Rebalancing for Taxable Accounts

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We recently studied the issue of portfolio rebalancing at the asset class level with the goal of identifying a clearly superior technique to be used for taxable accounts. Our approach was to take the set of strategic asset allocations in Table 1 and simulate their performance using assumptions as to the expected standard deviation, return, and correlation for each of the five asset classes (see Tables 2 ans 3).

Table 1: Composition of Model Portfolios

Asset Class	Conservative	Moderately Conservative	Moderate	Moderately Aggressive	Aggressive
Large-Cap Stocks	15%	25%	35%	45%	50%
Small-Cap Stocks	0%	5%	10%	15%	20%
International Stocks	5%	10%	15%	20%	25%
Bonds	50%	50%	35%	15%	0%
Cash	30%	10%	5%	5%	5%

Table 2: Expected Annual Returns and Standard Deviations

Asset Class	Expected Return	Expected Standard Deviation
Large-Cap Stocks	8.5%	18.9%
Small-Cap Stocks	10.1%	26.2%
International Stocks	8.3%	20.0%
Bonds	4.4%	5.8%
Cash	2.8%	3.0%

Note: Expected returns are expressed as nominal arithmetic returns.

Table 3: Expected Correlations Among Asset Classes

	Cash	Bonds	Large-Cap Stocks	Small-Cap Stocks	International Stocks
Cash	1.00				
Bonds	0.32	1.00			
Large-Cap Stocks	0.21	0.30	1.00		
Small-Cap Stocks	0.16	0.20	0.88	1.00	
International Stocks	0.17	0.19	0.70	0.62	1.00

Table 4 lists the 20 rebalancing techniques as well as a "never rebalance" strategy. This list is not exhaustive, but is hoped to be representative of the asset-class-based techniques in use today.

Table 4: Rebalancing Strategies Evaluated

Code	Rebalancing Strategy: Trigger Rule / Target Rule
A	Annual 5% Tolerance / Tolerance Boundary
B	Annual 10% Tolerance / Tolerance Boundary
C	Annual Time-Based / Strategic Target
D	Annual 5% Tolerance / Strategic Target
E	Annual 10% Tolerance / Strategic Target
F	Monthly Time-Based / Strategic Target
G	No Trigger / Never Rebalance
H	Quarterly 5% Tolerance / Tolerance Boundary
I	Quarterly 10% Tolerance / Tolerance Boundary
J	Quarterly Time-Based / Strategic Target
K	Quarterly 5% Tolerance / Strategic Target
L	Quarterly 10% Tolerance / Strategic Target
M	Semi-Annual 5% Tolerance / Tolerance Boundary
N	Semi-Annual 10% Tolerance / Tolerance Boundary
O	Semi-Annual Time-Based / Strategic Target
P	Semi-Annual 5% Tolerance / Strategic Target
Q	Semi-Annual 10% Tolerance / Strategic Target
R	Monthly 5% Tolerance / Tolerance Boundary
S	Monthly 10% Tolerance / Tolerance Boundary
T	Monthly 5% Tolerance / Strategic Target
U	Monthly 10% Tolerance / Strategic Target

The strategies tend to have two main components: the trigger and the target.

Rebalancing trigger. This defines the conditions under which a portfolio requires rebalancing. Two different sets of triggers were reviewed in this study as follows.

- *Time-based triggers.* These types of triggers force rebalancing to occur at specific intervals of time regardless of the portfolio's current asset allocation relative to its strategic target. Monthly, quarterly, semi-annual, and annual versions of time-based triggers were evaluated.
- *Tolerance-based triggers.* In this technique the portfolio is checked at a given time interval, but rebalancing occurs only when one of the portfolio's asset classes deviated from its strategic target by an amount exceeding the stated tolerance level (a threshold denominated as a percentage of total portfolio value). Rebalancing triggers using tolerances of 5 and 10 percentage points were examined using monthly, quarterly, semi-annual, and annual time intervals.

Rebalancing target. While the rebalancing trigger determines the need for rebalancing, the rebalancing target defines what asset allocation mix will be implemented once the trigger has been activated. Two types of rebalancing targets were reviewed.

- *Back to strategic target.* With this technique, all asset classes held in the portfolio are reset to their long-term strategic target weights (that is, the percentages given in Table 1).
- *Back to tolerance boundary.* When this technique is used, the asset class weights are reset to the edge of the tolerance boundary region for each asset class (instead of back to the strategic target). The tolerance boundary is defined as the range around the strategic target for each asset class plus or minus the tolerance threshold used. For example, if the target could be 60 percent, and the tolerance threshold is ±5 percentage points.

Some Methods Clearly Inferior

For each model portfolio and rebalancing technique, we ran 5,000 ten-year histories of monthly returns for each of the component asset classes. The simulations were conducted using a Monte Carlo-based portfolio simulation engine that generated random monthly total returns that were consistent with the expected long-term returns, standard deviations, and asset correlations given in Tables 2, 3, and 4. A ten-year period was selected so as to provide a long enough time horizon to bring out the good and bad qualities associated with each approach without being so long as to be unrealistic from the perspective of a typical investor holding period.

No transaction costs were charged. A tax rate of 35 percent was charged for positions held one year or less, and a tax rate of 15 percent was charged for positions held longer than one year. "First-in-first-out" accounting was used; any losses that were generated by a trade that couldn't be offset in that same year were carried over and used as needed.

The results from the simulation are presented in Figures 1 through 5. Each figure shows the average return and volatility from the 5,000 simulated results for each of the 21 rebalancing techniques applied to a given model portfolio. The results for a specific technique are indicated with the appropriate letter code taken from Table 4.

Figure 1: Conservative

Figure 2: Moderately Conservative

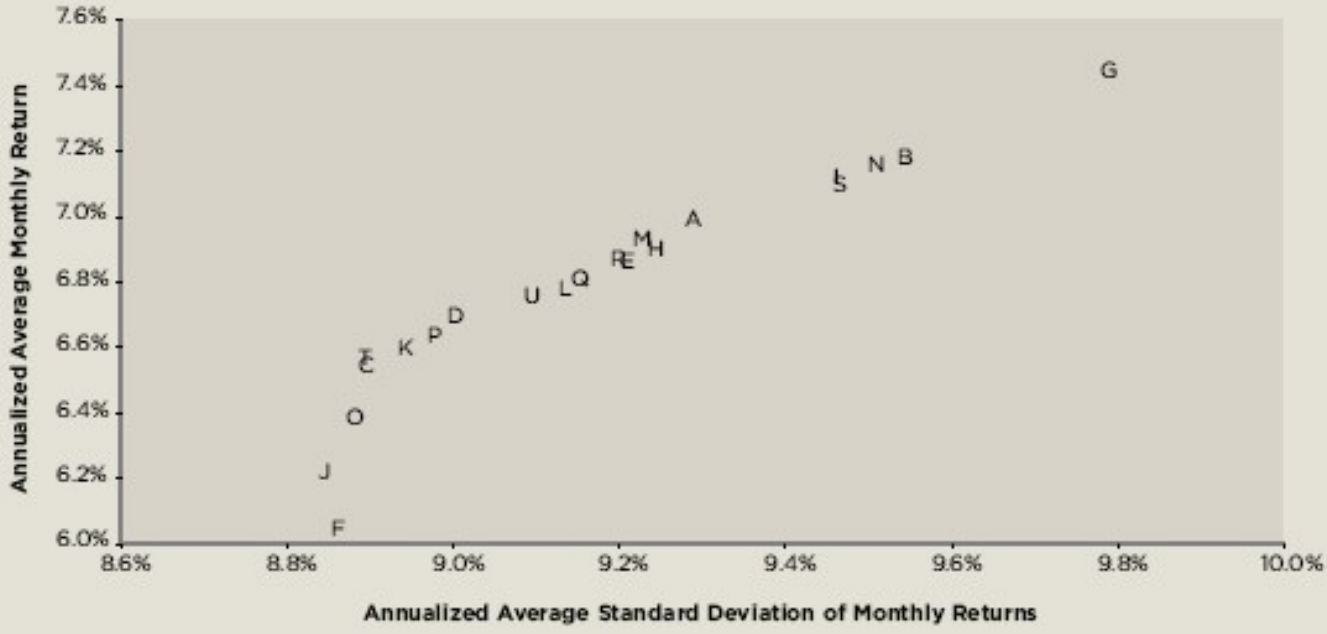


Figure 3: Moderate

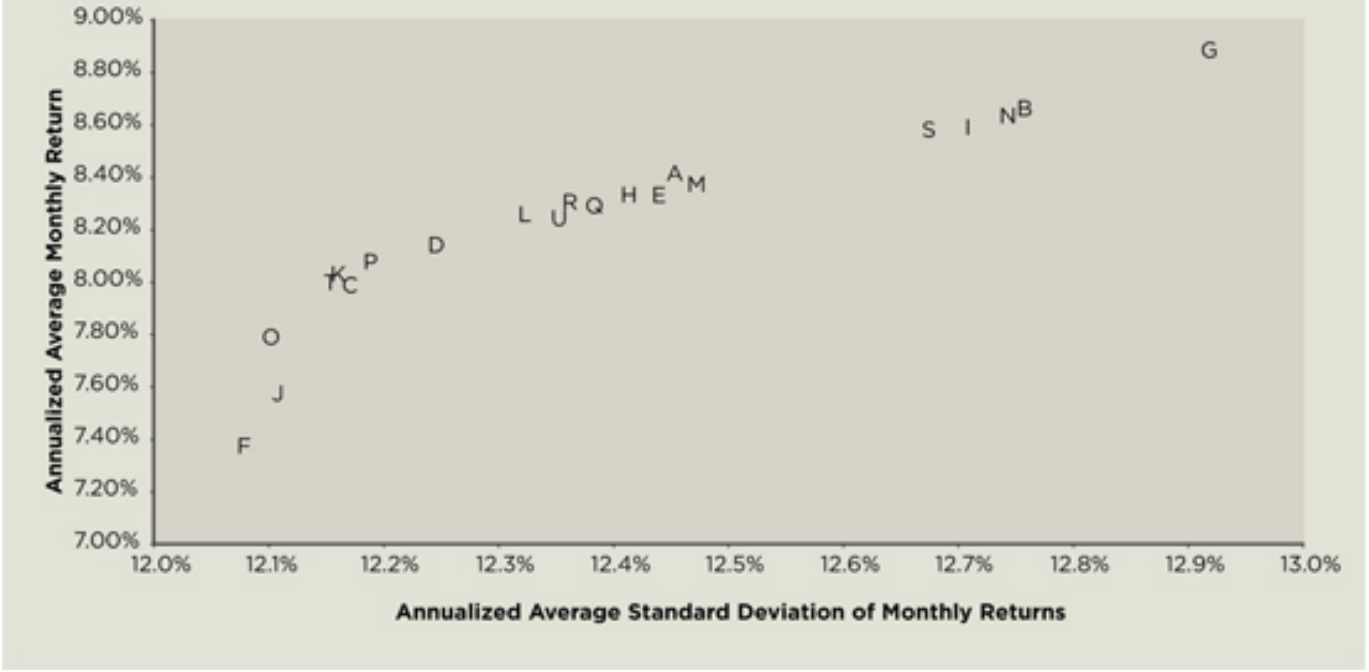


Figure 4: Moderately Aggressive

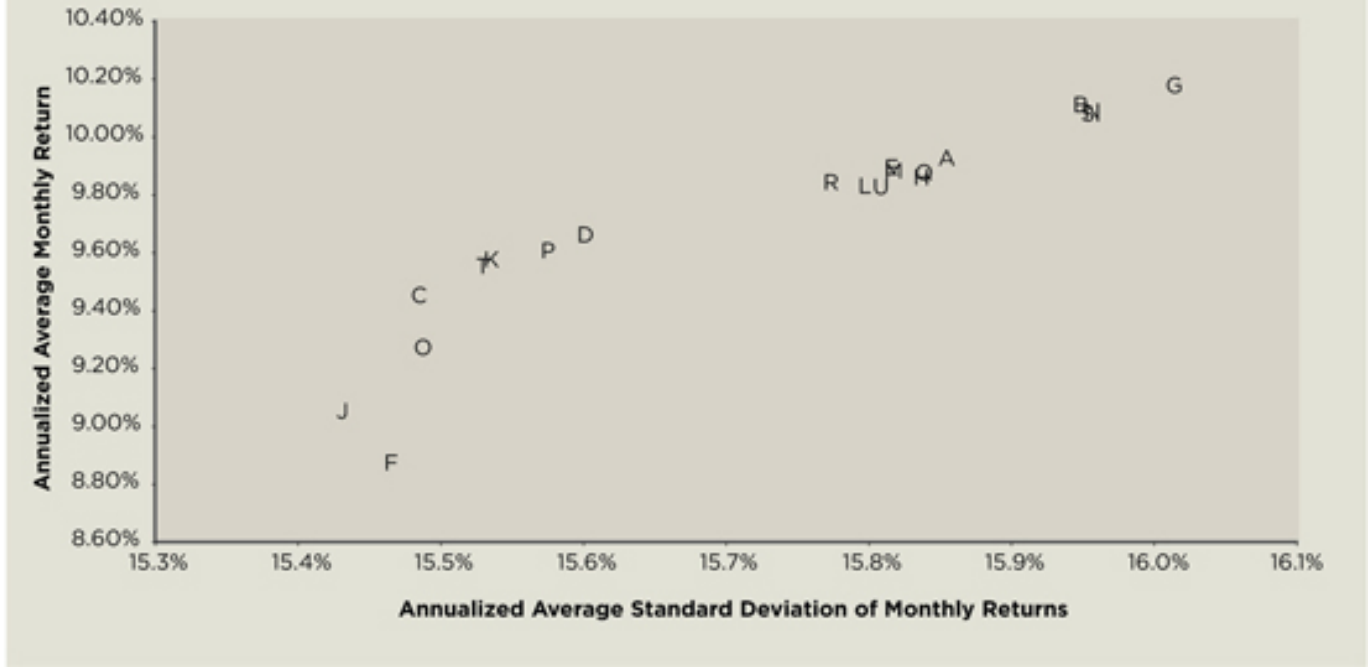
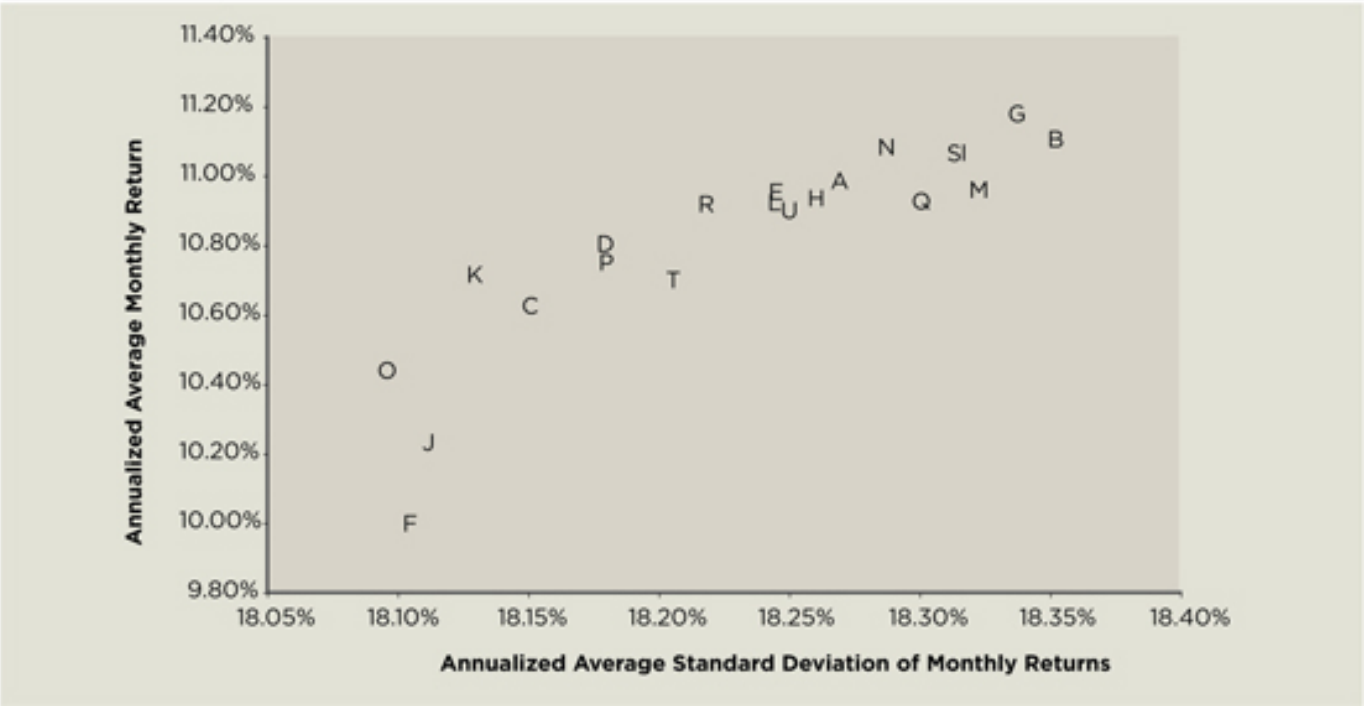


Figure 5: Aggressive



Regularities and Kinks

A number of regularities were apparent from the results and these were discussed at length in our previous work on this subject ("Rebalancing for Tax-Deferred Accounts: Just Do It—Don't Worry How," April 2006). What is different about this study is the fact that some techniques appear to be clearly inferior.

In the previous study, all the techniques lined up close to linearly when plotted in risk-return space. There was no apparent advantage in terms of risk-adjusted returns from using a specific technique. In these results there are kinks in all of the figures. These kinks indicate opportunities to improve return with little or no extra risk.

For example, technique F (from Table 4, this is monthly rebalancing back to the strategic target) is always the lowest-returning and lowest-risk technique. Compare its results with technique J (quarterly rebalancing back to the strategic target). F and J have virtually the same risk level, but J always has a higher average return. Then compare technique O (semi-annual rebalancing back to the strategic target) with J and F. Again we see that O has the same risk level, but a higher average return.

The reason these results differ from the tax-deferred results is that before, we assumed no taxes and no transaction costs. In these results, the positive capital gains tax rate functions as a sort of transaction cost. Those techniques that generate a greater number of rebalancing trades taxed at the 35 percent rate are at a disadvantage relative to those techniques whose trades are more often taxed at the 15 percent rate.

Tips When Rebalancing in a Taxable Account

1. Exert more care when rebalancing in taxable accounts.
2. Avoid generating rebalancing trades by directing new money into underweighted asset classes.
3. When sensible, execute trades to generate tax losses that can then be used to offset any capital gains generated by
rebalancing trades.

4. Be patient and wait until eligible for long-term capital gains treatment.
5. If taxable and tax-deferred accounts are both allocated toward the same goal, have the tax-deferred account bear as much of the
rebalancing load as possible.