficient international and high-yield markets, far fewer managers than expected were able to add value (for example, in the international market, 54% added value, while conventional wisdom would suggest the probability of beating the benchmark to be about 70%). Finally, if we refer back to Table 5, we see that in the less-efficient small-cap space, active funds have delivered negative average excess returns over time. Similar to the findings in Tables 3 and 4, these numbers will change over time and across benchmarks; however, the case for indexing across asset classes and sub-asset classes remains robust. Further, as more funds enter the arena, both results are likely to become more robust.

A second misconception about indexing is that actively managed funds will outperform index funds in a bear market. This belief is based on the idea that active managers can accurately time market declines and upturns. Relatively efficient markets, however, make it difficult to consistently time market movements with accuracy.

Table 7. Active funds perform inconsistently in bear markets

a. Performance of general equity managers in bear markets

	Dow Jones Wilshire 5000	Lipper General Equity Average	Index outperformance
January 1973–September 1974	–46.4%	–47.9%	+1.5%
December 1980–July 1982	–18.7	–10.2	–8.5
September 1987–November 1987	–29.8	–28.7	–1.1
June 1980–October 1990	–16.7	–16.9	+0.2
July 1998–August 1998	–17.5	–19.7	+2.2
February 2000–February 2003	–37.2	–35.2	–2.0

b. Performance of general equity managers during 12-months following bear markets

	Dow Jones Wilshire 5000	Lipper General Equity Average	Index outperformance
October 1974–September 1975	39.7%	35.4%	+4.3%
August 1982–July 1983	64.8	66.1	–1.3
December 1987–November 1988	23.9	21.9	+2.0
November 1990–October 1991	38.6	39.9	–1.3
September 1998–August 1999	38.9	36.8	+2.1
March 2003–February 2004	42.5	43.5	–1.0

Sources: Vanguard calculations using data from Lipper Inc. and Dow Jones Wilshire.

Many investors believe that managers of active funds can shift fund assets out of stocks in time to curb portfolio losses during market downturns. In reality, the probability that these managers will move fund assets to defensive stocks or cash at just the right time is very low. Most events that result in major changes in market direction are unanticipated. To succeed, an active manager would have to not only time the market but also do so at a cost that was less than the benefit provided. **Table 7** illustrates how hard it has been for active fund managers to outperform the Dow Jones Wilshire 5000 Composite Index. In three of six bear markets since January 1973, and during three of the 12-month periods following each, the average mutual fund underperformed the index. These results are particularly noteworthy, given that most bear markets are relatively brief, while the indexing cost advantage grows in magnitude over 5-, 10-, and 20-year periods.

Table 8. Index funds can withstand significant market declines

*Redemption scenario analysis: Percentage of portfolio that could be redeemed before realization of net capital gains**

Fund	Market decline			
	0%	10%	20%	30%
Vanguard® 500 Index	6%	21%	44%	100%
Vanguard Extended Market Index	57	76	97	100
Vanguard Total Stock Market Index	41	64	94	100
Vanguard Mid-Cap Index	24	60	99	100
Vanguard Small-Cap Index	26	48	77	100

*Does not include tax-loss carry forwards.

Notes: This hypothetical analysis shows the percentage of a portfolio that could be redeemed in cash before the realization of net capital gains. There are other forms of redemption such as in-kind of securities that do not trigger distributable capital gains to fund shareholders. Each scenario assumes the portfolio starts with a net realized capital gain position of 0%, which is not necessarily indicative of the portfolio's actual tax status. Capital gains and losses realized by selling proportional slices of each stock held in the portfolio are then factored into the analysis. Because the analysis assumes highest-cost lots are sold first (consistent with the manner in which Vanguard administers each portfolio's tax-lot structure), net losses are typically realized from initial sales. Loss realization from successive sales accumulates until subsequent sales realize net capital gains. This table shows the percentage of each fund that can be sold in this fashion before realized net capital gains return to 0%. This analysis is based on each fund's then-current holdings and tax-lot structure as of the reference date of the analysis and does not consider the fund's realized net capital gains or losses. Actual realization of net capital gains and losses for each fund is detailed in the funds' respective annual reports. The analysis also assumes security prices as of the reference date. Because substantial shareholder redemption activity is normally associated with poor recent performance, results from sensitivity analyses that assume security price declines of 10%, 20%, and 30% are also provided.

Source: Vanguard Quantitative Equity Group; data as of December 31, 2006.

Similarly, Lipper studied active managers' performances in bear markets (defined as a drop of 10% or more in the equity markets).⁷ Lipper found that active managers underperformed the S&P 500 Index in the six market corrections occurring between August 31, 1978, and October 11, 1990. For example, the average loss for the S&P 500 Index in these episodes was 15.1%, compared with a 17.0% average loss for large-cap growth funds.

Another common misconception about equity index funds is that their managers will be forced to sell fund holdings, and thus realize substantial capital gains, because of investors' increased redemptions during bear markets. There are two errors in this argument. The first error assumes that market downturns necessarily cause money to flow out of index funds. Net cash flows for broad equity index funds in aggregate actually remained positive during the most recent bear market.

The second error in this myth is that embedded capital gains distributions for equity index mutual funds (expressed as a percentage of their average net asset values) decreased during the 2000–2002 bear market in lockstep with the market decline. Using several of Vanguard's index funds as an example, **Table 8** shows that as the severity of a market decline increases, the percentage of the portfolio that could be redeemed without incurring taxable-gain distributions increases significantly.

Because cash flows of equity index funds have been largely positive over time, index fund managers purchase stocks across a wide range of prices. When redemptions result in net cash outflows, the managers can sell cost lots that they purchased at high prices and realize losses that can then be stockpiled to offset gains elsewhere in the portfolio. A well-managed index fund will use its high-cost lots to accommodate redemption requests. In reality, redemptions in a bear market can help an index fund to remain tax-efficient, creating losses, not gains, for tax purposes.

7 As cited by Evans and Malkiel (1999).

Conclusion

Since its beginnings in the early 1970s, indexing has grown rapidly because it provides a simplified, efficient investment vehicle with the potential to increase shareholder wealth across a broad range of asset and sub-asset classes. Primarily because of their low-cost structure, indexed investments have generally offered long-term outperformance relative to a majority of actively managed funds. In fact, if broadly diversified active funds were able to minimize fees and turnover on a par with index funds, much of the indexing advantage would be eliminated. The reality of active management, however, is that costs are generally higher, giving index funds a significant head start in relative performance.

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