

Next -generation Asset Management: Variance Rebalancing

In the years that I have been working with the financial planning industry, I have found that many financial advisors have an identity crisis. For the most part, if you were to ask a financial planner “What do you do for your clients?” they would be hard pressed for a concise answer. This is not because of the complexity of their services; it is because they themselves don’t know. What they do know is where their revenue comes from: commissions and/or fees. I submit that even within this subcategory of their business, many are unsure of the services they provide and the value they offer. I have been very surprised to find that many financial advisors justify their annual fee revenue for nothing more than (as I like to refer to it) “Reaching for the Stars”. They seem to ignore the academic research that demonstrates the lack of value provided by active managers (studies show 80% of actively managed funds don’t outperform indexes) and exchange their annual fee revenue for a vain attempt to select superior active managers.

I submit that the financial planners providing retirement planning services must focus on the modeling process and provide asset management services that eliminate unsystematic risks so as to increase the confidence of the modeling results. In order to provide this service, new asset management product structures based on indexing must be offered. A disciplined program of *variance rebalancing* answers the call. It provides index-based asset management of ETFs (Exchange Traded Funds) with variance rebalancing (a process of rebalancing portfolio asset allocation based on a measure of skew). Exchange Traded Funds provide advisors access to the markets in real time. Current access to investment products based on indexes is provided by mutual fund structures that only allow access to the markets at the end of the trading day. This has been very restrictive for asset managers whose focus is on maintaining proper asset allocation (this focus is on maintaining risk, since risk is the primary concern of retirement planning clients).

The next-generation program of Variance Rebalancing leverages the real time access to the markets to perform real time variance-based asset allocation rebalancing. It utilizes a computer based modeling program to monitor portfolios for the need to rebalance portfolios every minute of the trading day. Each time a portfolio is determined to be skewed, the program calculates the amount of ETF shares required to be bought and sold to return the portfolio to its proper asset allocation model percentages.

Through a unique technological advancement, cost efficiencies afforded to separately managed accounts and mutual funds can now be extended to these managed accounts. ETF rebalancing transactions expenses are calculated at an omnibus level. This means that all clients are treated equally when it comes to sharing in the rebalancing costs and that economies of scale reduce the individual’s share.

I conducted a study of the relative performance and return enhancements offered by the variance rebalancing as compared to annual rebalancing and “Buy and Hold”. To see the portfolio construction, see the image [Figure 1](#) below.

Figure 1

As you can see the portfolio is allocated 65% to equities, 20% to Bonds, 10% to Real Estate and 5% to Cash. The portfolio allocation is represented by index based ETFs, see below:

Figure 2

Asset Class	Allocation	Ticker	Description
Equities	65%	DGT	Dow Jones Global Titans
Bonds	20%	AGG	Lehman Bros. Aggregate Bond Index
Real Estate	10%	RWR	streetTRACKS DJ Wilshire REIT
Cash	5%	N/A	3 month CD Rates as indicated by the Federal Reserve

Rebalancing is triggered each time an asset class becomes askew by more than the percentage noted above in [Figure 1](#). For further clarification, 1% variance of askew is equal to an absolute dollar value of the relative aggregate account value. For example, if the total account value is \$10,000,000 and the Cash value grows to a value greater than \$550,000, a rebalancing is triggered. In addition, if a rebalancing is triggered in the course of a trading day, a rebalancing will not be triggered again until the next trading day. Therefore a rebalancing can only be triggered once a day. Based on these criteria, an analysis of minute-by-minute pricing of the ETFs listed in [Figure 2](#) above, rebalancing activity would have been triggered from January 1, 2004 – December 31, 2006 as shown in [Figure 3](#) below.

Figure 3

Date	Time	DGT	AGG	RWR
3/10/2004	11:17 AM	1674	38	-1314
3/22/2004	9:58 AM	1673	-572	-448
4/5/2004	11:54 AM	-1662	830	908
4/13/2004	10:01 AM	-1074	-238	2204
7/2/2004	9:30 AM	1720	392	-1864
8/6/2004	9:53 AM	1683	-532	-456
10/25/2004	9:30 AM	1749	127	-1260
11/4/2004	2:54 PM	-1695	861	-24
2/28/2005	2:10 PM	-1683	738	824
3/31/2005	9:30 AM	1391	-177	-112
5/13/2005	2:04 PM	1716	-172	-1204
7/8/2005	9:30 AM	1312	398	-1028
8/9/2005	9:30 AM	-1761	596	859
9/28/2005	9:30 AM	1188	-7	-306
12/29/2005	9:30 AM	685	614	-354
3/16/2006	10:05 AM	216	1120	-1503
4/7/2006	9:30 AM	-91	209	597
6/13/2006	10:45 AM	1773	-642	-155
6/28/2006	9:31 AM	-29	399	287
8/11/2006	9:30 AM	-2247	1359	110
11/21/2006	11:32 AM	817	790	-1463

As you can see from the trading activity above in [Figure 3](#), there were rebalancing triggers throughout each year that span the trading days. These opportunities could not be enacted within the current mutual fund supermarkets that are used by many financial planners. What are the results? Does Variance Rebalancing work? Before we discuss the results, let's discuss the type of market activity used for the analysis. The time period is 2004, 2005 and 2006. The reason for this time period is because the available data for minute by minute pricing of ETFs is limited. I was able to compile minute by minute pricing for the ETFs used in the study for these 3 years. It just so happens that over this time period each year had a positive return.

Please see the table [Figure 4](#) below:

Figure 4

Year	DGT	AGG	RWR	Cash
2004	7.39%	3.79%	32.46%	1.57%
2005	2.97%	2.28%	13.11%	3.51%
2006	19.65%	3.91%	35.53%	5.16%

One of the benefits to diversification is the shifting of assets to under performing asset classes that will provide higher returns in the future. This force is called *regression to the mean*. Rebalancing is a natural function of the “Buy Low” “Sell High” methodology implemented within a diversified portfolio. However, diversification is only offered by portfolios with asset classes without high correlations. Even though this portfolio of asset classes historically doesn’t have high correlations, during this 3 year period of analysis they do. I would expect that during periods of lower correlation, the benefits of variance rebalancing will be leveraged. Below are a couple of tables that provide the results of the performance analysis of:

1. ‘Buy N Hold’ (simple growth of each initial investment amount by the total return of each asset class).
2. Annual Rebalancing (each asset class is rebalanced at the end of each year).
3. Variance Rebalancing (each asset class is rebalanced when triggered by an asset classes’ exceeding askew tolerances)

Measuring performance cannot be evaluated solely on return. Risk must also be measured to develop complete picture of the asset management performance. As you can see below in [Figure 5](#), although the “Buy N Hold” and Annual Rebalancing discipline has a higher annualized rate of return, they carry with them high rates of risk (as measured by annual standard deviation). Therefore it is important that we measure the return performance with risk adjusted terms.

Figure 5

Risk	Return	
5.82%	10.22%	Buy N Hold
5.57%	9.90%	Annual Rebalancing
4.84%	9.48%	Variance Rebalancing

In [Figure 6](#) below, we can see a table of the relative performance numbers. The results show that Variance Rebalancing earned 92.79% of the return of “Buy N Hold” while limiting the risk to only 83.06%. And, Variance Rebalancing earned 95.76% of the return of the Annual Rebalancing while limiting the risk to only 86.87%.

Figure 6

Risk	Return	
83.06%	92.79%	Buy N Hold
86.87%	95.76%	Annual Rebalancing
100.00%	100.00%	Variance Rebalancing

So - What can we conclude about Variance Rebalancing? We can conclude that Variance Rebalancing provides more efficient risk adjusted returns. *Therefore, the portfolio managed with Variance Rebalancing is the preferable discipline.* For more information about the merits of variance based rebalancing see the links below:

- A study conducted by a group at MIT which analyzes the rebalancing process and proposes various optimal rebalancing methods.
<http://ssg.mit.edu/~waltsun/docs/rebalancingSSRN05.pdf>
- A paper by Bernstein Global Wealth Management is a unit of AllianceBernstein L.P. that discusses the psychology of rebalancing and proposes that amounts of variance askew are unique to the portfolio's asset classes.
https://www.bernstein.com/CmsObjectPC/pdfs/BJ_SP04_Rebalancing.pdf

The value of alpha is what every advisor seeks for their client, however many advisors follow such pursuits as active management to find alpha (which is in direct contradiction with Efficient Market Theory and the majority of all academic research). In the case of the Minuteman (variance based rebalancing) alpha is simply the byproduct of rebalancing at the time required by the investment policy statement.

In the study I conducted from minute-by-minute historical data spanning 2004 – 2006 (a time period selected simply because of the limited historical tick data for ETFs), the markets were pretty "Bullish" and in a tight trading range (which are not the types of markets conducive to demonstrating the benefits of variance based rebalancing). I am pointing out that this was a bad time period to use for measuring the benefits of variance based rebalancing (no cherry picking here).

Let's draw some measurable conclusions regarding the study.

Using “Buy N Hold” as the market, we can measure the alpha value of both Annual Rebalancing and Variance Rebalancing.

Portfolio	Return	Standard Deviation	Beta	Expected Return	Alpha (%)*
Buy N Hold	10.22%	5.82%	1.0	N/A	N/A
	9.90%	5.57%	.96	9.65%	0.25%
	9.48%	4.84%	.83	8.56%	0.95%

*Modified Alpha calculation – assumes risk free rate of 4% and expresses the additional rate or return earned on an annual basis.

Alpha Definition - A coefficient which measures risk-adjusted performance, factoring in the risk due to the specific security, rather than the overall market. A high value for alpha implies that the stock or mutual fund has performed better than would have been expected given its beta (volatility). <http://www.investorwords.com/183/alpha.html>

So let’s look at what this really means. It means that Minuteman Rebalancing provided an additional 0.95% annual return for the amount of risk. In my book this is the type of value that an advisor is trying to provide to the client. But you say that the return is not higher than the “Buy N Hold”. Well you can now invest in a higher risk portfolio model because of the greater efficiency. Instead of using a conservative portfolio, use a moderate or even a balanced portfolio.

If you were to use a Minuteman Rebalanced portfolio that had the same risk as the “Buy N Hold”, your return would have been 11.42%.

So the ball is in your court. I have presented an analysis of the application of the Minuteman Rebalancing with minute-by-minute ETF pricing during a less than flattering time period for rebalancing and still the return enhancement is significant enough to provide value much greater than the cost 0.5% annually. Not to mention that client received the constant assuredness that their portfolio never strayed farther than their comfort level. So is it worth it? The math says YES.

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