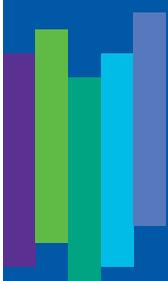


INVESTMENT PRINCIPLES
INFORMATION SHEET FOR CFA PROFESSIONALS

**THE BENEFITS OF
DIVERSIFICATION**
**HOW TO
REBALANCE**



3F

IMPORTANT NOTICE

The term "financial advisor" is used here in a general and generic way to refer to any duly authorized person who works in the field of financial services, including the following:

- Investment brokers
- Mutual fund brokers
- Scholarship plan dealers
- Exempt market dealers
- Portfolio managers
- Investment fund managers
- Life insurance agents
- Financial planners (F.Pl.)



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HOW TO REBALANCE

We have already explained in 3a that the benefits of diversification cannot be captured without a rebalancing process. If portfolios are not rebalanced, the allocation will drift gradually toward the best performing asset, which is usually the riskiest asset. Thus the volatility of a portfolio that is not rebalanced is likely to increase over time, and the portfolio will not benefit from the impact of lower volatility on compounded returns. There are many choices of rebalancing methodologies, such as calendar, threshold, and risk-based. The methodologies do not all have the same return to risk efficiency, although any method should prove better than buy-and-hold. Furthermore, the efficiency of diversification is very much a function of the diversity of the asset classes in the portfolio. The rebalancing process will be of greater benefit to portfolios that incorporate a larger number of asset classes.

COMPOUNDED RETURNS AND REBALANCING

In document 3a, we explained that volatility drains the compounded return of a portfolio by about half the squared standard deviation of returns. In other words:

$$\text{Average Compounded Return} \cong \text{Average Periodic Return} - \text{Volatility}^2/2$$

There are at least two implicit assumptions in this relation: first, that the volatility is stable over time; and, second, that the portfolio is continuously rebalanced. Obviously, neither assumption is true. Portfolios are not rebalanced continuously and volatility is far from stable. For example, market volatility is usually far more significant during difficult economic environments than in more normal times. Thus it is important to know not only the different forms of portfolio rebalancing but also how they fare comparatively. Thus the objective here is not to justify rebalancing (this aspect has already been covered), but to determine its impact and to examine whether some rebalancing methodologies may be more efficient.

CALENDAR, THRESHOLD, AND RISK-BASED REBALANCING

Let's assume a portfolio with an allocation target of 60% equities and 40% bonds. Even if the portfolio is initially allocated on a 60/40 basis, market returns will cause the actual portfolio allocation to deviate from this target. A calendar rebalancing implies rebalancing the portfolio toward the target at specific intervals, which could be monthly, quarterly, annually, etc. A threshold rebalancing is triggered only when the actual portfolio allocation deviates from the 60/40 target by a given spread. For example, rebalancing may be triggered if the fixed-income component deviates by more than 10% from its 40% target value (namely, it goes below 36% or above 44%). In both cases, when rebalancing occurs, the portfolio may be rebalanced exactly to the long-term target or to some tolerance band in order to reduce portfolio turnover. For example, if the tolerance band for fixed income is between 38% and 42%, the portfolio will be rebalanced toward 38% fixed income if the allocation is below 36% and toward 42% if it is above 44%.

Risk-based rebalancing is more complex. As we stated, the volatility of a portfolio is not stable over time. For example, a risk-based rebalancing methodology may involve implementing an allocation that has the same current volatility as the average long-term volatility of a 60/40 portfolio. Let's assume the average long-term volatility of a 60/40 portfolio is 9%. If the current volatility of a 60/40 portfolio is higher than 9% because of a recent spike in equity volatility, risk-based rebalancing will involve reducing the allocation to equity in order to keep the level of volatility constant. As with calendar and threshold rebalancing, a tolerance volatility band may also be applied, such as tolerating the current allocation as long as portfolio volatility remains between 8% and 10%.

REBALANCING METHODOLOGIES AND PERFORMANCE

Lussier (2013)¹ completed an extensive review of most rebalancing methodologies documented in the literature and compared their efficiency using similar portfolio contexts for all. The analyses considered all three types of methodology, different portfolio targets (ranging from 40/60 to 80/20), different rebalancing intervals (from weekly to every two

years), different threshold measures, two rebalancing targets (to the target and to a tolerance band), and two types of portfolios (a simple portfolio based solely on the S&P 500 and on Treasury bonds and a more diversified portfolio containing U.S. and international equities as well as small-cap equities and commodities). The study covered a period of 30 years. The results of all methodologies were compared with a standard calendar monthly rebalancing approach. The main conclusions are consistent with the results of most other studies:

- With a calendar approach, the highest excess performances were achieved with semi-annual rebalancing although quarterly and annual rebalancing also delivered good results. But the improvement against a standard monthly rebalancing is far better for a more diversified portfolio than for a portfolio with only few asset classes. Gains of 10 to 15 basis points (bps) were observed on average.
- The threshold methodology using a tolerance threshold of about 20% to 25% (which is triggered when any of the portfolio components deviates from its target allocation by more than 20% to 25%) yielded better results with average excess performances of about 20 to 35 bps on average.
- A controlled volatility strategy which consisted of targeting the average long-term volatility of the target allocation yielded even better results, although it is obviously more difficult to implement.

A portfolio benefitting from greater diversification of asset classes can expect even greater gains. To a certain point, these results are intuitive. We know that when an asset class benefits from a favourable environment, the price momentum in this asset class can last several quarters. For example, when equity outperforms or underperforms fixed income or when U.S. equities outperform or underperform international equities, this relative performance trend will usually last several quarters, or even years, although it is difficult to forecast how long it will last. By rebalancing too often, we run the risk of selling rising assets or buying losing assets too quickly. But if we wait too long to rebalance, a rising asset may start to fall out of favour, and some of the previous gains may be lost. Similarly, a risk-based methodology yielded better results because managing the total risk of a portfolio leads to a more stable long-term risk and a lesser drag of volatility on compounded returns. Furthermore, managing

¹ Lussier, J., 2013, *Successful Investing Is a Process*, Wiley-Bloomberg Press, pp. 170-179.

volatility or even capping portfolio volatility at a maximum level sometimes protects the portfolio from the unfavourable performances that are generally observed during periods of extreme volatility.

REBALANCING AND RISK

Do we increase portfolio risk if we do not rebalance as often? Although not rebalancing at all will usually cause the allocation of the portfolio to drift toward the riskier assets, calendar rebalancing on a quarterly or even on an annual basis has not been found to increase risk. There is an intuitive explanation for this. Let's consider an unfavourable equity market. If the equity market declines and if we rebalance every day or every month, we will continually be purchasing equities to bring the portfolio back to its target allocation. But if we rebalance less frequently, we actually allow the portfolio to maintain a lower allocation to the declining (riskier) asset until a rebalancing eventually occurs, let's say a quarter or a semester later. This may actually decrease risk significantly if equities are declining significantly and volatility is high. But if the value of the equities rises, we allow the allocation to equities to drift higher and conceptually the risk of the portfolio to increase. But rising equity markets often occur when volatility is lower, which means we tolerate a higher allocation to equities in environments of normal or lower volatility. As long as the rebalancing interval is not too significant, we could not find evidence that a longer rebalancing interval, such as three to 12 months, is riskier than a monthly interval.

Rebalancing improves compounded returns by allowing the diversification process to work. But there are many rebalancing methodologies, and the evidence shows that some may provide higher excess returns without necessarily increasing risk. In the case of calendar rebalancing, quarterly to annual rebalancing intervals were found to be more efficient on average than monthly rebalancing, but threshold rebalancing can provide even better results. Finally, risk-based rebalancing appears to be a superior methodology although it is more complex to implement. Most investors would be well-served if they implemented disciplined calendar-based rebalancing and then eventually explored other methodologies.