Best practices for portfolio rebalancing

To maintain the risk-and-return characteristics of a portfolio's target asset allocation, it's important for an investor to rebalance. But questions about how often and how much to rebalance often arise.

Authors: Colleen M. Jaconetti, CPA, CFP®, Francis M. Kinniry Jr., CFA, and Yan Zilbering

The primary goal of a rebalancing strategy is to *minimize risk* relative to a target asset allocation, rather than to maximize returns. It is well documented that a portfolio's asset allocation is the major determinant of a portfolio's risk-and-return characteristics.[1] Yet, over time, asset classes produce different returns, so the portfolio's asset allocation will likely drift. Therefore, to recapture the portfolio's original risk-and-return characteristics, the portfolio should be rebalanced.

The issue: Because asset allocation changes over time as asset classes produce different returns, a portfolio should be rebalanced to recapture its original risk-and-return characteristics.

The challenge: Investors' natural emotional tendencies, along with rebalancing costs including time, taxes, and labor, pose hurdles to implementing a rebalancing strategy.

Vanguard conclusion: We found that there is no optimal rebalancing frequency or threshold. For most broadly diversified stock and bond portfolios, annual or semiannual monitoring—with rebalancing at 5% thresholds—is likely to produce a reasonable balance between risk control and cost minimization for most investors.

Many investors ask "how often, how far, and how much" to rebalance a portfolio. Similar to the initial selection of a portfolio's target asset allocation, the selection of a rebalancing strategy involves a trade-off between risk and return. In theory, investors should choose a rebalancing strategy that weighs their willingness to assume risk against expected returns net of the costs of rebalancing—including time, taxes, and labor.

Using broad U.S. stock and bond market data from 1926 through 2009, we found that there is no optimal frequency or threshold when selecting a rebalancing strategy. Our analysis demonstrates that the risk-adjusted returns are not meaningfully different whether a portfolio is rebalanced monthly, quarterly, or annually; however, the number of rebalancing events and resulting costs increase significantly.

As a result, we conclude that for most broadly diversified stock and bond fund portfolios (assuming reasonable expectations regarding return patterns, average returns, and risk), annual or semiannual monitoring, with rebalancing at 5% thresholds, is likely to produce a reasonable balance between risk control and cost minimization for most investors. Annual rebalancing is likely to be preferred when taxes or substantial time/costs are involved.

Note: This article is adapted from a recent (2010) Vanguard research paper by the same authors and title; available at www.vanguard.com/rebalancing.

1 Assuming a well-diversified portfolio that engages in limited market-timing. See Brinson, Hood, and Beebower (1986), Brinson, Singer, and Beebower (1991), Ibbotson and Kaplan (2000), and Davis, Kinniry, and Sheay (2007).

Return data for this paper are based on the following stock and bond benchmarks, as applicable: Stocks are represented by the Standard & Poor's 90 from 1926 through March 3, 1957; the S&P 500 Index from March 4, 1957, through 1974; the Wilshire 5000 Composite Index from January 1, 1975, through April 22, 2005; and the MSCI US Broad Market Index from April 23, 2005, through 2009. 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 Capital U.S. Aggregate Bond Index from 1976 through 2009.

Theoretical and practical considerations

Because asset allocation is the major determinant of a portfolio's risk and return, Vanguard believes that the asset allocation decision—which takes into account each investor's risk tolerance, time horizon, and financial goals—is the most important decision in the portfolio-construction process. It follows, therefore, that it's important to periodically rebalance, to diminish a portfolio's tendency to drift from its target asset allocation and acquire risk-return characteristics that may be inconsistent with an investor's goals and preferences. *Note that the goal of portfolio rebalancing is to minimize risk (tracking error) relative to the investor's target asset allocation, rather than to maximize returns.*

Investors often ask how frequently to monitor a portfolio; how far an asset allocation can deviate from its target before it is rebalanced; and whether periodic rebalancing should restore a portfolio to its target or to a close approximation of the target. While each of these decisions has an impact on a portfolio's risk-and-return characteristics, the differences in results among strategies are not very significant. Thus, the choice often becomes one of investor preference.

In addition, costs and emotions are two important practical considerations that can influence rebalancing strategies. Potential rebalancing costs—which can have a direct bearing on the preferred frequency—include taxes (capital gains taxes may be due on the sale of appreciated assets in taxable accounts), transaction costs (such as brokerage commissions and mutual fund fees), and time and labor costs of the investor (or investment manager). Trading restrictions also may limit the frequency of transacting within an account.

The natural emotional tendencies of many investors can further make rebalancing a challenge. Since 1926, significant rebalancing opportunities *into equities* have occurred after strongly negative equity market events on only seven occasions: 1930, 1931, 1937, 1974, 2000, 2002, and 2008.[2] Understandably, at these times, poor investment performance coupled with extreme uncertainty about the future made it seem counterintuitive for investors to consider rebalancing their portfolios by selling their best-performing asset classes and committing more capital to underperforming asset classes. Historically, however, investors who did not rebalance their portfolios by increasing their allocation to equities may have not only missed out on the subsequent equity returns but also did not maintain the asset-class exposures of their target asset allocation.

Investors who are equally loath to rebalance during bull markets can end up with a portfolio that is overweighted to equities, putting the investors' portfolios at risk of larger losses compared with their target portfolios.

2 Assuming a 60% stock/40% bond portfolio and annual rebalancing with a 5% threshold.

Trade-offs in the rebalancing decision

As with the selection of an initial target asset allocation, a rebalancing strategy involves a risk–return trade-off. The more risk an investor is willing to assume, the higher the expected return over the long term (known as the risk premium). If a portfolio is never rebalanced, it tends to gradually drift from its target asset allocation as the weight of higher-return, higher-risk assets increases. Compared with the target allocation, the portfolio's expected return increases, as does its vulnerability to deviations from the return of the target asset allocation.

To minimize the risk associated with portfolio drift, investors can use several possible triggers to determine when to rebalance. We focus primarily on the following three:

- A *"time-only"* strategy, which triggers a rebalancing event based on a set time schedule such as monthly, quarterly, annually, and so on. The choice of frequency largely depends on the investor's risk tolerance, the correlation among the portfolio's assets, and the costs involved in rebalancing.
- A *"threshold-only"* strategy, which ignores the time aspect and triggers a rebalancing event when a portfolio deviates from its target asset allocation by a predetermined minimum percentage, such as 1%, 5%, 10%, and so on. The nature of this strategy requires daily monitoring to determine how often to rebalance.
- A *"time-and-threshold"* strategy, which combines the "time-only" and "threshold-only" strategies. The portfolio is monitored on a set time schedule, but is rebalanced only if the allocation deviates from the target by the predetermined minimum rebalancing threshold at that time.

We evaluated the hypothetical results of using each of these three strategies for the period 1926–2009, assuming a portfolio with a target asset allocation of 60% stocks/40% bonds. For the "time-only" strategy, we assumed rebalancing monthly, quarterly, annually, and never, with each portfolio rebalanced at the predetermined interval, regardless of the magnitude of variation from the target asset allocation. We found little difference among the results.

For example, monthly rebalancing produced an 8.5% average annualized return with a 12.1% annualized standard deviation, and annual rebalancing produced an 8.6% average annualized return with an 11.9% annualized standard deviation. Both portfolios had an average equity allocation of about 60%. However, the most notable observation comes from comparing the rebalanced portfolio results with the *never-rebalanced* portfolio—which drifted to an average equity allocation of more than 84%, with an average annualized return of 9.1% and an average annualized standard deviation of 14.4%.

For the historical, hypothetical analysis of "threshold-only" rebalancing, we used thresholds of 1%, 5%, and 10% deviation from the target asset allocation, and we assumed *daily* monitoring. The insignificant differences in the results for the risk-and-return characteristics may not warrant the additional costs associated with a 0% threshold (which required more than 5,300 rebalancing events) versus a 10% threshold (which required only 4 rebalancing events). The primary drawback to the threshold-only strategy is that it requires daily monitoring. Investors can either perform the monitoring themselves or pay an advisor to do it for them (which ultimately lowers the portfolio's total return because of the additional cost); the choice depends primarily on investor preference.

Figure 1. Comparing portfolio rebalancing results for 'time-and-threshold' strategy: Various frequencies and thresholds, 1926 through 2009

Monitoring frequency	Monthly	Monthly	Monthly	Monthly	Quarterly	Quarterly	Quarterly	Annually	Annually	Annually	Never
Minimum rebalancing threshold	**0%**	**1%**	**5%**	**10%**	**1%**	**5%**	**10%**	**1%**	**5%**	**10%**	**None**
Average equity allocation	**60.1%**	**60.1%**	**61.2%**	**61.6%**	**60.2%**	**60.9%**	**62.6%**	**60.5%**	**60.7%**	**63.0%**	**84.1%**
Costs of rebalancing											
Annual turnover	2.7%	2.3%	1.7%	1.3%	2.2%	1.7%	1.5%	1.7%	1.6%	1.4%	0.0%
Number of rebalancing events	1,008	389	58	20	210	50	21	72	28	15	0
Absolute framework											
Average annualized return	8.5%	8.5%	8.6%	8.8%	8.7%	8.8%	8.9%	8.6%	8.6%	8.7%	9.1%
Volatility	12.1%	12.1%	12.2%	12.2%	12.2%	12.1%	12.3%	11.9%	11.8%	12.1%	14.4%

Notes: **This illustration does not represent the return on any particular investment.** Assumes a portfolio of 60% stocks/40% bonds. All returns are in nominal U.S. dollars. For benchmark data, see box on page 2. There were no new contributions or withdrawals. Dividend payments were reinvested in equities; interest payments were reinvested in bonds. There were no taxes. All statistics were annualized.

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

The third strategy we evaluated, "time-and-threshold," calls for rebalancing the portfolio on a scheduled basis (e.g., monthly, quarterly, or annually), but only if the portfolio's asset allocation has drifted from its target asset allocation by a predetermined minimum rebalancing threshold, such as 1%, 5%, or 10%. If, as of the scheduled rebalancing date, the portfolio's deviation from the target asset allocation is less than the predetermined threshold, the portfolio will not be rebalanced. Likewise, if the portfolio's asset allocation drifts by the minimum threshold or more at any *intermediate* time interval, the portfolio will not be rebalanced at that time.

Figure 1 summarizes the results of several hypothetical portfolios using "time-and-threshold" rebalancing—with monthly, quarterly, and annual monitoring frequencies and 1%, 5%, and 10% minimum rebalancing thresholds. We compared the risk-and-return characteristics produced by the various time-and-threshold strategies relative to a target asset allocation of 60% stocks/40% bonds that was rebalanced monthly regardless of the magnitude of the allocation drift (0% minimum rebalancing threshold). The impact of portfolio drift can be seen in the never-rebalanced portfolio in the far right column—with an average equity allocation of more than 84%.

A portfolio that was rebalanced more frequently—either because it was monitored more frequently or because it had tighter rebalancing thresholds—tracked the target asset allocation more closely, but the magnitude of the differences in the average annualized returns and volatility was relatively insignificant.

In addition, Figure 1 shows that the cost of rebalancing may place upper limits on the optimal number of rebalancing events. In our hypothetical simulation, the number of rebalancing events and the annual turnover were proxies for costs, which detract from the portfolio's return and potentially undermine the risk-control benefits of some rebalancing strategies. (Actual costs for any investor depend on a portfolio's unique transaction costs and taxes.) A rebalancing strategy with monthly monitoring and 1% thresholds was more costly

to implement (389 rebalancing events, with annual portfolio turnover of 2.3%) than one that included annual monitoring and 10% rebalancing thresholds (15 rebalancing events and annual portfolio turnover of 1.4%).

After taking into consideration reasonable expectations regarding return patterns, average returns, and risk, we concluded that—for most broadly diversified stock and bond fund portfolios—annual or semiannual monitoring, with rebalancing at 5% thresholds, produces a reasonable balance between risk control and cost minimization.

There are two important qualifications to this conclusion. First, this analysis assumes that some approximation of the U.S. stock and bond markets' historical return patterns, average returns, volatility, and low return correlation can be expected to persist in the future. Second, our analysis assumes that a portfolio holds a broadly diversified group of liquid assets with readily available market prices.[3]

Implementing a rebalancing strategy

In translating this conceptual rebalancing framework into practical strategies, it's important to recognize two real-world limitations to the framework's assumptions. First, conventional wisdom among financial practitioners suggests that investor preferences may be less precise than theory assumes. Investors' target asset allocations are typically flexible within 5% to 10% ranges, indicating that they are mostly indifferent to small risk-or-return deviations. Second, some costs of rebalancing—time, labor, and market impact—are difficult to quantify and are often included indirectly in advisory fees or reflected as trading restrictions.

Recognizing such real-world limitations to rebalancing, we offer two practical strategies that aim to capture the risk-control benefits illustrated by our theoretical framework while minimizing the costs:

Rebalance with portfolio cash flows. Rebalancing a portfolio with dividends, interest payments, realized capital gains, or new contributions can help investors control risk and trim the costs of rebalancing. Typically, investors can accomplish this by sweeping their taxable portfolio cash flows into a money market or checking account and then redirecting these flows to the most underweighted asset class as part of their scheduled rebalancing event.[4] Our analysis showed that an investor who had simply redirected portfolio income would have achieved most of the risk-control benefits of more labor- and transaction-intensive rebalancing strategies at a much lower cost.

For taxable investors, this strategy was also very tax-efficient. One caution: The high levels of dividends and interest rates during this 84-year period may not be available in the future. An effective approach independent of the level of dividends and bond yields is to use portfolio contributions and withdrawals to rebalance the portfolio. However, the potential tax consequences of these transactions may require more customized rebalancing strategies.

Rebalance to some intermediate asset allocation. When trading costs are mainly fixed—the cost of time, for example—rebalancing to the target allocation is optimal because it reduces the need for further transactions. However, when trading costs are mainly proportional to the size of the trade—as in commissions or taxes, for example—rebalancing to the closest rebalancing boundary is optimal, to minimize the size of the transaction. If both fixed and proportional costs exist, the optimal strategy is to rebalance to some intermediate point.

3 A concentrated or aggressive, actively managed portfolio of stocks and bonds may also behave differently from our illustrated examples. Such portfolios tend to be more volatile than broadly diversified stock and bond portfolios, requiring more frequent rebalancing to maintain similar risk control relative to the target asset allocation.

4 The sweep process just described can improve the after-tax return of the portfolio at the margin; however, investors should weigh the time and effort required against the potential increased returns.

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P.O. Box 2900
Valley Forge, PA 19482-2900

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