

Vanguard[®]

Vanguard's framework for constructing diversified portfolios

Vanguard research

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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 best meet that need, the investor must establish a disciplined method of portfolio construction that balances the potential risks and returns of various types of investments.

This paper reviews our research into the investment decisions involved in constructing a diversified portfolio. We discuss the importance of a top-down hierarchy—one that focuses on broad asset allocation and diversification within sub-asset classes before honing in on specific funds. We illustrate the importance of keeping portfolio costs low. Finally, we review key implementation considerations, such as the use of indexed or active strategies, tax efficiency for taxable investors, and the importance of rebalancing.

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Many investors expect lower nominal returns in the future. Accordingly, many portfolio strategies have recently focused on higher income, tactical factor timing, and the use of alternative investments. Although no one can predict what individual investments will do best in the future, we believe the best strategy for long-term success is to have a well-thought-out plan with an emphasis on balance and diversification and a focus on keeping costs low and maintaining discipline (Vanguard, 2013). A written investment plan that clearly documents the investor's goals, constraints, and investment decisions provides the framework for a well-diversified portfolio.

This paper discusses how to create a diversified portfolio by focusing on six major components:

1. Defined investment goals and constraints.
2. Broad strategic allocation among the primary asset classes such as equities, fixed income, and cash.

3. Sub-asset allocation within classes, such as U.S. or non-U.S. equities or large-, mid-, or small-capitalization equities, and so on.
4. Allocation to indexed and/or actively managed assets.
5. For taxable investors, allocation of investments in taxable and/or tax-advantaged accounts.
6. Selection of individual managers, funds, or securities to fill allocations.

Defining investment goals and constraints

A sound investment plan for individuals—or policy statement for institutions—begins with an outline of objectives, as well as any significant constraints. Most investment objectives are rather straightforward—saving for retirement, preserving assets, funding a pension plan, or meeting a university's spending requirements, for example. If the investor has multiple goals (such as paying for both retirement

Notes about risk and performance data: All investments are subject to risk, including the possible loss of the money you invest. Past performance is no guarantee of future returns. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index. There may be other material differences between products that must be considered prior to investing. Diversification does not ensure a profit or protect against a loss in a declining market. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income.

Be aware that fluctuations in the financial markets and other factors may cause declines in the value of your account. Investments in stocks or bonds issued by non-U.S. companies are subject to risks including country/regional risk, which is the chance that political upheaval, financial troubles, or natural disasters will adversely affect the value of securities issued by companies in foreign countries or regions, and currency risk, which is the chance that the value of a foreign investment, measured in U.S. dollars, will decrease because of unfavorable changes in currency exchange rates. Bond funds are subject to the risk that an issuer will fail to make payments on time and that bond prices will decline because of rising interest rates or negative perceptions of an issuer's ability to make payments. 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. Please remember that all investments involve some risk. Be aware that fluctuations in the financial markets and other factors may cause declines in the value of your account. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income. High-yield bonds generally have medium- and lower-range credit quality ratings and are therefore subject to a higher level of credit risk than bonds with higher credit quality ratings.

Although the income from a municipal bond fund is exempt from federal tax, you may owe taxes on any capital gains realized through the fund's trading or through your own redemption of shares. For some investors, a portion of the fund's income may be subject to state and local taxes, as well as to the federal Alternative Minimum Tax.

and a child's college expenses), the plan should account for each one; alternatively, there can be a separate plan for each.

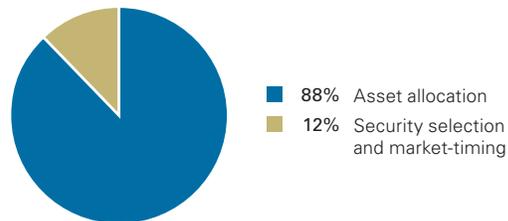
Most investment objectives can be viewed in the context of a required rate of return (RRR). The RRR is the return that a portfolio would need to generate to bridge the gap between an investor's current assets, any future cash flows, and the investment goal. For example, consider an investor who has determined that to be comfortable in retirement he or she needs to save \$1,000,000 over the next 40 years in today's dollars (inflation-adjusted). If he or she starts today with a \$10,000 deposit and saves the same inflation-adjusted amount over the next 40 years, the real RRR needed to reach the goal would be 4%.¹

Constraints, on the other hand, can be either simple or complex, depending on the investor and the situation. One of the primary constraints in meeting any objective is the investor's tolerance for risk.² Risk and expected return are generally related, in that the desire for greater return will require taking on greater exposure to market risk. Other constraints can include time horizon (an infinite horizon, such as that faced by many university endowments, allows for different risks than does a much shorter time frame, such as that of an investor looking to fund a child's college education), exposure to taxes, liquidity requirements, legal issues, and unique limitations such as a desire to avoid certain investments entirely. Because constraints may change over time, they should be closely monitored.

Investors should consider both their RRR and tolerance for risk when putting together an investment plan. Because increased return comes with increased risk, they should carefully weigh how much risk they are willing to take on to meet their objectives. Plans

Figure 1. Investment success is largely determined by the long-term mixture of assets in a portfolio

Percentage of a portfolio's movements over time explained by:



Notes: Calculations are based on monthly returns for 518 U.S. balanced funds from January 1962 through December 2011. For details of the methodology, see the Vanguard research paper *The Global Case for Strategic Asset Allocation* (Wallick et al., 2012).

Sources: Vanguard calculations, using data from Morningstar.

to meet long-term objectives should be designed to endure through changing market environments and should incorporate sufficient flexibility to adjust for unexpected events along the way. After implementing a plan, the investor should evaluate it on a regular, ongoing (e.g., annual) basis.

Broad strategic asset allocation

When developing a portfolio, it is critical to select a combination of assets that offers the best chance of meeting the plan's objective, subject to the investor's constraints. In portfolios with broadly diversified holdings, the mixture of those assets will determine both the aggregate returns and their variability.³ A seminal 1986 study⁴ showed that the asset allocation decision was responsible for the vast majority of a diversified portfolio's return patterns over time. Vanguard's own study confirmed this (see **Figure 1**).

1 For simplicity, we assume the investor has a predetermined savings goal in today's dollars; however, we realize that in practice the goal is more likely to be maintaining a certain level of income throughout retirement.

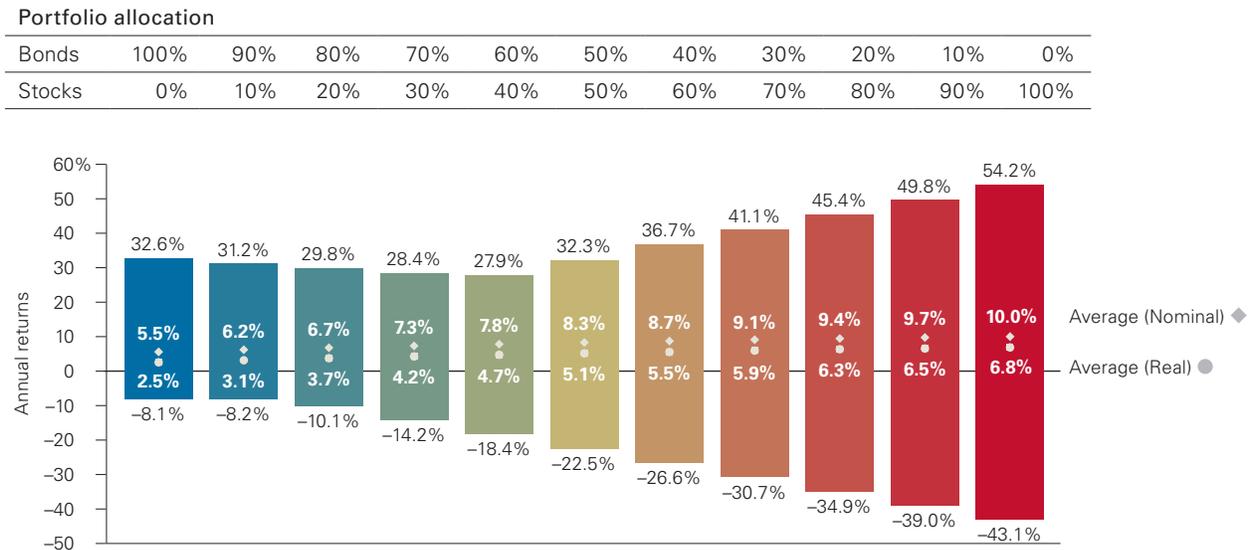
2 There are many definitions of risk, both traditional (including volatility, loss, and shortfall) and nontraditional (such as liquidity, manager, and leverage). Investors commonly define risk as the volatility inherent in a given asset or investment strategy. For more on the various risk metrics used in the financial industry, see Ambrosio (2007).

3 For asset allocation to be a driving force, it must be implemented using vehicles that approximate the return of market indexes. These indexes are commonly used to identify the risk and return characteristics of asset classes and portfolios. Using an alternative vehicle may deliver a result that differs from that of the market index and potentially lead to a different outcome than that assumed in the asset allocation process. As an extreme example, using a single stock to represent the equity allocation in a portfolio would likely lead to a very different outcome than would either a diversified basket of stocks or any other single stock.

4 See Brinson, Hood, Beebower (1986).

Figure 2. The mixture of assets defines the spectrum of returns

Moving from left to right, the stock allocation relative to bonds increases in 10% increments. The length of the bars indicates the range of annual returns for each allocation; the longer the bar, the larger the variability. The numbers inside the bar are the average annual nominal* and real returns for that allocation for the 87 years indicated.



*Nominal value is the return before adjustment for inflation, real value includes the effect of inflation.

Notes: Stocks are represented by the Standard & Poor's 90 Index from 1926 through March 3, 1957; the S&P 500 Index from March 4, 1957, through 1974; the Wilshire 5000 Index from 1975 through April 22, 2005; and the MSCI US Broad Market Index thereafter. Bonds are represented by the S&P High Grade Corporate Index from 1926 through 1968; the Citigroup High Grade Index from 1969 through 1972; the Barclays U.S. Long Credit AA Index from 1973 through 1975; and the Barclays U.S. Aggregate Bond Index thereafter. Data are through December 31, 2012.

Source: Vanguard.

An informed understanding of the return and risk characteristics of the various asset classes is vital to the portfolio construction process. **Figure 2** shows a simple example of this relationship, using two asset classes—U.S. stocks and U.S. bonds—to demonstrate the impact of broad asset allocation on returns and their variability. Although the annual returns represent averages over an 87-year period and should not be expected in any given year or time period, they do give an idea of the long-term historical returns and the downside market risk that have been associated with various allocations (Davis, Aliaga-Díaz, Patterson, 2013). Note that more concentrated investments would be even riskier and that investment time horizon should also be taken into account when considering the potential risk-return of a portfolio.

Investors should carefully consider **Figure 2** as they determine how to achieve their investment goals without exceeding their tolerance for risk. For example, the hypothetical individual described earlier, who is saving for retirement with a 4% real RRR, should select an asset mix that meets or exceeds that amount with an acceptable corresponding risk of potential loss. If either of those requirements is not met, he or she may need to go back and revisit them. Of course, shorter investment horizons may require greater investments in bonds and cash than in equities, because these asset classes have less downside volatility.

Inflation risk is often overlooked and can have a major effect on asset-class returns, changing the portfolio's risk profile. This is one reason why Vanguard generally does not believe that cash plays a significant role in a diversified portfolio with long-term investment horizons. Rather, cash should be

Figure 3. Trade-off between market risk and inflation risk

1926–2012 total returns	Nominal*			Real (inflation-adjusted)*		
	Average annual return	% of years with negative return	Greatest annual loss	Average annual return	% of years with negative return	Greatest annual loss
100% T-bills	3.60%	1%	–0.02%	0.61%	38%	–15.05%
100% bonds	5.54	15	–8.13	2.49	32	–16.15
100% stocks	9.97	29	–43.13	6.80	34	–37.29

*Nominal value is the return before adjustment for inflation, real value includes the effect of inflation.

Notes: All investing is subject to risk. Investments in bonds are subject to interest rate, credit, and inflation risk. Unlike stocks and bonds, U.S. Treasury bills are guaranteed as to the timely payment of principal and interest.

For U.S. stock market returns, we used the Standard & Poor’s 90 Index from 1926 through March 3, 1957; the Standard & Poor’s 500 Index from March 4, 1957, through 1974; the Wilshire 5000 Index from 1975 through April 22, 2005; and the MSCI US Broad Market Index thereafter. For U.S. bond market returns, we used the Standard & Poor’s High Grade Corporate Index from 1926 through 1968; the Citigroup High Grade Index from 1969 through 1972; the Lehman Brothers U.S. Long Credit AA Index from 1973 through 1975; the Barclays U.S. Aggregate Bond Index from 1976 through 2009; and the Spliced Barclays U.S. Aggregate Float Adjusted Bond Index thereafter. For U.S. cash reserve returns, we used the Ibbotson 1-Month Treasury Bill Index from 1926 through 1977 and the Citigroup 3-Month Treasury Bill Index thereafter. Data as of December 31, 2012.

Source: Vanguard.

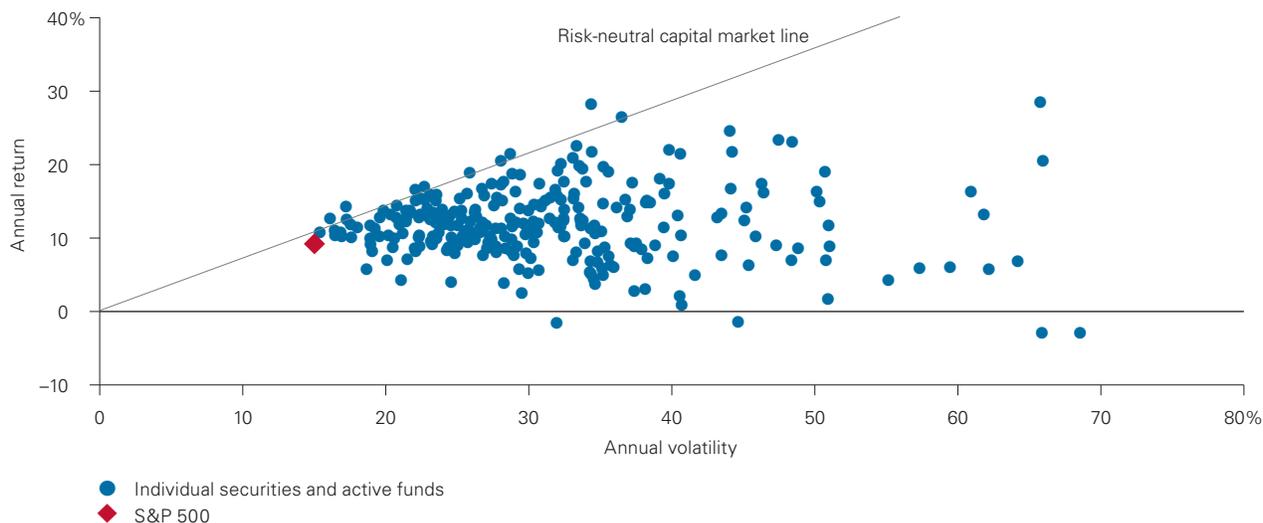
used to meet liquidity needs or integrated into a portfolio designed for shorter-term horizons. **Figure 3** shows the long-term returns of stocks, bonds, and cash on both a nominal and an inflation-adjusted basis. As highlighted, cash has had a negative nominal return only 1% of the time, whereas negative returns occurred with stocks nearly 30% of the time. However, in the long run, what matters most is that investments meet a portfolio’s objectives. Therefore, 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. When examining real inflation-adjusted returns, we see that cash has delivered a negative return more frequently than stocks or bonds. Because many longer-term goals are measured in real terms, inflation can be particularly damaging, as its effects compound over long time horizons. Over the short term, the effects of inflation are generally less damaging than the potential losses from assets with higher expected real returns (Bennyhoff, 2009).

Each investor will have unique cash requirements, and the amount of cash to keep on hand will depend on a number of factors, such as liquidity needs, dependability of employment or other income sources, and level of financial conservativeness. The investor should first identify his or her specific needs

by assessing major expenses and when those will come due, and then determine what assets are available to meet those needs. Separately, investors should keep a certain amount of cash for emergencies—typically 3 to 36 months’ worth of living expenses (Kinniry and Hammer, 2012).

A caveat to the importance of the asset allocation decision is Jahnke’s (1997) argument that individual security selection and allocation changes can dramatically affect the total returns of an actively managed portfolio. **Figure 4** (on page 6) illustrates the vast dispersion of returns from individual securities over the last 25 years. The annualized returns from 1988 to 2012 for all stocks in the S&P 500 Index reveal how diversified investments mitigate catastrophic loss. If you have the misfortune of holding only a few of the worst-performing stocks in an index, the results can be extremely harmful to your portfolio’s overall value. An investor should not expect any individual stock to consistently provide lower risk than or returns in line with the overall market. Broad diversification can help to protect against the downside risk of owning individual securities. Therefore, a portfolio’s asset allocation has the greatest impact on return and variability *provided* that the allocations are broadly diversified.

Figure 4. S&P 500 constituents' return and volatility, 1988–2012



Note: Constituents shown are as of December 31, 2012.

Sources: Vanguard calculations, using data from Morningstar.

Rebalancing: an essential monitoring tool

Although setting a target asset allocation is only the beginning of the construction process, it is the most important. Therefore, the portfolio should stay close to the target over time to maintain a consistent risk-return profile. Over long 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 has deviated by a meaningful amount, for example, by more than 5 percentage points (Jaconetti, Kinniry, and Zilbering, 2010). When capital gains taxes are a consideration, the transactions are best completed within a tax-advantaged account to avoid a gain on the sales.

It's preferable to rebalance every time cash enters or leaves the portfolio. These cash flows can include any dividend, interest, or capital gains distributions generated by the assets.

Figure 5 illustrates how dividend and interest payments can be used to reduce potential rebalancing costs for several hypothetical portfolios. The "Income" column shows a 60% stock/40% bond portfolio that was rebalanced by investing the dividend and interest payments in the underweighted asset class from 1926 through 2012. An investor who simply redirected his or her portfolio's income would have achieved most of the risk-control benefits of more labor- and transaction-intensive rebalancing strategies at a much lower cost.

For example, a portfolio that was monitored monthly and rebalanced at 5% thresholds would have had 61 rebalancing events and annual turnover of 1.8%. The portfolio that was rebalanced by simply redirecting income would have had no rebalancing events and turnover of 0%. For taxable investors, this strategy would also have been very tax-efficient. The differences in risk among the various rebalancing strategies were very modest. On a cautious note: The higher levels of dividends and interest rates during this 87-year period may not be available in the future. An effective rebalancing approach independent of these levels is to use portfolio contributions and withdrawals. However, the potential tax consequences of these transactions may require more customized strategies.

Figure 5. Historical performance of alternative rebalancing rules for a 60% equity/40% bond portfolio (1926–2012)

Monitoring frequency	Monthly	Monthly	Quarterly	Annually	Never	Income
Threshold	0%	5%	5%	5%	None	None
Average equity allocation	60.1%	61.2%	60.9%	60.8%	84.6%	60.9%
Costs of rebalancing						
Annual turnover	2.7%	1.8%	1.6%	1.5%	0.0%	0.0%
Number of rebalancing events	1,044	61	51	29	0	0
Absolute framework						
Average annualized return	8.6%	8.6%	8.8%	8.7%	9.2%	8.5%
Volatility	12.1%	12.2%	12.1%	11.7%	14.4%	11.2%

Notes: This illustration does not represent the return on any particular investment. All returns are in nominal U.S. dollars. There were no new contributions or withdrawals. Except in the “Income” column, dividend payments were reinvested in equities; interest payments were reinvested in bonds. The Income column shows a 60% stock/40% bond portfolio that was rebalanced by investing the portfolio’s dividend and interest payments in the underweighted asset class from 1926 through 2012. There were no taxes. All statistics were annualized.

Stocks are represented by the Standard & Poor’s 90 Index from 1926 through March 3, 1957; the S&P 500 Index from March 4, 1957, through 1974; the Wilshire 5000 Index from January 1, 1975, through April 22, 2005; and the MSCI US Broad Market Index from April 23, 2005, through December 31, 2012. Bonds are represented by the S&P High Grade Corporate Index from 1926 through 1968; the Citigroup High Grade Index from 1969 through 1972; the Lehman Long-Term AA Corporate Index from 1973 through 1975; and the Barclays U.S. Aggregate Bond Index from 1976 through 2012.

Sources: Vanguard calculations, using data from Standard & Poor’s, Wilshire, MSCI, Citigroup, and Barclays.

Sub-asset allocation

Once the appropriate strategic asset allocation has been determined, the focus should turn to diversification within asset classes to reduce exposure to risks associated with a particular company, sector, or market segment.

Investors seeking exposure to the stock and bond markets must decide on the degree of exposure to the various risk and return characteristics appropriate for their objectives. For equities, these attributes include market capitalization (large-, mid-, and small-) and style (growth and value), and domestic and non-U.S. exposure. For the bond market, short-, intermediate-, or long-term maturities; high, medium, or low credit quality; taxable or tax-exempt status (depending upon an investor’s tax bracket); inflation-protected issues; and U.S. versus non-U.S. bonds need to be considered. Each category can have specific risk factors.

In practice, diversification is a rigorously tested application of common sense: Markets and asset classes will often behave differently from each other—sometimes marginally, sometimes greatly—

at any given time. Owning a portfolio with at least some exposure to many or all key market components ensures the investor of some participation in stronger areas while also mitigating the impact of weaker areas. Vanguard believes that investors should seek to gain exposure to these asset classes through a market cap-weighted portfolio that matches the risk-return profile of the asset-class target through broad diversification.

Stocks

Broad-market index funds are one way to achieve market cap weighting within an asset class. Price is a powerful mechanism collectively used by market participants to establish and change views about a company’s future performance (including the issuance or retirement of shares). Relevant information is continuously incorporated into stock prices through investor trading, which then affects market capitalization. Market cap-weighted indexes therefore reflect at every moment the consensus investor estimate of each company’s relative value and how the average investor has performed for a specific targeted beta. As a result, Vanguard believes the best index is not necessarily the one

that provides the highest return or lowest standard deviation over a given period, but the one that most accurately measures the collective asset-weighted capital invested within the market it is intended to track.

Because current market price incorporates all possible factors used by investors to estimate a company's value, a market cap-weighted index represents a true multifactor approach—indeed, an all-factor approach—to investing and an ex-ante (forward-looking), theoretically mean-variance-efficient portfolio. Any deviation from market cap weighting within a targeted beta, such as U.S. equities and non-U.S. equities, presumes that the collective valuation processes used by investors in that market are flawed.⁵

Often, investors attempt to determine the sub-asset allocations of their portfolio by looking at outperformance; however, relative performance changes often. Over very long-term horizons, most sub-asset classes tend to perform in line with their broad asset class, but over short periods there can be sharp differences. For examples, see **Figure 6**, which shows annual returns for a variety of asset and sub-asset classes. A portfolio that diversifies across asset classes is less vulnerable to the impact of significant swings in performance by any one segment. Concentrated or specialized asset classes, such as REITs, commodities, or emerging markets, tend to be the most volatile. This is why we believe that most investors are best served by significant allocations to investments that represent broad markets, such as U.S. and non-U.S. stocks and bonds.⁶

In volatile markets, with very visible winners and losers, active market-timing is a dangerous temptation. The appeal of altering a portfolio's asset allocation in response to short-term market developments is strong because of hindsight: An analysis of past returns indicates that taking advantage of market shifts could result in substantial rewards. However, the opportunities that are clear in retrospect are rarely visible in prospect (Kinniry and Philips, 2012). Investors examining **Figure 6** might

conclude that market divergences are cyclical and that they can capitalize on them. But if this were the case, data should show that most active managers have been able to beat market indexes. In reality, market leadership has proven difficult to predict, and research has shown that historically, even most professional managers have underperformed market benchmarks (see "Active and Passive Strategies" on page 11).

A primary way to diversify the equity allocation of a U.S.-based portfolio is through non-U.S. investing. Historically, adding non-U.S. equities would have led to a less volatile portfolio on average. Determining this allocation depends on several factors, one of which is current global market capitalization.

Figure 7 (on page 10) shows the percentage of global assets invested in U.S. and non-U.S. equity and fixed income. In our view, an upper limit to broad non-U.S. equity allocations should be based on these equities' global market capitalization (currently 54%). A case can be made, however, for a dedicated allocation to non-U.S. stocks that differs from the global market-weighted portfolio based on awareness of local and global biases and the fact that, despite increasing efficiencies, global markets are not yet fully and seamlessly integrated. Costs, liquidity, and transparency for markets outside the United States can be important considerations in deciding whether or not to maintain a U.S. home bias (Philips, 2011). Historically, an allocation of 20% to 40% non-U.S. stocks has provided diversification benefits even though the allocation was not fully market cap-weighted.

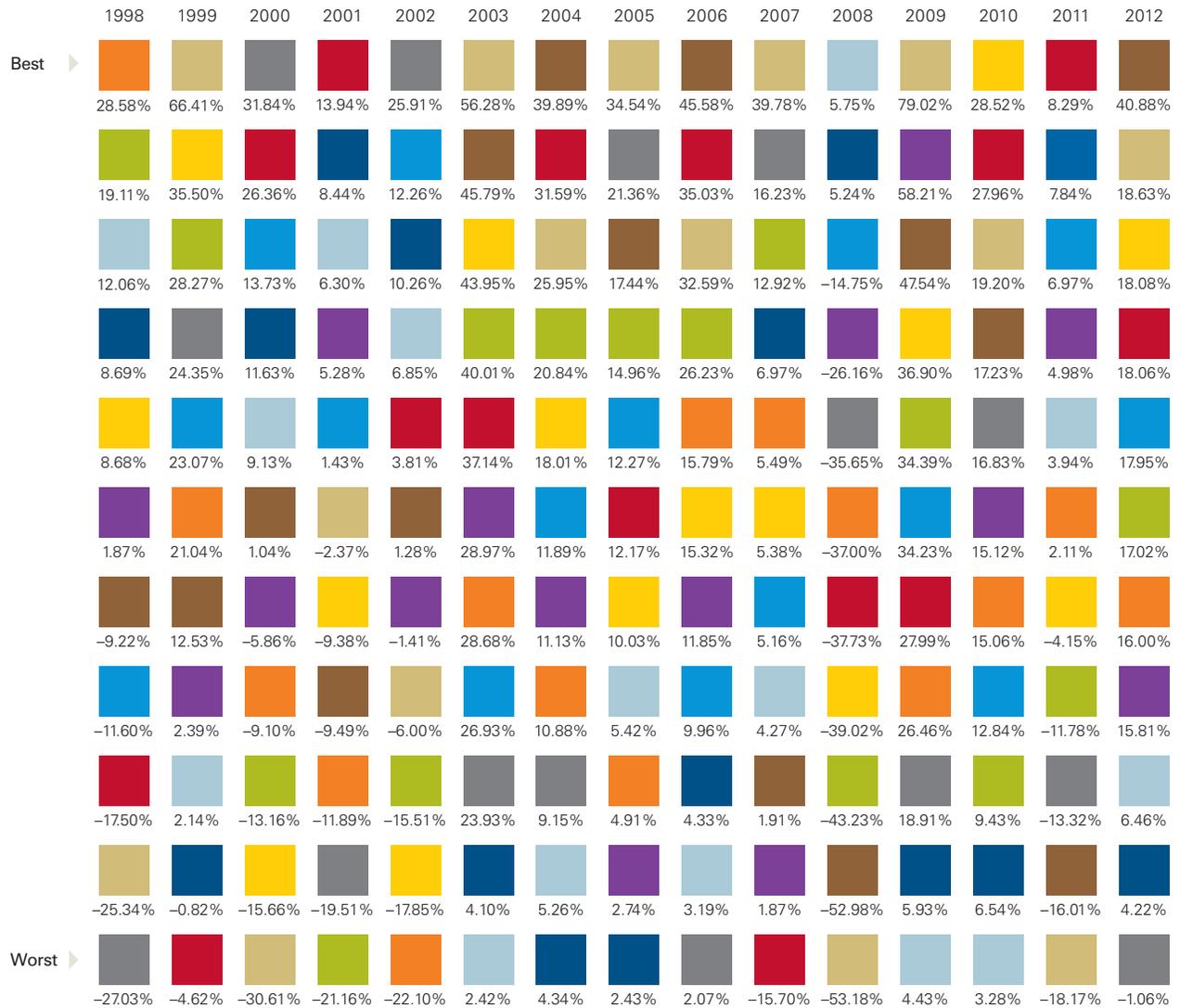
Bonds

As stated earlier, investors seeking exposure to parts of the bond market must decide on the degree of exposure to U.S. and non-U.S. issues; short-, intermediate-, or long-term maturities; high, medium, or low credit quality; inflation-protected issues; and/or issues with taxable or tax-exempt status (depending upon the tax bracket). Each of these categories can have specific risk factors. As highlighted in **Figure 6**, annual returns of bond market segments can vary widely as well.

⁵ See Philips and Kinniry (2012) for more detailed discussion of major U.S. market indexes and considerations for determining an appropriate benchmark.

⁶ We believe that if non-U.S. bonds are to play an enduring role in a diversified portfolio, their currency exposure should be hedged. For additional perspective, including an analysis of the impact of currency on the return characteristics of foreign bonds, see Philips (2012).

Figure 6. Annual returns for selected categories ranked in order of performance—best to worst



U.S. stocks	Non-U.S. stocks	U.S. bonds	Non-U.S. bonds	Other
■ FTSE NAREIT Equity REIT Index	■ MSCI World ex USA Index	■ Barclays U.S. Aggregate Bond Index	■ Barclays Aggregate Emerging Market Bond Index	■ Dow Jones-UBS Commodity Index Total Return
■ S&P 500 Index	■ MSCI Emerging Markets Index	■ Barclays U.S. High Yield Bond Index	■ Barclays Global Aggregate Ex U.S. Bond Index (Hedged)	
■ Wilshire 4500 Completion Index	■ S&P Global ex-U.S. Property Index			

Notes: Large-cap U.S. stocks are represented by the S&P 500 Index, mid-cap and small-cap U.S. stocks by the Wilshire 4500 Completion Index, developed non-U.S. stock markets by the MSCI World ex USA Index, and emerging markets by the MSCI Emerging Markets (EM) Index. Commodities are represented by the Dow Jones-UBS Commodity Index Total Return, U.S. real estate by the FTSE NAREIT Equity REIT Index, and non-U.S. real estate by the S&P Global ex-U.S. Property Index. U.S. investment-grade bonds are represented by the Barclays U.S. Aggregate Bond Index, U.S. high-yield bonds by the Barclays U.S. High Yield Bond Index, non-U.S. bonds by the Barclays Global Aggregate Ex U.S. Bond Index (Hedged), and emerging markets bonds by the Barclays Aggregate Emerging Market Bond Index.

Sources: Vanguard, Thomson Reuters Datastream, Barclays.

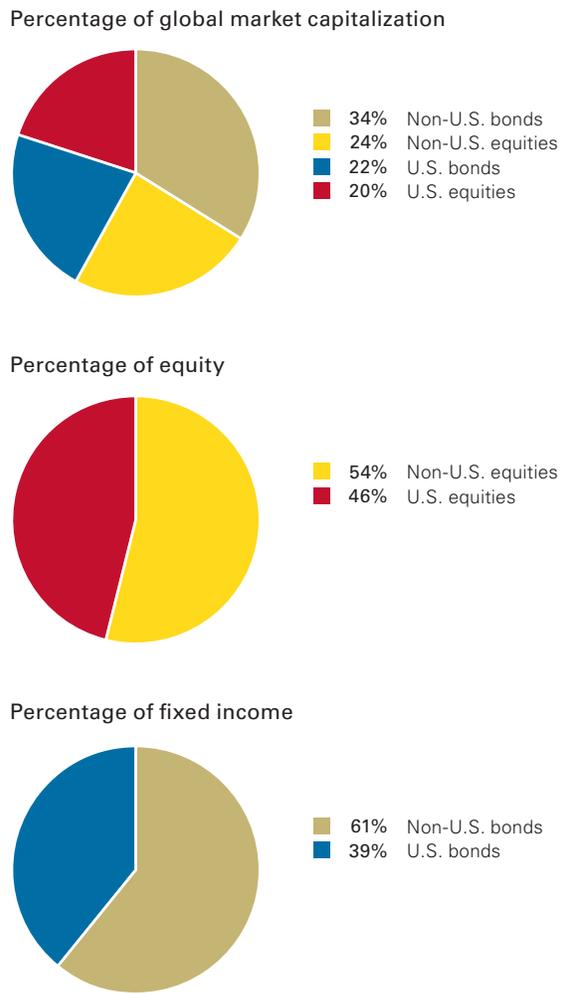
As in equity allocation decisions, bond investors should be cautious and understand the risks of moving away from a market cap-weighted portfolio. For example, overweighting corporate bonds in an attempt to obtain higher yields has had disadvantages in years such as 2008, which was characterized by a flight to quality and resulted in negative returns for corporate bonds but strong positive returns for Treasuries. On the other hand, seeking to reduce credit risk by overweighting Treasuries can result in lower long-run returns versus a market cap-weighted benchmark.

To try to match asset-class risk and return assumptions, bond sector weightings should generally be similar to those of the broad bond market, which has an intermediate-term duration.⁷ Exposure to the nominal investment-grade bond segments through a total bond market fund would achieve the goals of both market proportionality to those segments and intermediate-term average duration.

As we discussed with equity sub-asset allocation, a bond portfolio's allocation to non-U.S. securities is potentially a way to reduce overall volatility. Non-U.S. bonds have grown considerably over the past two decades and, as shown in Figure 7, now represent the world's largest investable asset class.⁸ Research by Philips (2012) explores the strategic role of non-U.S. fixed income in light of the potential diversification benefits, risks, and costs, paying particular attention to the issue of currency.

We find that, for the average investor, non-U.S. bonds can help mitigate volatility in a diversified portfolio, assuming that their inherent currency risk is hedged. While no allocation is optimal for all investors, having some exposure can be better than having none. That said, a home bias may be defensible on grounds other than pure diversification; investors considering non-U.S. bonds should balance the benefits against both the costs involved and the value of preserving a core allocation to the U.S. bond market.

Figure 7. Percentage of market cap invested in U.S. and non-U.S. equity and fixed income



Notes: Non-U.S. bonds are represented by the Barclays Global Aggregate ex U.S. Bond Index and the Barclays Aggregate Emerging Market Bond Index, U.S. bonds by the Barclays U.S. Aggregate Bond Index, U.S. stocks by the MSCI USA Investable Market Index, and non-U.S. stocks by the MSCI All Country World Investable Market Index ex USA. Data are through December 31, 2012.

Sources: Vanguard, Thomson Reuters Datastream, Barclays, and MSCI.

Once maturity and credit-quality weights are determined, an investor needs to decide whether to use municipal or taxable bonds to fill those allocations within taxable accounts. In general, this decision is based both on an individual's

7 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.

8 From year-end 1994 to 2012, non-U.S. bonds increased from 13% to 34% of global market capitalization, according to Barclays.

marginal tax rate and on the yields of the bonds (of similar credit quality and duration). The higher the tax rate, the more appropriate tax-advantaged municipal bonds become. Generally, taxable investors at or above the 28% tax bracket could benefit from long-term investments in municipal bonds versus taxable bonds, given the historical yield difference between the two. However, the yield advantage of taxable bonds can also be captured by placing them in a tax-advantaged account, if available. For further discussion of this subject, see “Taxable Investors: Asset Location Further Maximizes Tax Efficiency” on page 13.

Active and passive strategies

An actively managed portfolio strategy can be a solution for investors who want the opportunity to outperform a target benchmark and are willing to assume somewhat higher costs, manager risk, taxes, and variability relative to the market, otherwise known as tracking error. Skilled managers do exist and provide the opportunity for outperformance; however, identifying them ahead of time is challenging. Overall, the track record of active management has been less than stellar (Philips et al., 2013).

The difficulty can largely be explained by the zero-sum nature of investing. Simply put, because all investors’ holdings are represented in the market, for every outperforming investment there must be an underperforming one, such that the dollar-weighted performance of all investors equals the performance of the overall market. After accounting for all applicable costs (commissions, management fees, bid-ask spreads, administrative costs, market impact, and, where applicable, taxes), the average investor will trail the market. Therefore, investors who minimize costs may be able to outperform those who incur higher costs.

There is considerable evidence that the odds of outperformance increase if investors simply aim to seek the lowest possible cost for a given strategy. For example, Financial Research Corporation (2002) evaluated the predictive value of different metrics, including a fund’s past performance, Morningstar

Figure 8. Asset-weighted expense ratios of active and passive investments

Average expense ratios as of December 31, 2012

	Investment type	Actively managed funds	Index funds	ETFs
U.S. stocks	Large-cap	0.82	0.11	0.14
	Mid-cap	1.00	0.19	0.25
	Small-cap	1.07	0.23	0.23
U.S. sectors	Stock	0.98	0.40	0.39
	Real estate	0.98	0.12	0.22
International stocks	Developed market	0.92	0.19	0.31
	Emerging market	1.17	0.22	0.44
U.S. bonds	Corporate	0.60	0.12	0.14
	Government	0.50	0.15	0.15

Note: Discrepancies are due to rounding.

Sources: Vanguard calculations, using data from Morningstar.

rating, alpha, and beta. The study found that 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. Similar research conducted at Vanguard by Wallick et al. (2011) evaluated a fund’s size, age, turnover, and expense ratio and concluded that the expense ratio was the only significant factor in determining future alpha. Philips and Kinniry (2010) also showed that using a fund’s Morningstar rating as a guide to future performance was less reliable than using its expense ratio. Practically speaking, a fund’s expense ratio is a valuable guide (although not a sure thing) because it is one of the few characteristics that is known in advance. A Vanguard study of the average performance of funds with high- and low-quartile expense ratios found that the less expensive funds outperformed in all 14 categories across equity and fixed income (Vanguard, 2013).

Figure 8 shows the average dollar-weighted expense ratios for actively managed equity and bond mutual funds. As of December 31, 2012, investors in actively managed large-cap equity mutual funds were paying an average of approximately 0.82% annually, and

those in actively managed government bond funds were paying 0.50% annually, versus 0.11% and 0.15% for the respective index funds and 0.14% and 0.15% for ETFs.

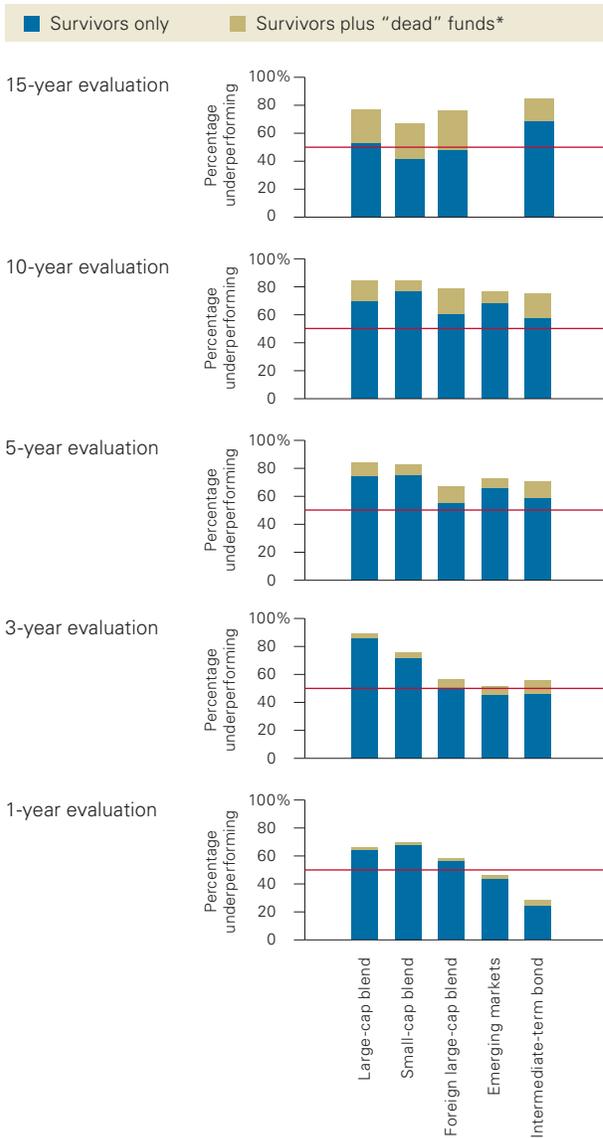
Indexed strategies can give investors the opportunity to outperform active managers because they generally operate with lower costs. The higher expenses for actively managed funds often result from the research process required to identify potential outperformers and the generally higher turnover associated with the attempt to best a benchmark.

Figure 9 demonstrates the relative success of low-cost indexed strategies compared to their higher-cost actively managed counterparts. Because both indexed and active funds exist within every market, we limited our analysis to large-cap blend stocks, small-cap blend stocks, non-U.S. developed markets stocks, emerging markets stocks, and U.S. diversified bonds.

In keeping with the zero-sum theory, a majority of actively managed funds underperformed the average low-cost index fund across investment categories and time periods.

Because both indexing and low-cost active management have potential advantages, combining these approaches can prove to be effective. As indexing is incrementally added to active management strategies, the risk characteristics of the portfolio converge closer to those of the benchmark, decreasing tracking error and providing diversification. The combination offers 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.

Figure 9. Percentage of active funds that underperformed the average return of low-cost index funds



*Dead funds are funds that began but did not finish the period.

Notes: The actively managed funds are those listed in the respective Morningstar categories. Index funds are represented by funds with expense ratios of 20 basis points or less as of December 31, 2012. All returns used were for the investor share class. Data reflect periods ended December 31, 2012.

Sources: Vanguard and Morningstar.

Taxable investors: Passive strategies can provide tax advantages

From an after-tax perspective, broad index funds and ETFs may provide an additional advantage over actively managed funds. Because turnover is much lower in index funds—selling occurs only when the composition of the market changes—they tend to realize and distribute capital gains less frequently. That said, it's important to note that tax efficiency can vary tremendously, depending on the index the fund is attempting to track (narrower indexes may require greater turnover) as well as the fund's management process (all else being equal, a full replication strategy would likely lead to less turnover than an optimization strategy). A 2010 study from Lipper (Thomson Reuters) found that over the 16 years ended 2009, the highest portfolio turnover ratio for the average S&P 500 Index fund was 19.00% (in 1994), and the lowest was 6.54% (in 2004).

The same study reported that index or index-based funds posted the top returns, both on a before- and after-tax return basis, in 7 of 11 classification groups over the ten years ended 2009. Of course, the actual impact of taxes, as well as how the results of the two strategies compare, can and does change over time, depending on how markets perform and the tax code changes. For example, the above study found that U.S. diversified equity funds reported an average one-year tax drag of 2.75% from 1996 through 2000 but only 0.68% from 2001 through 2009. In 2009, actively managed equity funds had a lower tax burden than passively managed funds. Underscoring the difficulty of evaluating performance data, poorly performing funds that do not pass through capital gains or income distributions can appear to be tax efficient.

Taxable investors: Asset location further maximizes tax efficiency

A taxable investor's goal should be to maximize a portfolio's after-tax returns without exceeding a target level of risk. Asset location is critical to this outcome. The objective of asset location is to hold tax-efficient investments, such as broad-market equity index funds or ETFs, in taxable accounts and

tax-inefficient investments, such as taxable bonds, in tax-advantaged accounts (Jaconetti, 2007). This allows the investor to capture the taxable-municipal spread—the higher yield premium taxable bonds offer over municipal bonds. Asset location becomes most meaningful when tax-advantaged and taxable accounts are approximately equal in a portfolio. It is also important for portfolios with longer time horizons, since its primary benefit is the deferral or elimination of taxes for as long as possible. **Figure 10** (on page 14) presents a general asset location framework for investment accounts and selections.

When deciding to invest in active equity funds and thereby use 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 or ETFs because of the higher relative tax costs of active management.

Manager selection

If an investor has determined that an active strategy can best meet his or her objectives, the next challenge is to select a manager to provide exposure to the various market segments. Managers who keep costs low need to add less value to deliver a return in excess of a benchmark. Discipline in maintaining low administrative and advisory expenses plus costs due to turnover, commissions, and execution is essential for realizing any available excess return. Another key challenge involves tenure—keeping a good manager rather than rapidly turning over the portfolio. Filtering out noise—especially short-term measures of performance versus either benchmarks or peers—is also crucial. Topping the list, 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. Selecting and keeping very talented active managers with proven philosophies, discipline, and processes at costs competitive with indexing can provide the opportunity to outperform.

Figure 10. General framework for asset location

Order for investment accounts	Order for investment selections
1. Pre-tax, qualified tax-deferred accounts (i.e., 401(k)) 2. Roth accounts	1. Active equity funds* 2. Taxable bond funds 3. Broad-market equity index funds and ETFs
3. Taxable accounts	1. Broad-market equity index funds and ETFs 2. Municipal/taxable bond funds 3. Active equity funds
4. Non-qualified tax-deferred accounts (i.e., nondeductible IRA)	1. Active equity funds* 2. Taxable bond funds 3. Broad-market equity index funds and ETFs

*If the decision has been made to hold active equity funds in the portfolio. Under this framework, tax-inefficient investments or strategies (for example, active equity mandates, REITs, commodities, or other alternative investments) should be added to the portfolio only if the value resulting from their inclusion increases returns or reduces volatility more than the cost of implementing these strategies (costs include taxes as well as management and frictional costs).

Source: Vanguard.

In choosing investments, many investors tend to focus on short-term returns. They may spend little time on aspects of investment or manager selection that they *can* control (e.g., investment expenses, contribution and withdrawal levels) and more on what they can't control (e.g., picking the "hottest" mutual fund or sector).

But successfully choosing an active manager that will outperform in the future is a difficult exercise. Vanguard researchers examined the consistency of performance among active managers in an analysis that ranked all U.S. stock mutual funds in terms of excess returns or outperformance for the five years through 2007. They then identified the top 20% of funds—i.e., the best performers over that five-year period—and tracked their excess returns over the next five years (through December 2012) to see how consistently they performed. Did the top performers retain their edge?

Figure 11 displays the results. If outperformance tended to persist, a large percentage of funds would have remained in the first quintile. Instead, only 174 of the initial 1,168 best-performing funds (15%) remained at the top five years later, with an average

excess return of 2.02 percentage points. These results are no better than random; the former first-quintile funds are dispersed fairly evenly across all the bars in the second part of the chart. Rather than maintaining its lead, a previous winner stood a 58% chance of falling into the bottom 40% of all funds or disappearing altogether. On average, the former top performers fell significantly below their benchmarks' returns (the quintile 4 and 5 funds trailed by 2.07 and 4.59 percentage points, respectively), meaning that past leaders are more likely to underperform than to continue to be winners.

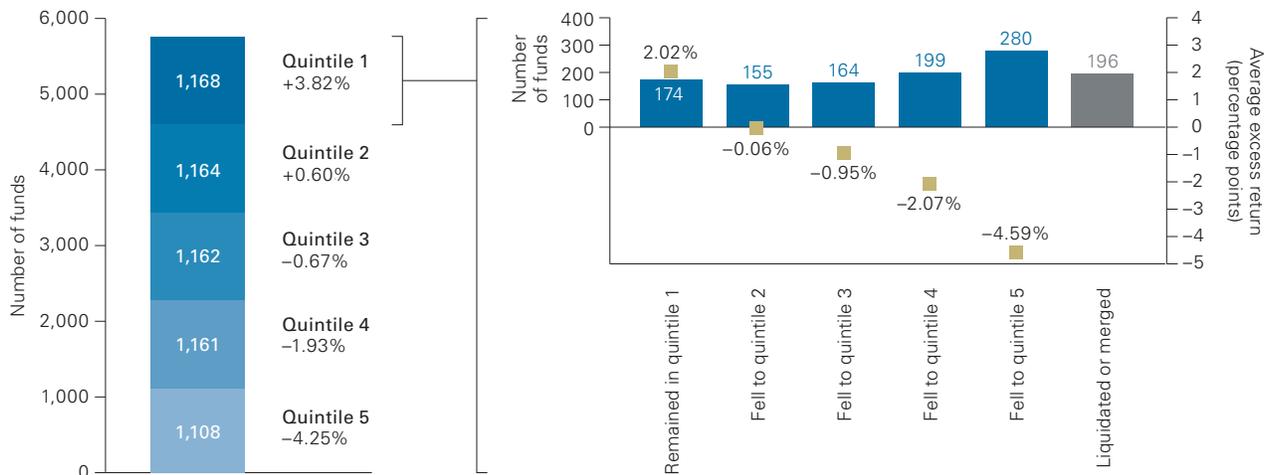
To state this another way: Of the 5,763 funds available to investors in 2007, only 174 (3%) achieved top-quintile excess returns over *both* the five years through 2007 and the five years through 2012.

This high turnover is one reason why abandoning managers whose results have lagged can lead to further disappointment. For example, in a well-reported study, authors Amit Goyal and Sunil Wahal (2008) looked at U.S. institutional pension plans that replaced underperforming managers with outperformers. The results were far different than expected. The authors found that, following

Figure 11. Fund leadership is quick to change

Funds ranked by excess return versus benchmarks, January 2003–December 2007

Excess returns and rankings for former top-quintile funds, January 2008–December 2012



Notes: The chart is based on a ranking of all actively managed U.S. equity funds covered by Morningstar's nine style categories. It measures their excess returns versus their stated benchmarks as reported by Morningstar during the five years through 2007. Of the 5,763 funds ranked, 1,168 fell into the top excess-return quintile as of year-end 2007.

Sources: Vanguard and Morningstar.

termination, the fired managers actually outperformed the managers hired to replace them by 49 basis points in the first year, 88 basis points over the first two years, and 103 basis points over the first three years (results are cumulative).

As when they are selecting active managers, investors who choose to index their investments should realize that not all index managers are created equal. When selecting an index fund, investors should ensure that it tracks a benchmark that is truly representative of the targeted objective. When comparing similar index funds, they should focus first on the expense ratio, because this is the largest factor driving tracking error or deviations relative to the target index. Wide tracking error may be a potential warning sign of inefficient management. Investors may also wish to consider other factors, such as the degree to which the fund engages in securities lending or whether it attempts to match the benchmark through a sampling technique or through full replication.

Conclusion

We have illustrated the importance of keeping your costs low while building a broadly diversified portfolio. Indexing is a proven way to accomplish both of these goals, as investments that seek to track their benchmarks at the lowest possible costs have historically outperformed their active counterparts on average over time. If an investor wants to try to outperform a benchmark, he or she must carefully choose active managers or strategies. Successful investors employ superior due diligence, focusing on a firm's people, philosophy, process, and, lastly, performance—all at a cost competitive with indexing. Fortunately, investors do not have to choose all active or all passive allocations; a combination of both has two advantages: It provides the opportunity to outperform while also offering some risk control relative to the desired benchmark(s).

Asset location is a simple but powerful tool to add long-term value to a portfolio on an after-tax basis. When setting return expectations, look at after-tax results, as this will reflect the actual money available to meet a portfolio's objectives. Because investing evokes emotion, even sophisticated investors should arm themselves with a long-term perspective and a disciplined approach. Abandoning a planned investment strategy can be costly, and research has shown that some of the most significant derailers are behavioral: the failure to rebalance, the allure of market-timing, and the temptation to chase performance.

Successful investment management companies base their business on a core investment philosophy, and Vanguard is no different. Although we offer many strategies for both internally and externally managed funds, a common theme runs through the investment advice we provide to clients: Focus on those things within your control. Too many investors focus on the markets, the economy, manager performance, or the performance of a given security or strategy instead of the core fundamentals that we believe should drive a successful portfolio. We believe a top-down approach, starting with a suitable asset allocation mix aligned with the investor's goals and constraints, offers the best chance of success.

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