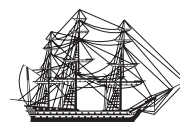


# Portfolio Construction for Taxable Investors

Vanguard Investment Counseling & Research



**Vanguard**<sup>®</sup>

**Executive summary.** Most investment portfolios are designed to meet a specific future financial need—either a single goal or a multifaceted set of objectives. To reach those goals and objectives, a disciplined method of portfolio construction must be established that balances the potential risks and returns of various types of investments.

This paper reviews various aspects of our research involving five major investment decisions that need to be made, in successive order, in the portfolio construction process. The decisions are:

**Asset allocation**—Choosing asset-class weights: equities, fixed income, cash, and so on.

**Sub-asset allocation**—Choosing investments within an asset class, such as U.S. or international equities; or large-, mid-, or small-capitalization equities.

**Active and/or passive allocations**—Choosing indexed and/or actively managed assets.

**Asset location**—Deciding on the placement of investments in taxable and/or tax-advantaged accounts.

**Manager selection**—Choosing individual managers, funds, or securities to fill allocations.

The top-down order in which these decisions are made is important in establishing a well-constructed portfolio. Many investors use a bottom-up approach, placing more emphasis on manager/security selection or sub-asset allocation (based on an investment's recent returns) than on asset allocation, the most important portfolio decision. However, in using a bottom-up approach, the selection of the investments—

## Authors

Scott J. Donaldson, CFA, CFP<sup>®</sup>  
Frank J. Ambrosio, CFA

potentially the more uncertain part of portfolio construction—would then determine the more important part—the overall asset allocation.

After deciding the asset allocation of the portfolio, it is important to keep in mind that broad diversification, with exposure to all parts of the stock and bond markets, is a powerful strategy for managing portfolio risk. Diversification *across* asset classes reduces a portfolio's exposure to the risks common to an entire asset class. Diversification *within* asset classes reduces a portfolio's exposure to the risks associated with a particular company, sector, or market. This diversification can be achieved through index and/or actively managed investment strategies.

The decision to purchase certain investments within either tax-advantaged and/or taxable accounts, known as *asset location*, is a valuable tool to increase potential after-tax returns. This can be achieved by placing tax-efficient assets in taxable accounts and tax-inefficient assets in tax-advantaged accounts.

Selecting specific investments to represent the various market segments should come last. A common error in portfolio construction is that of choosing specific investments that may appear to be worthwhile individually, but make little sense when combined in a portfolio. In the end, this collection of investments does not necessarily form a coherent asset allocation or sub-asset allocation that matches the investor's objectives and risk tolerance.

## Asset allocation

A portfolio's asset allocation—the percentage of a portfolio invested in various asset classes such as stocks, bonds, and cash investments, according to the investor's financial situation, risk tolerance, and time horizon—is the most important determinant of the return variability and long-term performance of a broadly diversified portfolio engaging in limited market-timing (Davis, Kinniry, and Sheay, 2007). As a result, the portfolio construction decision hierarchy should reflect this importance by using a top-down process, with asset classes, sub-asset classes, and investments chosen in order of risk and return stability from most to least stable, rather than a bottom-up process that focuses on the individual investments. The two contrasting processes are illustrated in **Figure 1**.

An investor's goals, objectives, and constraints should be considered in determining a suitable asset allocation. Often a written investment policy statement is advisable, which should include discussion of the following factors:

- Return expectations for various assets.
- Risk tolerance.
- Investment time horizon.
- Taxation.
- Liquidity needs.
- Legal issues and other unique circumstances.

**Figure 1. Portfolio construction process**

A "top-down" approach is recommended.

Asset allocation  
Sub-asset allocation  
Investment selection

Many investors approach investing from a "bottom-up" perspective.

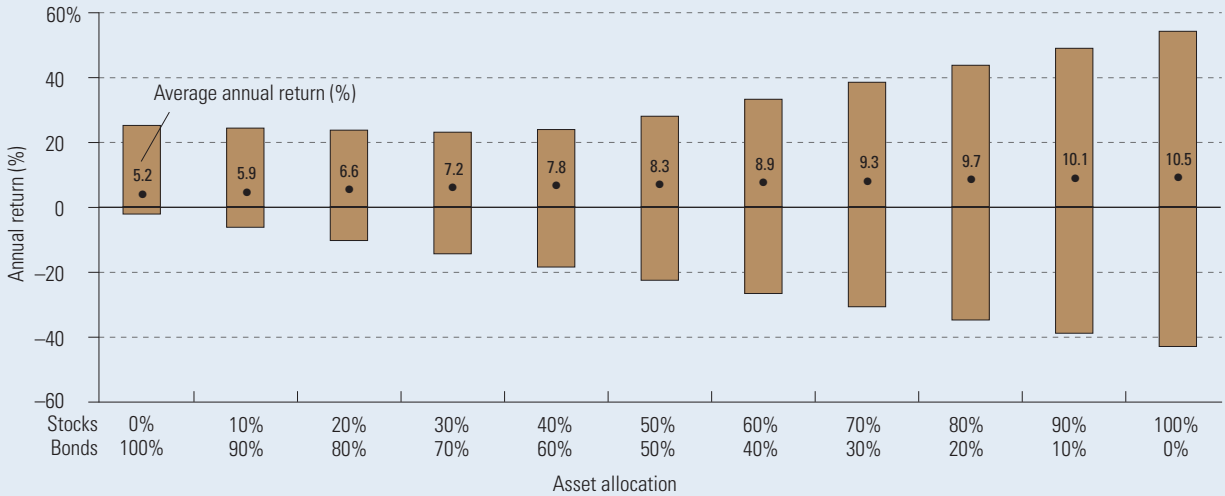
Source: Vanguard Investment Counseling & Research.

*A Note on Risk: Diversification does not ensure a profit or protect against a loss in a declining market.*

**Return, risk, and time horizon.** An informed understanding of the return and risk characteristics of the various asset classes is vital to the portfolio construction process. **Figure 2** shows the relationship between return and risk over the long term. For example, a portfolio of 80% stocks/20% bonds could potentially experience a larger range of returns over any given time period than a portfolio of 20% stocks/80% bonds. The risk–return data in Figure 2 reflect returns from the broad stock and bond markets—a more concentrated investment would be even riskier.

The investment time horizon should also be taken into account when considering the potential risk–return of a portfolio. Longer investment horizons increase the magnitude of potential outcomes, both positive and negative. Shorter investment horizons may require greater investments in bonds and cash than in equities, since these asset classes have smaller potential losses.

**Figure 2. Range of calendar-year returns for various stock/bond allocations (1926–2006)**



*Past performance 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: Stocks represented by Standard & Poor’s 500 Index (1926–1970); Dow Jones Wilshire 5000 Composite Index (1971–4/22/2005); and MSCI US Broad Market Index (4/23/2005–12/31/2006); bonds represented by Ibbotson Intermediate-Term Government Index (1926–1972) and Lehman Intermediate U.S. Treasury Index (1973–2006). As you move from left to right in the figure, the stock allocation increases relative to bonds in 10% increments. The length of the bars indicates the range of annual returns for each asset allocation; the longer the bar, the larger the return variability. The number inside the bar is the average annual return for the asset allocation for the 81 years indicated.

Sources: Ibbotson Associates and Vanguard Investment Counseling & Research.

**Inflation risk.** This discussion so far takes market risk, or the variability of nominal returns (returns unadjusted for inflation), into account, but it fails to consider inflation risk. Inflation risk is often overlooked and can have a major effect on asset-class returns, changing the portfolio’s risk profile. As highlighted in **Table 1**, stocks have had a much larger percentage of years with a negative return on a nominal basis. However, when inflation is taken into account, stocks, bonds, and cash have had a similar frequency of negative real returns—between 35% and 40% of all calendar years.

In the long run, what matters most is that investments meet a portfolio’s objectives, whether those objectives are measured in inflation-adjusted terms or not. Investors should weigh “shortfall risk”—the possibility that a portfolio will fail to meet longer-term financial goals—against “market risk,” or the chance that portfolio returns will be negative. Since many longer-term goals are measured in real terms, inflation can be particularly damaging, as its effects compound over long time horizons. However, over the short

term, the effects of inflation are generally less damaging than the potential losses from assets with higher expected real returns (Bennyhoff, 2006). As a result, for investors with shorter time horizons, market-risk concerns should be paramount. For most investors with longer time horizons, inflation risks outweigh market risks and should warrant a sizable allocation to assets like stocks and bonds.

Another consideration in the asset allocation process is the type of liability that the portfolio will fund. For example, the investment horizon will be longer for a retirement portfolio, which is expected to last many years, than for a portfolio that will fund a one-time purchase, even if both liabilities start at the same future date.

For liabilities that occur over a period of many years, the order, or time path, of returns is critical. Long-term market-average returns do not show the potential fluctuations in final balances based on different time paths of returns.

**Table 1. Trade-off between market risk and inflation risk**

	Nominal			Real		
	Average annual return	Percent of years with negative return	Highest annual loss	Average annual return	Percent of years with negative return	Highest annual loss
1926–2006 total returns						
100% T-bills	3.8%	0%	0.0%	0.8%	35%	–15.0%
100% bonds	5.2	9	–2.3	2.1	38	–14.5
100% stocks	10.5	30	–43.1	7.2	35	–37.3

Notes: Stock returns represented by S&P 500 Index (1926–1970); Dow Jones Wilshire 5000 Composite Index (1971–4/22/2005); and MSCI US Broad Market Index (4/23/2005–12/31/2006); bond returns represented by Ibbotson Intermediate Government Index (1926–1972) and Lehman Intermediate U.S. Treasury Index (1973–2006). Cash returns represented by Citigroup 3-Month Treasury Bill Index.

Sources: Ibbotson Associates and Vanguard Investment Counseling & Research.

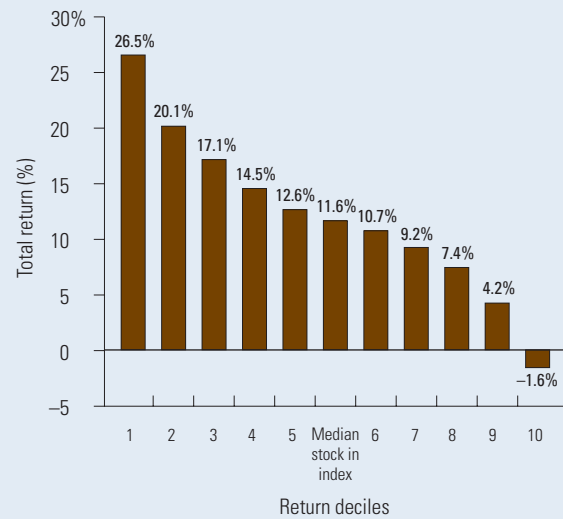
A caveat to the importance of asset allocation is Jahnke's (1997) argument that security selection and allocation changes can dramatically affect the total returns of an actively managed portfolio. As shown in **Figure 3**, the vast dispersion of returns from individual securities or active funds for any given time period is indicative of this impact. For instance, choosing just a few individual stocks from an index (such as the Standard & Poor's 500 Index) can have a large impact on risks and returns.

If security selection or market rotation were easy, one would expect to see professional active managers beating index funds. As **Figure 4** on page 6 shows, however, active managers have had limited success outperforming the market.

In addition, the return dispersion of single stocks and market segments and the difficulty of selecting consistently outperforming stocks or market segments lead to one of the basic tenets of investment management: diversification.

One benefit of diversification is that it brings the portfolio closer to the expected risk and return of the asset class. Either a Monte Carlo or a time-path analysis of expected risks and returns for a portfolio is predicated on achieving the returns of each asset class, which is best represented by a broadly diversified market-cap-weighted index. Owing to the wide dispersion of returns, as illustrated in **Figure 3**, indexing tends to dominate active management over the long term; this is shown by the differences in return between active and passive funds (see **Table 5**, on page 17). Since this is the case, it is best for investors to hold broadly diversified portfolios and to limit any rotations within asset and sub-asset classes.

**Figure 3. Median ten-year annualized returns of S&P 500 Index stocks, by decile: Period ended December 31, 2005**



Sources: FactSet and Vanguard Investment Counseling & Research.

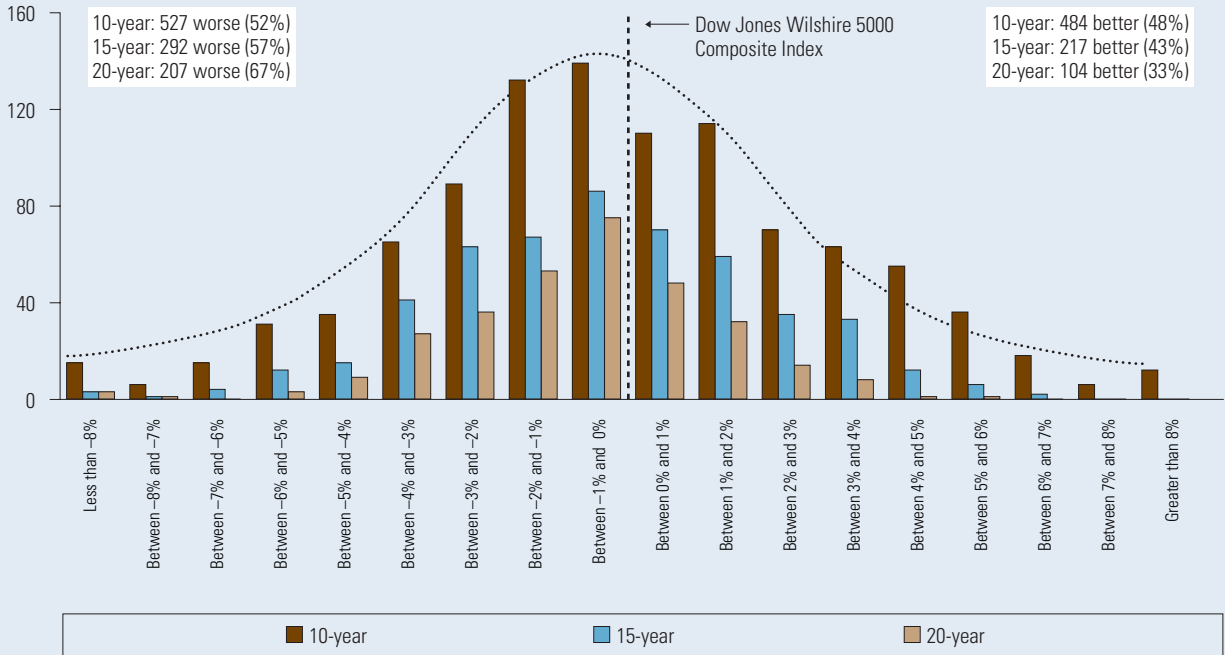
This conclusion is further supported by a pension funds study by Brinson, Hood, and Beebower (1986), which concluded that two factors dominate risk and return attribution:

- Asset allocation of the policy portfolio.
- Investment costs.

These two factors are also cited in studies by Vanguard and in prior work, which empirically support the dominance of strategic asset allocation in determining total return and return variability in this type of broadly diversified portfolio.

Figure 4. 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.

The 1986 study by Brinson and colleagues raised doubts about the wisdom of tactical asset allocation. If we assume that pension funds in the study changed their asset allocation policies in response to changing market conditions (rather than in response to funding concerns), the data in **Table 2** indicate that, even before management costs are factored in, active asset allocation, on average, detracted from pension funds' performance from 1974 through 1987 (Davis, Kinniry, and Sheay, 2007).

This finding further underscores the difficulty of rotating within asset and sub-asset classes. Based on the evidence just discussed, most fiduciaries tend to hold broadly diversified portfolios and to limit rotations within asset and sub-asset classes. The top-down method of portfolio construction should be used to achieve these goals.

**Table 2. Historical returns from market-timing and security selection**

	91 large pension plans: 1974–1983	82 large pension plans: 1977–1987
Market-timing	–0.66%	–0.26%
Security selection	–0.36	+0.26
Other	–0.07	–0.07
Total active return	–1.10	–0.08

*The performance data shown represent past performance, which is not a guarantee of future results.*

Note: The sample included 227 balanced funds. Calculations were based on monthly returns, but results were similar for three-year return dispersion.

Source: Brinson et al. (1986, 1991).

## Sub-asset allocation

Once the appropriate strategic asset allocation has been determined, the focus should turn to sub-asset allocation—how to weight various types of stocks and bonds.

Markets and asset classes will usually behave differently from each other at any given point in time. Even within asset classes, there are differences in risk due to differences in equity style and market-capitalization or bond duration and credit quality—these differences define sub-asset classes. Sub-asset class returns can be significantly different from one another owing to these differences in risk characteristics.

Investors often attempt to determine the sub-asset allocations of their portfolio by looking at outperformance; however, relative performance leadership changes often. **Figure 5**, on pages 8–9, illustrates the differences between the calendar-year returns of various equity sub-asset classes and those of the overall bond market, all represented by different-colored boxes in the figure. As shown in the figure, performance leadership tends to be unpredictable and changes quickly. By owning a portfolio with at least some exposure to all key asset and sub-asset classes, investors are better able to participate in some of the stronger-performing assets while also mitigating the negative impact of weaker-performing assets.

Figure 5. Periodic table of investment returns (1980–2006)

Annual returns for selected equity categories. Ranked in order of performance—best to worst.

1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
Russell 2000 Growth 52.26%	Russell 2000 Value 14.85%	LB Agg 32.64%	Russell 2000 Value 38.64%	LB Agg 15.15%	MSCI EAFE 56.16%	MSCI EAFE 69.44%	MSCI EAFE 24.63%	Russell 2000 Value 29.47%	Russell 1000 Growth 35.92%	LB Agg 8.95%	Russell 2000 Growth 51.19%	Russell 2000 Value 29.14%
Russell 1000 Growth 39.57%	LB Agg 6.26%	Russell 2000 Value 28.52%	Russell 1000 Value 28.29%	Russell 1000 Value 10.10%	Russell 1000 Growth 32.85%	Russell 1000 Value 19.98%	Russell 1000 Growth 5.31%	MSCI EAFE 28.27%	Russell 1000 Value 25.19%	Russell 1000 Growth -0.26%	Russell 2000 Value 41.70%	Russell 1000 Value 13.81%
Russell 2000 Value 25.39%	Russell 1000 Value 1.26%	Russell 2000 Growth 20.98%	MSCI EAFE 23.69%	MSCI EAFE 7.38%	Russell 1000 Value 31.51%	Russell 1000 Growth 15.36%	LB Agg 2.76%	Russell 1000 Value 23.16%	Russell 2000 Growth 20.17%	Russell 1000 Value -8.08%	Russell 1000 Growth 41.16%	Russell 2000 Growth 7.77%
Russell 1000 Value 24.41%	MSCI EAFE -2.28%	Russell 1000 Growth 20.46%	Russell 2000 Growth 20.13%	Russell 2000 Value 2.27%	Russell 2000 Value 31.01%	LB Agg 15.25%	Russell 1000 Value 0.50%	Russell 2000 Growth 20.37%	LB Agg 14.53%	Russell 2000 Growth -17.41%	Russell 1000 Value 24.61%	LB Agg 7.40%
MSCI EAFE 22.58%	Russell 2000 Growth -9.24%	Russell 1000 Value 20.04%	Russell 1000 Growth 15.98%	Russell 1000 Growth -0.95%	Russell 2000 Growth 30.97%	Russell 2000 Value 7.41%	Russell 2000 Value -7.11%	Russell 1000 Growth 11.27%	Russell 2000 Value 12.43%	Russell 2000 Value -21.77%	LB Agg 16.00%	Russell 1000 Growth 5.00%
LB Agg 2.71%	Russell 1000 Growth -11.31%	MSCI EAFE -1.86%	LB Agg 8.37%	Russell 2000 Growth -15.83%	LB Agg 22.13%	Russell 2000 Growth 3.58%	Russell 2000 Growth -10.48%	LB Agg 7.88%	MSCI EAFE 10.54%	MSCI EAFE -23.45%	MSCI EAFE 12.13%	MSCI EAFE -12.17%

The performance data shown represent past performance, which is not a guarantee of future results.

Notes: MSCI EAFE = Morgan Stanley Capital International Europe, Australasia, Far East Index of international stock returns; LB Agg = Lehman Brothers U.S. Aggregate Bond Index of the total bond market; Russell 1000 indexes represent large- to mid-cap stocks; Russell 2000 indexes represent small-cap stocks. Each color in the periodic table represents the same equity category—or the bond market—in each year, ranked in order of returns by year, highest to lowest.

Source: Vanguard Investment Counseling & Research.



Figure 5. Periodic table of investment returns (1980–2006) (continued)

Annual returns for selected equity categories. Ranked in order of performance—best to worst.

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
MSCI EAFE 32.56%	MSCI EAFE 7.78%	Russell 1000 Value 38.35%	Russell 1000 Growth 23.12%	Russell 1000 Value 35.18%	Russell 1000 Growth 38.71%	Russell 2000 Growth 43.09%	Russell 2000 Value 22.83%	Russell 2000 Value 14.03%	LB Agg 10.26%	Russell 2000 Growth 48.54%	Russell 2000 Value 22.25%	MSCI EAFE 13.54%	MSCI EAFE 26.34%
Russell 2000 Value 23.84%	Russell 1000 Growth 2.66%	Russell 1000 Growth 37.19%	Russell 1000 Value 21.64%	Russell 2000 Value 31.78%	MSCI EAFE 20.00%	Russell 1000 Growth 33.16%	LB Agg 11.63%	LB Agg 8.44%	Russell 2000 Value -11.43%	Russell 2000 Value 46.03%	MSCI EAFE 20.25%	Russell 1000 Value 7.05%	Russell 2000 Value 23.48%
Russell 1000 Value 18.12%	Russell 2000 Value -1.55%	Russell 2000 Growth 31.04%	Russell 2000 Value 21.37%	Russell 1000 Growth 30.49%	Russell 1000 Value 15.63%	MSCI EAFE 26.96%	Russell 1000 Value 7.01%	Russell 1000 Value -5.59%	Russell 1000 Value -15.52%	MSCI EAFE 38.59%	Russell 1000 Value 16.49%	Russell 1000 Growth 5.26%	Russell 1000 Value 22.25%
Russell 2000 Growth 13.36%	Russell 1000 Value -1.99%	Russell 2000 Value 25.75%	Russell 2000 Growth 11.26%	Russell 2000 Growth 12.95%	LB Agg 8.69%	Russell 1000 Value 7.35%	MSCI EAFE -14.17%	Russell 2000 Growth -9.23%	MSCI EAFE -15.94%	Russell 1000 Value 30.03%	Russell 2000 Growth 14.31%	Russell 2000 Value 4.71%	Russell 2000 Growth 13.35%
LB Agg 9.75%	Russell 2000 Growth -2.43%	LB Agg 18.47%	MSCI EAFE 6.05%	LB Agg 9.65%	Russell 2000 Growth 1.23%	LB Agg -0.82%	Russell 1000 Growth -22.43%	Russell 1000 Growth -20.42%	Russell 1000 Growth -27.89%	Russell 1000 Growth 29.75%	Russell 1000 Growth 6.30%	Russell 2000 Growth 4.15%	Russell 1000 Growth 9.07%
Russell 1000 Growth 2.90%	LB Agg -2.92%	MSCI EAFE 11.21%	LB Agg 3.63%	MSCI EAFE 1.78%	Russell 2000 Value -6.45%	Russell 2000 Value -1.49%	Russell 2000 Growth -22.43%	MSCI EAFE -21.44%	Russell 2000 Growth -30.26%	LB Agg 4.10%	LB Agg 4.34%	LB Agg 2.43%	LB Agg 4.33%

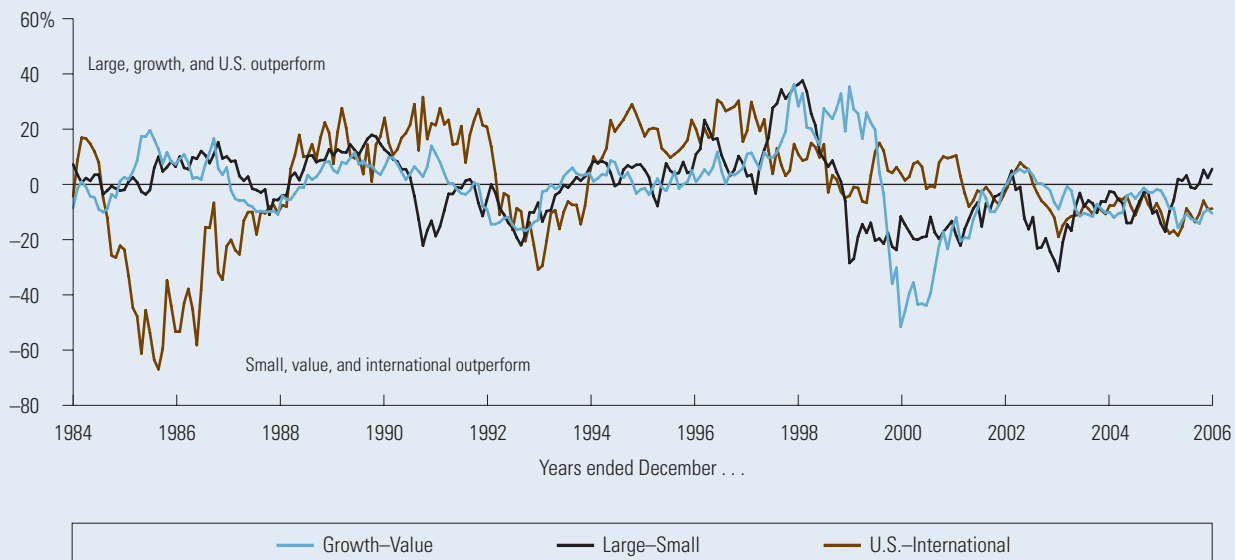
The performance data shown represent past performance, which is not a guarantee of future results.

Notes: MSCI EAFE = Morgan Stanley Capital International Europe, Australasia, Far East Index of international stock returns; LB Agg = Lehman Brothers U.S. Aggregate Bond Index of the total bond market; Russell 1000 indexes represent large- to mid-cap stocks; Russell 2000 indexes represent small-cap stocks. Each color in the periodic table represents the same equity category—or the bond market—in each year, ranked in order of returns by year, highest to lowest.

Source: Vanguard Investment Counseling & Research.

Figure 6. Rolling return differentials between various equity sub-asset classes (1984–2006)

12-month rolling return differentials

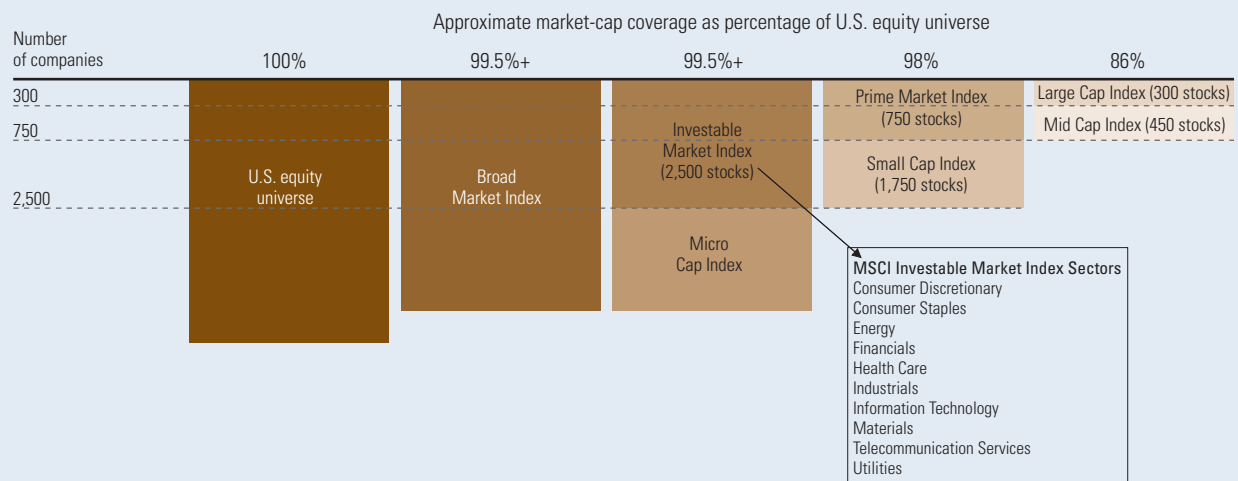


Source: Vanguard Investment Counseling & Research.

Over very long-term horizons, most sub-asset classes perform in line with their broad asset class, but over short time periods there can be sharp differences in returns. **Figure 6** also shows the return differences between three sets of paired equity sub-asset classes (large versus small, growth versus value, U.S. versus international) in 12-month periods over 23 years. The potential for quick changes in leadership is illustrated by the record outperformance of growth stocks in 1998, which was supplanted by the record outperformance of value stocks in 2000. There will always be a leading and a lagging market segment, but it is difficult to predict for sure how long a trend will last, or whether it will revert, or what the next outperformer will be.

The difficulty of predicting performance underscores the hurdle professional managers face in trying to outperform the market using style, size, or sector tilts. In fact, making measurable style, size, or sector tilts represents a bet against all market participants collectively. Investors examining Figures 5 and 6 might conclude that market divergences are cyclical and that they can capitalize on them. Yet, if this were the case, data should show that active managers have been able to beat market indexes. As shown in Figure 4, professional managers have underperformed indexes over time as changes in market leadership have proven difficult to predict.

Figure 7. Map of U.S. equity market using MSCI indexes



Source: Morgan Stanley Capital International.

A better approach to determining a portfolio's sub-asset allocation target is to understand the various asset classes and how investors collectively weight them in the market. An investor should seek to gain exposure to these asset classes through a market-proportional portfolio that matches the risk–return profile of the asset class target through broad diversification.

Market-cap weighting of individual equities to construct total-equity-market indexes is comparable to market-proportional weighting of sub-asset classes to make up the total asset class. Broad-market index funds are one proxy for the market-proportional weighting of an asset class. Figure 7 provides an example of market-proportional weighting of U.S. equities. Market-cap-weighted indexes reflect the consensus estimation of each company's value at any given moment. In an efficient market, new information affects the price of one or more securities and is reflected instantaneously in an index via the

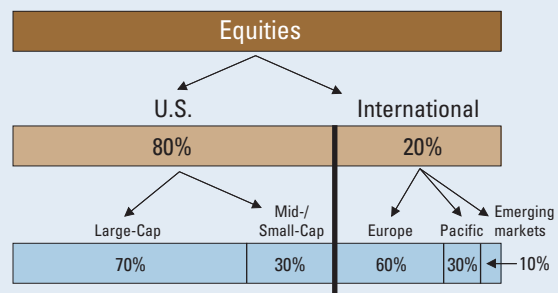
change in market capitalization. Because current prices (and, hence, company values) are set based on current and expected events, cap-weighted market indexes represent the expected, theoretically mean-variance-efficient, portfolio of securities in a given asset class. In addition, market-cap-weighted indexes are inherently continuously rebalanced, and turnover is limited to changes in the constituents or in their shares outstanding due to corporate events such as share buybacks or issuances. Taking into account these features, the major indexes of most industry index providers are market-cap weighted.

Portfolios that are not market-cap weighted will not reflect the average return of the dollars invested in that market. These portfolios are therefore not indexed to the market and may be considered to operate under active management or some rules-based factor exposure designed to deliver a return different from that of the market. Investment strategies not indexed to a market-cap-weighted

benchmark can therefore be viewed as taking specific bets against a market-cap-weighted benchmark and should be evaluated based on the quality and success of those bets (Philips and Ambrosio, 2007).

For equities, attributes to consider are domestic and international exposure, market capitalization (large-, mid-, and small-), and style (growth and value). **Figure 8** shows how a hierarchy of sub-asset class weights can be used to establish a diversified equity allocation.

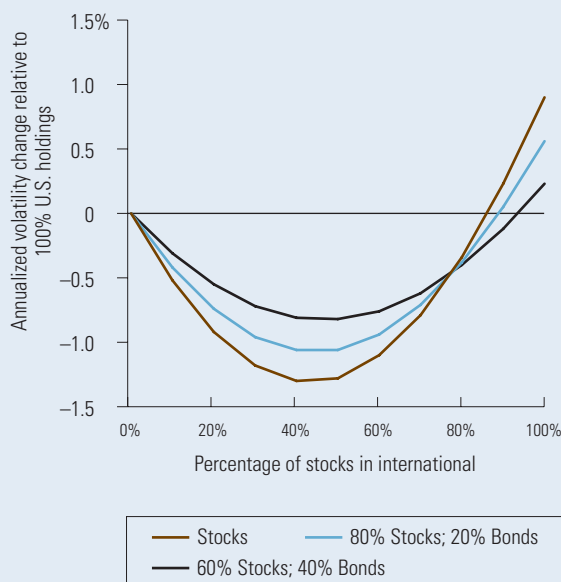
**Figure 8. Equity sub-asset allocation decision tree**



Source: Vanguard Investment Counseling & Research.

**Figure 9. International allocations have historically provided a diversification benefit to U.S. portfolios**

*Average annualized change in portfolio volatility when adding international stocks to a U.S. portfolio: 1970–2006*



Note: International stocks represented by MSCI World Index ex USA. U.S. stocks represented by S&P 500 Index for 1970 and Dow Jones Wilshire 5000 Index from 1971 to 2006.

Source: Vanguard calculations from data provided by MSCI and Thomson Datastream.

One primary way to diversify the equity allocation of a U.S.-based portfolio, depending upon the portfolio's objectives and risk tolerance, is through international equity investing. An upper limit to broad international equity allocations should be based on the global market capitalization for international equities (currently approximately 50%) (Philips, 2006). **Figure 9** shows that although holding some portion of a diversified equity portfolio in international equities has helped to temper the volatility of U.S. equities, the majority of the benefit was achieved as the international allocation increased from zero to 20% of total equity exposure. Moving from an allocation of 20% to 40% in international stocks continued to reduce the portfolio's volatility, but at a significantly lower rate.

Similarly, investors seeking exposure to all parts of the bond market must decide on degrees of exposure to issues with short-, intermediate-, or long-term maturities; with high, medium, or low credit quality; and with taxable or tax-exempt status (depending upon an investor's tax bracket). In considering these sub-allocations, investors should be aware that each category can have specific risk factors to be weighed. As is the case with equity sub-asset classes, annual returns of bond market segments can vary widely, as shown in **Figure 10**.

Figure 10. Periodic table of fixed income returns (1993–2006)

Annual returns for selected bond categories. Ranked in order of performance—best to worst.

1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
High-Yield 17.12%	International 5.33%	Corporate 22.25%	High-Yield 11.35%	High-Yield 12.76%	International 18.44%	TIPS 2.40%	U.S. Treasury 13.52%	Corporate 10.40%	International 22.37%	High-Yield 28.97%	International 12.55%	Municipal 3.51%	High-Yield 11.85%
International 13.77%	High-Yield -1.03%	International 21.47%	International 6.73%	Corporate 10.23%	U.S. Treasury 10.03%	High-Yield 2.39%	TIPS 13.17%	Broad Bond Market 8.44%	TIPS 16.57%	International 19.36%	High-Yield 11.13%	TIPS 2.84%	International 8.16%
Municipal 12.29%	Mortgage-Backed -1.61%	High-Yield 19.17%	Mortgage-Backed 5.35%	Broad Bond Market 9.65%	Broad Bond Market 8.69%	Mortgage-Backed 1.86%	Municipal 11.68%	Mortgage-Backed 8.22%	U.S. Treasury 11.79%	TIPS 8.40%	TIPS 8.46%	U.S. Treasury 2.79%	Mortgage-Backed 5.22%
Corporate 12.16%	Broad Bond Market -2.92%	Broad Bond Market 18.47%	Municipal 4.43%	U.S. Treasury 9.57%	Corporate 8.57%	Broad Bond Market -0.82%	Broad Bond Market 11.63%	TIPS 7.89%	Corporate 10.52%	Corporate 7.70%	Corporate 5.24%	High-Yield 2.74%	Municipal 4.84%
U.S. Treasury 10.68%	U.S. Treasury -3.38%	U.S. Treasury 18.35%	Broad Bond Market 3.63%	Mortgage-Backed 9.49%	Mortgage-Backed 6.96%	Corporate -1.96%	Mortgage-Backed 11.16%	U.S. Treasury 6.75%	Broad Bond Market 10.26%	Municipal 5.31%	Mortgage-Backed 4.70%	Mortgage-Backed 2.61%	Broad Bond Market 4.33%
Broad Bond Market 9.75%	Corporate -3.93%	Municipal 17.45%	Corporate 3.28%	Municipal 9.19%	Municipal 6.48%	Municipal -2.06%	Corporate 9.39%	High-Yield 5.28%	Municipal 9.60%	Broad Bond Market 4.10%	Municipal 4.48%	Broad Bond Market 2.43%	Corporate 4.26%
Mortgage-Backed 6.84%	Municipal -5.17%	Mortgage-Backed 16.80%	U.S. Treasury 2.70%	International -4.01%	TIPS 3.95%	U.S. Treasury -2.56%	International -3.91%	Municipal 5.13%	Mortgage-Backed 8.75%	Mortgage-Backed 3.07%	Broad Bond Market 4.34%	Corporate 1.96%	U.S. Treasury 3.08%
					High-Yield 1.87%	International -8.83%	High-Yield -5.86%	International -3.75%	High-Yield -1.41%	U.S. Treasury 2.24%	U.S. Treasury 3.54%	International -8.65%	TIPS 0.41%

The performance data shown represent past performance, which is not a guarantee of future results.

Notes: Broad Bond Market = Lehman U.S. Aggregate Bond Index; U.S. Treasury = Lehman U.S. Treasury Bond Index; Corporate = Lehman U.S. Credit Index; Mortgage-Backed = Lehman Fixed Rate Mortgage Backed Securities Index; TIPS = Lehman U.S. Treasury Inflation Notes Index; Municipals = Lehman Municipal Bond Index; High-Yield = Lehman U.S. Corporate High Yield Index; International = Lehman Global Aggregate Ex USD Index. Each color in the table represents the same bond category in each year, ranked in order of returns by year, highest to lowest. The years 1993–1997 have one fewer bond category, since U.S. Treasury Inflation-Protected Securities (TIPS) did not exist for a full calendar year during this period.

Sources: Lehman Brothers and Vanguard Investment Counseling & Research.

## Rebalancing

Setting the target asset and sub-asset allocations of the portfolio are only the beginning of the portfolio construction process. The portfolio should stay close to the targets over time to maintain a similar risk–return profile. Over long time periods, equity allocations have tended to drift upward, simply because equities have historically outperformed bonds.

Most broadly diversified equity and bond portfolios should be reviewed periodically—once or twice a year—and rebalanced only if the targeted percentage of equities or bonds is off by a meaningful amount (i.e., more than 5 percentage points), particularly if the rebalancing transactions would incur a tax. When capital gains taxes are a consideration during the rebalancing process, the transactions are best completed within a tax-advantaged account to avoid a gain on the sales.

A preferable way to rebalance is to do so every time cash enters or leaves the portfolio. Add any new cash flow to the asset that is below its target, and when you withdraw cash, do so from the asset that is above its target. These cash flows can include any dividend, interest, or capital gains distributions from the portfolio investments.

**Table 3** illustrates the relatively small differences in risk and return among various rebalancing strategies, and suggests that rebalancing strategies based on various reasonable monitoring frequencies (every year or so) and reasonable allocation thresholds (variations of 5% or so) may provide sufficient risk control relative to a nonrebalanced portfolio with broadly diversified stock and bond holdings (Tokat, 2007).

**Table 3. Historical performance of alternative rebalancing rules for a 60% equity/40% bond portfolio (1960–2003)**

Monitoring frequency	Monthly	Monthly	Quarterly	Annually	Never	Income
Allocation threshold	0%	5%	5%	5%	None	None
Average equity allocation	60.055%	61.099%	61.014%	61.088%	74.366%	61.580%
<b>Costs of rebalancing</b>						
Annual turnover	9.130%	2.130%	2.670%	2.110%	0%	0%
Number of rebalancing events	528	17	18	13	0	0
<b>Absolute framework</b>						
Average return	9.509%	9.495%	9.669%	9.612%	9.655%	9.294%
Volatility	10.103	10.182	10.100	10.165	12.083	10.126
Worst 12-month return	-28.592	-28.193	-26.990	-26.967	-31.096	-25.978
<b>Relative framework</b>						
Average excess return		-0.013%	0.160%	0.103%	0.146%	-0.215%
Volatility of excess return		0.371	0.431	0.763	2.650	1.067
Worst 12-month excess return		-1.331	-0.959	-1.955	-0.956	-0.454

*The performance data shown represent past performance, which is not a guarantee of future results. Investment returns will fluctuate.*

*This hypothetical illustration does not represent the return on any particular investment.*

Notes: Stocks represented by S&P 500 Index (1960–1970) and Dow Jones Wilshire 5000 Index (1971–2003). Bonds represented by S&P High Grade Corporate Index (1960–1968), Citigroup High Grade Index (1969–1972), Lehman U.S. Government/Credit Index (1973–1975), and Lehman U.S. Aggregate Bond Index (1976–2003). No new contributions or withdrawals were made, and there were no taxes. Except in the Income " column, dividend payments were reinvested in equities, and interest payments were reinvested in bonds.

Sources: Vanguard Investment Counseling & Research, Standard & Poor's, Dow Jones, and Lehman Brothers.

To try to match asset class risk and return assumptions, bond sector weightings should generally be similar to those of the broad market benchmarks, which have intermediate-term average maturities. The overall bond market is also intermediate-term in duration,<sup>1</sup> so exposure to all bond segments through a total bond market fund would achieve both of the goals of market proportionality and intermediate-term average duration.

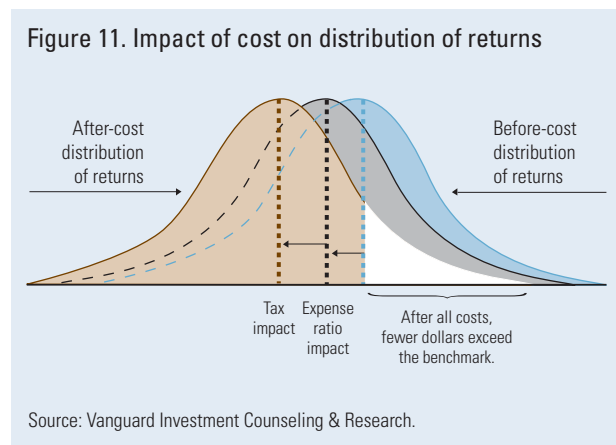
Once the maturity and credit-quality weights are determined for a bond allocation, the next step is to decide whether to use municipal or taxable bonds to fill those allocations. In general, this decision is based both on an individual's marginal tax rate and on the yields of municipal and taxable bonds (of similar credit quality and duration). The higher the individual's tax rate, the more tax-advantaged municipal bonds become. Generally, taxable investors at or above the 28% marginal tax bracket could benefit from long-term investments in municipal bonds versus taxable bonds, given the historical yield difference between the two types of bonds. However, the yield advantage of taxable bonds over municipal bonds can also be captured by placing taxable bonds in a tax-advantaged account, if available. The decision to hold bonds in a taxable or tax-advantaged account is discussed later in this paper in the "Asset location" section.

## Active and passive allocation

Asset and sub-asset class exposure targets can be met by implementing either an indexing or an actively managed investment strategy, or both.

Actively managed investment strategies can be a solution for investors who want the opportunity to outperform a benchmark and are willing to assume somewhat higher costs, manager risk, taxes, and variability relative to the market, or tracking error. Skilled managers can provide the *opportunity* to outperform, but the *probability* of this occurring improves in a low-cost, active-management framework. For taxable investors, the probability of outperformance after costs (expenses and taxes) is further improved when actively managed strategies are placed in tax-advantaged accounts.

Costs matter a great deal, because investment returns are reduced dollar for dollar by fees, commissions, transaction expenses, and, for taxable assets, any taxes incurred. Investors as a group are the market; one investor's gain is another investor's loss. Therefore, investors as a group earn the market return before fees, expenses, trading costs, and taxes (the "zero-sum game"), and they earn somewhat less than the market return after subtracting all those costs, as shown in **Figure 11**. The market return is represented by the vertical dashed line farthest to the right in the figure.



<sup>1</sup> Duration, a measure of a bond's price change relative to changes in interest rates, can be used to estimate the level of potential return volatility.

The zero-sum game framework leads to a conclusion that actively managed strategies underperform in the long term because of costs, not necessarily lack of skill. By minimizing costs, investors (and mutual funds) improve their odds of posting superior relative returns, as shown in Table 4.

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 the lowest average costs. As a result, over time, index funds stand a greater chance of outperforming higher-cost funds and of delivering a return much closer to the benchmark return. Broadly

diversified, low-cost index funds are a superior option for long-term investors who want to minimize tracking error, costs (capturing the advantage shown in Table 4), and manager risk and who also want greater tax efficiency (Philips and Ambrosio, 2007).

Table 5 illustrates that the equal-weighted average of active fund returns was lower than their benchmarks in each category shown—for both stocks and bonds. These data do not support the belief that actively managed funds can outperform in “inefficient” areas of the market—such as small-cap stocks.

**Table 4. Morningstar category median returns, by expense ratio quartile**

Quartiles, sorted by expensive 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
Quartile 1	0.70%	7.13%	0.93%	10.96%	0.96%	11.01%
Quartile 2	1.04	7.06	1.21	10.39	1.27	10.20
Quartile 3	1.26	6.41	1.41	9.05	1.49	10.27
Quartile 4	1.86	6.04	2.02	8.37	2.09	8.69

Benchmark total return	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
	7.55%	7.45%	11.86%	12.03%	9.06%	11.72%

Notes: Data as of June 30, 2007. All returns are ten-year annualized.

Analysis includes only funds in the Morningstar database that have ten-year data. Large-cap funds consist of the Morningstar categories for large-cap value, large-cap blend, and large-cap growth. Mid-cap funds consist of the Morningstar categories for mid-cap value, mid-cap blend, and mid-cap growth. Small-cap funds consist of the Morningstar categories for small-cap value, small-cap blend, and small-cap growth.

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: Morningstar and Vanguard Investment Counseling & Research.



**Table 5. Actively-managed fund returns versus benchmarks: Equal-weighted averages**

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)		

<span style="display: inline-block; width: 10px; height: 10px; background-color: #f4a460; border: 1px solid black;"></span> Equal-weighted average fund returns	<span style="display: inline-block; width: 10px; height: 10px; background-color: #a4c6e0; border: 1px solid black;"></span> Index total returns	<span style="display: inline-block; width: 10px; height: 10px; background-color: #e0e0e0; border: 1px solid black;"></span> Actively managed fund underperformance
---	---	--

*Past performance is not a guarantee of future returns. These hypothetical illustrations are not an exact representation of any particular investment, as you cannot invest directly in an index or a fund-group average.*

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 U.S. Government Index, 1–5 Year U.S. Credit Index, Intermediate U.S. Government Index, Intermediate U.S. Credit Index, GNMA Index, and U.S. High Yield Index.

Since there are advantages to both indexing and active management, combining these approaches can prove to be highly effective. As indexing is incrementally added to active management strategies in a portfolio, the risk characteristics of the portfolio converge closer to those of the benchmark, decreasing tracking error and providing diversification. Combining both active

and passive strategies provides the opportunity to outperform a benchmark, while adding some risk control relative to that benchmark. The appropriate mix should be determined by the goals and objectives of the investment policy statement, keeping in mind the trade-off between tracking error and possibility of outperformance.

## Asset location

For a taxable investor, the goal should be to maximize a portfolio's after-tax returns. Asset *location*—which refers to the decision whether or not to hold an investment in a taxable or a tax-advantaged account—is critical to this outcome. From an asset location perspective, there is a strong preference to hold tax-efficient investments in taxable accounts and tax-

inefficient investments in tax-advantaged accounts. Therefore, asset location becomes more meaningful when tax-advantaged and taxable accounts are approximately equal in a portfolio. It is also most important for portfolios with longer time horizons, since the primary benefit of the asset location decision is the deferral or elimination of taxes for as long as possible.

**Table 6. Example of asset location scenarios**

Scenario	Taxable accounts	Tax-advantaged accounts	Pre-tax annual total return	After-tax annual total return
A	Index equity (50%)	Taxable bonds (50%)	7.5%	7.3%
B	Tax-free bonds (50%)	Equity (50%)	7.0	7.0
C	Taxable bonds (50%)	Equity (50%)	7.5	6.6*
D	Active equity (50%)	Taxable bonds (50%)	7.5	6.6

*The performance data shown represent past performance, which is not a guarantee of future results. Investment returns will fluctuate. This hypothetical illustration does not represent the return on any particular investment.*

Note: If tax-managed or ETF equity funds were utilized in taxable accounts, the after-tax returns would be expected to improve. All returns are represented preliquidation and predistribution of tax-deferred assets.

\*Over time, this portfolio would be expected to outperform Portfolio D (after taxes), if rebalancing is utilized.

Return data	Pre-tax	After-tax	Investor data	
Taxable bond return	5.0%	3.3%	Taxable assets	\$500,000
Municipal bond return	4.0	4.0	Tax-advantaged assets	\$500,000
Active equity return:			Marginal tax rate	35%
Dividend income	2.0	1.7	Short-term capital gains tax rate	35
Short-term capital gains	2.0	1.3	Long-term capital gains tax rate	15
Long-term capital gains	5.0	4.3	Qualified dividend income tax rate	15
Unrealized capital gains	1.0	1.0		
Total active equity	10.0%	8.3%		
Index equity return:			Asset allocation: 50% stocks and 50% bonds	
Dividend income	2.0%	1.7%		
Short-term capital gains	0.0	0.0		
Long-term capital gains	0.5	0.4		
Unrealized capital gains	7.5	7.5		
Total index equity	10.0%	9.6%		

Source: Vanguard Investment Counseling & Research.

**Table 6** presents an example of possible asset location scenarios to illustrate this decision, using historical average returns for all assets, adjusted for today's tax environment. In other words, the table conservatively assumes that pre-tax returns of the actively managed investment are no worse than those of the index fund. If an investor decides to invest in active equity funds for the opportunity to outperform similar indexed funds, then the active equity funds should be purchased in tax-advantaged accounts prior to purchasing taxable bonds. This strategy is advantageous if the investor feels confident that the excess return over indexing will be consistently greater than the taxable–municipal spread. Historically, the odds that active equity funds will produce this excess return (over indexing) have been low. As a result, the highest probability of maximizing a portfolio's after-tax returns is provided by placing broad-market equity index funds/ETFs or tax-managed equity funds in taxable accounts and placing taxable bonds in tax-deferred accounts (Scenario "A" in Table 6).

When deciding to invest in active equity funds and thereby utilize the valuable shelf space inside tax-deferred accounts, the investor should feel confident that the excess return over indexing will be greater than the taxable–municipal spread. Many tax-sensitive investors would be better off investing all of their equity assets in broad-market index funds/ETFs because of the higher relative tax costs of active management.

The data in **Table 7** illustrate the difficulty of generating after-tax excess returns from actively managed funds.<sup>2</sup> The after-tax rankings show that 75%–84% of all large-cap-blend equity funds underperformed Vanguard's broad indexed or tax-managed equity funds for the ten years ended September 30, 2007. These figures improved on the 65%–80% of funds that underperformed on a pre-tax basis.

**Table 7. Tax considerations: Judge results after taxes**

As of September 30, 2007	Morningstar category	Morningstar category percentile ranking by total returns					
		One-year		Five-year		Ten-year	
		Pre-tax	After-tax	Pre-tax	After-tax	Pre-tax	After-tax
Vanguard® Total Stock Market Index Fund	Large blend	38 (805/2089)	25 (507/2089)	20 (248/1284)	15 (195/1284)	28 (163/566)	21 (118/566)
Vanguard 500 Index Fund	Large blend	46 (961/2089)	29 (593/2089)	35 (443/1284)	29 (366/1284)	35 (200/566)	25 (141/566)
Vanguard Total International Stock Index Fund	Foreign large blend	18 (130/715)	11 (80/715)	9 (40/454)	9 (39/454)	20 (43/218)	16 (34/218)
Vanguard Tax-Managed Growth and Income Fund	Large blend	45 (942/2089)	44 (918/2089)	33 (418/1284)	27 (348/1284)	33 (188/566)	23 (130/566)
Vanguard Tax-Managed Capital Appreciation Fund	Large blend	34 (722/2089)	31 (640/2089)	15 (196/1284)	12 (146/1284)	27 (157/566)	18 (100/566)

The performance data shown represent past performance, which is not a guarantee of future results. For fund performance data current to the most recent month-end, visit our website at [www.vanguard.com/performance](http://www.vanguard.com/performance).

Notes: All fund returns are for Investor Shares. Table includes only Vanguard broad stock index funds, and a Vanguard tax-managed fund, with ten-year returns. Numbers in parentheses are: fund ranking/total number of funds in Morningstar category. After-tax figures are preliquidation.

Source: Morningstar, Inc.

<sup>2</sup> To research this topic, we referred to certain Vanguard mutual funds to model the tax-efficient aspects of equities. These funds offered both long-term and specific data that were readily accessible, and the funds' assets were sufficiently sizable. Other data sources did not provide such features.

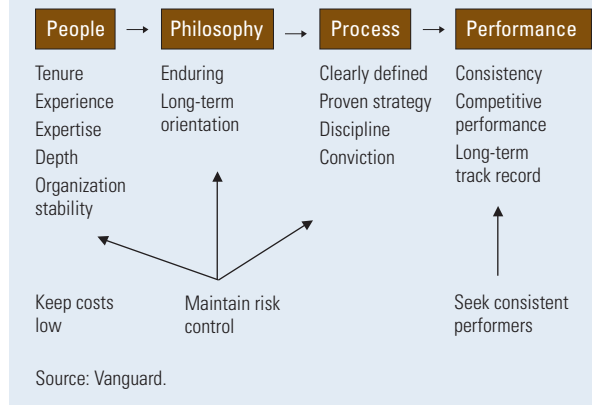
## Manager selection

Finally, after determining the asset allocation and sub-asset allocation targets, the portfolio management strategy (active and/or index), and where to purchase those assets, the manager selection process can begin.

If active management will be included in the portfolio, selecting a successful active manager requires superior due diligence. Incorporating very talented active managers with a proven philosophy, discipline, and process, and at competitive costs to indexing, can provide the opportunity for outperformance, as summarized in **Figure 12**. Discipline in maintaining low investment costs—that is, administrative and advisory expenses plus costs due to turnover, commissions, and execution—is essential for realizing any available excess return. Another key involves tenure—keeping a good manager, once one is found, rather than rapidly turning over the portfolio. Also, maintaining the ability to filter out noise—especially short-term measures of performance versus either benchmarks or peers—is crucial. Topping the list in importance, however, is finding a manager who can articulate, execute, and adhere to prudent, rational strategies consistently; and making sure that the manager’s strategy fits into your overall asset and sub-asset allocations.

Regarding selection of investments, short-term returns tend to capture the focus of many people seeking to choose an individual investment. Many spend little time on aspects of security selection that they *can* control

Figure 12. Identifying attractive investment firms



(e.g., investment expenses, contribution and withdrawal levels) while spending more time on aspects they *can't* control (e.g., picking the “hottest” mutual fund or sector).

Choosing an investment based on recent outperformance is often a futile endeavor, because individual investments rarely persistently outperform. **Table 8** shows that less than 50% of funds that ranked in the top quartile of outperformance in one three-year period went on to rank even in the top half of funds in the next three-year period (highlighted in the table). This means that there is a better chance of underperforming after a period of outperformance.

**Table 8. Past success is not an indicator of future success for active funds**

Alpha rank: Three-year nonoverlapping periods	Quartile rank in subsequent three years (% persistence)					Total
	1st quartile	2nd quartile	3rd quartile	4th quartile	Missing	
1st quartile	29.2%	16.2%	15.0%	20.6%	19.0%	100%
2nd quartile	16.6	24.8	22.3	15.3	21.0	100
3rd quartile	14.7	20.0	22.8	16.0	26.5	100
4th quartile	15.1	14.9	15.3	22.6	32.0	100

Notes: Data apply to U.S. equity funds. Russell capitalization and style benchmarks were assigned using regression analysis over three-year rolling periods.

Alpha represented by net excess returns over customized benchmarks. Data cover the period 1985–2005.

Source: Vanguard calculations using data from CRSP mutual fund database and Russell.

## Conclusion

Although opinions differ about what individual investments will be successful in the future, one thing is certain: The best chance of long-term investment success is to have a plan and to be disciplined about maintaining it. A written investment plan should follow a top-down approach, starting with a suitable asset allocation mix. To create this asset allocation mix, realistic expectations of both risk and return must be established for all asset classes under consideration. The asset allocation decision is the most important determinant of both the return variability and the long-term total return of a broadly diversified portfolio engaging in limited market-timing.

It is also extremely important to know the costs of your portfolio's investments and to keep them low. One way to assemble a low-cost investment portfolio is through indexing. Indexing has proven itself over time, as investments that have matched their benchmarks have historically outperformed most of their

peers. If an opportunity to outperform the benchmark is desired, well-chosen active managers or strategies are critical. A combination of both active and passive strategies has two advantages: It provides the opportunity to outperform a benchmark(s), while providing some risk control relative to the benchmark(s). The appropriate mix should be determined by the goals and objectives of the portfolio's investment policy statement. Successful investors focus on due diligence and highly talented, low-cost managers.

As we have described, asset location is a simple, but powerful, tool in adding long-term value to a portfolio on an after-tax basis. When considering return expectations, judge results after taxes, as this will reflect the actual money available to meet the portfolio's final objectives. These realistic expectations should be based on very long-term historical information, so that market rotation or performance chasing does not enter into the decision-making process.

## References

- Bennyhoff, Donald G., 2006. *Preserving a Portfolio's Real Value: Is There an Optimal Strategy?* Valley Forge, Pa.: Investment Counseling & Research, The Vanguard Group.
- Brinson, Gary P., L. Randolph Hood, and Gilbert L. Beebower, 1986. Determinants of Portfolio Performance. *Financial Analysts Journal* 42(4): 39–48.
- Brinson, Gary P., Brian D. Singer, and Gilbert L. Beebower, 1991. Determinants of Portfolio Performance II: An Update. *Financial Analysts Journal* 47(3): 40–8.
- Davis, Joseph H., Francis H. Kinniry Jr., and Glenn Sheay, 2007. *The Asset Allocation Debate: Provocative Questions, Enduring Realities*. Valley Forge, Pa.: Investment Counseling & Research, The Vanguard Group.
- Ennis, Richard M., and Michael D. Sebastian, 2002. The Small-Cap Alpha Myth. *Journal of Portfolio Management* 28(3): 11–16.
- Jaconetti, Colleen M., 2007. *Asset Location for Taxable Investors*. Valley Forge, Pa.: Investment Counseling & Research, The Vanguard Group.
- Jahnke, William W., 1997. The Asset Allocation Hoax. *Journal of Financial Planning* 10(1): 109–113.
- Malkiel, Burton G., and Aleksander Radisich, 2001. The Growth of Index Funds and the Pricing of Equity Securities. *Journal of Portfolio Management* 27(2): 9–21.
- Philips, Christopher B., 2006. *International Equity: Considerations and Recommendations*. Valley Forge, Pa.: Investment Counseling & Research, The Vanguard Group.
- Philips, Christopher B., and Frank J. Ambrosio, 2007. *The Case for Indexing*. Valley Forge, Pa.: Investment Counseling & Research, The Vanguard Group.
- Tokat, Yesim, 2007. *Rebalancing in Theory and Practice*. Valley Forge, Pa.: Investment Counseling & Research, The Vanguard Group.



P.O. Box 2600  
Valley Forge, PA 19482-2600

**Connect with Vanguard®** > [www.vanguard.com](http://www.vanguard.com)

**For more information about Vanguard funds, visit [www.vanguard.com](http://www.vanguard.com), or call 800-662-2739, to obtain a prospectus. Investment objectives, risks, charges, expenses, and other important information about a fund are contained in the prospectus; read and consider it carefully before investing.**

*Vanguard, Connect with Vanguard, and the ship logo are trademarks of The Vanguard Group, Inc. All other marks are the exclusive property of their respective owners.*

### Vanguard Investment Counseling & Research

**E-mail** > [research@vanguard.com](mailto:research@vanguard.com)

Ellen Rinaldi, J.D., LL.M./Principal/Department Head

John Ameriks, Ph.D./Principal

Joseph H. Davis, Ph.D./Principal

Francis M. Kinniry Jr., CFA/Principal

Roger Aliaga-Diaz, Ph.D.

Frank J. Ambrosio, CFA

Donald G. Bennyhoff, CFA

Maria Bruno, CFP®

Scott J. Donaldson, CFA, CFP®

Michael Hess

Julian Jackson

Colleen M. Jaconetti, CPA, CFP®

Karin Peterson LaBarge, Ph.D., CFP®

Christopher B. Philips, CFA

Liqian Ren, Ph.D.

Glenn Sheay, CFA

Kimberly A. Stockton

David J. Walker, CFA

Investment products: Not FDIC-insured • No bank guarantee • May lose value

© 2007 The Vanguard Group, Inc.  
All rights reserved.  
Vanguard Marketing Corporation, Distributor.

ICRPC 102007