The Importance of Portfolio Rebalancing in Volatile Markets

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Steven Weinstein, Cindy Sin-Yi Tsai and Jason Laurie discuss the importance of rebalancing a portfolio in every market climate and the significant role rebalancing has in maintaining an investment policy.

One of an investment advisor's most important roles is to formulate a customized, written investment policy for each client. This policy documents each client's objectives and constraints, including financial position, required return, investment time horizon, and risk tolerance. From this information, the advisor constructs a diversified asset allocation strategy with target weights in different investment classes. Until a major life event changes the investor's circumstances, the policy and strategy should be maintained. This requires regular evaluation of the portfolio for possible rebalancing.

Rebalancing—Advantages and Disadvantages

Because different asset classes produce different returns, the relative weighting inevitably drifts over time. Rebalancing brings the portfolio into alignment with the original target weights of each asset class by selling the overweighted asset classes and buying the underweighted asset classes. Through this discipline, the portfolio maintains the original risk profile intended for the client. The process not only forces the investor to sell high and buy low, but it also reduces long-term portfolio volatility.

Rebalancing does have some potential disadvantages. For taxable investors, rebalancing may create additional taxes and transactions costs. There are concerns that long-term portfolio returns may be reduced because investors are selling their winners. The discipline required by rebalancing creates extra work for both the investor and the advisor, as they must regularly value the various asset classes in the portfolio, analyze the extent of drift

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and ensure correct implementation. Finally, this discipline is counter-intuitive to characteristics of human nature documented in the literatures of behavioral finance. Advisors can mitigate the potential impact of these disadvantages of rebalancing by educating their clients. This study strives to provide empirical support for this cause.

Many of the merits of rebalancing are addressed by previous studies and are validated here.[1] However, most of the previous studies did not incorporate tax assumptions; some were written for an audience that included both taxable and tax-exempt investors. By contrast, this study focuses on the taxable investor, and:

- incorporates growth and value investment styles;
- utilizes municipal bonds for the fixed income allocation;
- evaluates the three longest and worst bear markets since 1926; and
- reports rebalancing results on both a pre- and after-tax basis to examine whether rebalancing makes sense.

Rebalancing Intuition, Behavioral Finance and Investing

While rebalancing forces investors to comply with their stated investment policy, it also forces them to sell those asset classes that are performing the best. This is extremely difficult for most individual investors, and a brief review of behavioral finance shows why.[2] Overconfidence, belief perseverance and availability bias are among the various characteristics described by behavioral finance theory that may affect rebalancing decisions.

Overconfidence leads people to ascribe success to their own talent. Research shows that when people are asked to assess their own skills in particular areas, 90 percent of respondents rank themselves "above average." Studies in belief perseverance provide evidence that people form an opinion and cling to it too long, often in the face of data that directly contradicts their beliefs. Further research shows that when confronted with contradictory evidence, people contort it to support their views. Belief perseverance also explains how investors become undiversified—they select their investments based on what has performed well recently. Availability bias suggests that recent events, especially noteworthy ones, shape people's views on what to expect next. The result is that investors extrapolate experiences of the recent past, whether good or poor, far into the future. During the great bull market of the 1990s, many investors felt that stocks would continue to do well because they had done well in recent past. By contrast, many investors today have seen outstanding recent results in the bond market and are forecasting this into the future. Disciplined portfolio rebalancing reduces the bias of these beliefs by causing investors to stay focused on the investment policy rather than the emotion of recent successes or failures.

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Effects of Rebalancing on a Diversified Portfolio Held from 1980 to 2002

There are many rebalancing techniques. Investors could rebalance a portfolio according to different frequencies, the most common ones being monthly, quarterly and annually. At those intervals, one could view rebalancing as a mandatory action, regardless of how much the portfolio has drifted. Alternatively, one could rebalance only when a trigger is exceeded, for instance, when the weight of an investment category drifts by more than five percentage points from the target weight. Some investors rebalance according to broad asset class weights, while others take into consideration weights of growth and value investment styles within an asset class.

For this study, we constructed a portfolio consisting of 60-percent equity and 40-percent fixed income diversified over various asset classes and investment styles, which is a very typical recommendation for a taxable private client whose goal is conservative growth. We chose an annual, mandatory rebalancing schedule. This reflects annual client meetings and a time frame that is long enough to minimize taxes and transactions costs. We did not test other rebalancing methodologies and portfolio mixes in this study. Previous research has concluded that performance and risk differentials are small between various rebalancing strategies, and

there is no one strategy that outperforms across portfolios of different risk profiles.[3]

Table 1 Annualized Returns Ending 2002

	1980–2002	Five-Year	Three-Year
Large Growth BARRA Large Cap Growth	12.6%	-1.1%	-19.6%
Large Value BARRA Large Cap Value	13.0%	-0.9%	-9.5%
Small Growth Russell 2000 Growth	7.4%	-6.6%	-21.1%
Small Value Russell 2000 Value	13.9%	2.7%	7.4%
International Equity MSCI EAFE	10.0%	-2.6%	-17.0%
Municipal Bonds Lehman Municipal Bond	8.2%	6.1%	8.8%

Sources: BARRA, Russell/Mellon Analytical Services, Morgan Stanley Capital International (MSCI) and Lehman Brothers

To create a relevant example for this study, the sample portfolio was constructed with both growth and value investment styles for the domestic asset classes. This is a common practice among many advisors. Empirical analysis demonstrates that a particular investment style can dominate in the short term (but not forever),[4] lending support to having a balanced style mix. More importantly, the sample portfolio's fixed income portion was invested in municipal bonds, a preferred vehicle for high-net-worth taxable investors. Because the longest time period available for comprehensive municipal bond index data is 1980–2002, that was our chosen time period for the long-term test of rebalancing.

One-half of the 60-percent equity portion was placed in large cap stocks, with the remaining half divided equally between small cap and international. The large and small cap allocations were each split evenly between growth and value styles. The portfolio target weights were 15-percent large growth, 15-percent large value, 7.5-percent small growth, 7.5-percent small value, 15-percent international equity and 40-percent municipal bonds. Actual historical returns of style-appropriate indices were used as proxies for performance of these asset classes (please refer to the Data Sources section at the end of this study for the list of indices used).

To present empirical results of rebalancing on both a pre- and after-tax basis, we made some simplifying tax assumptions. Namely, this study:

- used actual historical federal marginal tax rates for ordinary income and capital gains;
- carried the tax implication of losses forward until a gain was realized; and
- assumed taxable turnover.

We assumed that investors would be taxed at the highest federal tax rate based on the historical tax tables. The use of the highest historical marginal tax rate makes the study conservative. During most of the 20th century, tax schedules were set such that only the very highest annual income earners were taxed at the top federal tax bracket. In recent years, changes in tax policy have meant that a much larger proportion of the population is taxed at the highest marginal tax rate. The highest marginal ordinary income rate was applied to the yield or income return of each index.

Incorporating the effects of taxable turnover, a certain portion of capital gains was considered to be realized and was taxed at the highest federal long-term capital gains tax rate. This taxable turnover portion varied across asset classes from 10 to 55 percent and was higher for equity than fixed income, higher for small cap than large cap, and higher for growth than value.

To measure after-tax returns, taxes were assumed to be paid from the portfolio, which in turn required a portion of the portfolio to be liquidated to pay these taxes, creating additional realized gains that were taxed in the following year. With annual rebalancing, selling the winners triggers additional realized gains. These assumptions were

Table 2 Allocation Drift When Never Rebalanced 1980–2002 (After-Tax Results)

	Target	Highest	Lowest
Large Growth	15.0%	27.5%	13.1%
Large Value	15.0%	23.2%	15.3%
Small Growth	7.5%	9.7%	3.6%
Small Value	7.5%	14.5%	7.9%
International Equity	15.0%	26.8%	12.5%
Municipal Bonds	40.0%	36.0%	19.5%

Source: Altair Advisers, LLC

meant to be realistic but conservative, as most separate account managers who work with private investors use year-end tax selling strategies that may keep actual realized gains below the assumed rates. Detailed asset class level assumptions about realized gains can be found in Appendix A.

If performance of all asset classes fluctuates in the same direction and with similar magnitude, rebalancing would not be needed because the asset class weights would not drift much. Table 1 shows that during the period of 1980 through 2002, all asset classes and investment styles had good returns. The period encompasses the great bull market of 1982 to 2000. But note that the five-year annualized return column indicates that some asset classes had positive returns, some had negative returns, and some were close to zero. The three-year annualized return column shows even more disparity.

Never rebalancing is a bad idea. A portfolio can deviate significantly from the investment policy's target asset allocation formulated to suit the client's risk profile. As illustrated in Table 2, a portfolio that started out with a target of 60-percent equity and 40-percent fixed income had as much as 80-percent equity and 20-percent fixed income during the study period. Every equity asset class reached higher proportions in the portfolio than originally intended. The portfolio's combined equity weighting exceeded 65 percent in 21 out of 23 years studied; in 10 of those years, the combined equity weighting exceeded 70 percent. Most years, the portfolio's risk profile exceeded that of the intended plan. Advisors and investors put much effort into creating customized investment policies suitable to the client's risk profile. By doing nothing, a portfolio can wind up in a much riskier posture, as demonstrated during the period of this study.

Results support the advantages of rebalancing. Rebalancing prevents the portfolio from drifting to higher risk levels than intended by the investment policy.

One might argue that this drift towards equities—"letting the winners run"—is perfectly fine if it results in better total performance. Tables 3 and 4 demonstrate that in the bull market period studied, an investor who never rebalanced obtained slightly lower returns than an investor who did rebalance on both a before- and after-tax basis, but the nonrebalanced investor took on significantly more risk as measured by standard deviation. Consequently, an investor who follows a disciplined portfolio rebalancing program could have achieved a higher Sharpe Ratio (a risk-adjusted measure that evaluates return per unit of risk taken). The lowest annual return on the two portfolios during this 23-year period is dramatically different, –8.3 percent (after-tax) on the always-rebalanced portfolio compared to –12.0 percent (after-tax) on the never-rebalanced version.

Rebalancing does not necessarily generate improved return in a sustained bull market as it requires selling equities while they are going up. It is more powerful in volatile markets.[5] Nevertheless, rebalancing in a bull market reduces risk. This helps clients achieve both the risk and the return requirements of their investment policy.

Table 3 Results of Study #1, 60-Percent Equity, 40-Percent Municipal Bond Portfolio: 1980–2002 (Pre-Tax Results)

	Never Rebalance	Always Rebalance
Annual Return	10.8%	10.9%
Annual Std Dev	12.9%	11.3%
Sharpe Ratio	0.3574	0.4034
Highest Return	31.3%	30.6%
Lowest Return	-14.4%	-8.3%
Source: Altair Advisers, LLC		

Table 4 Results of Study #1, 60-Percent Equity, 40-Percent Municipal Bond Portfolio: 1980–2002 (After-Tax Results)

	Never Rebalance	Always Rebalance
Annual Return	9.2%	9.4%
Annual Std Dev	11.6%	10.6%
Sharpe Ratio	0.2548	0.2826
Highest Return	28.3%	28.0%
Lowest Return	-12.0%	-8.3%
Source: Altair Advisers, LLC		

Rebalancing and the Three Bears

A second analysis illustrates the power of rebalancing during periods of market volatility. The current bear market that started in 2000 has perhaps not yet played itself out, so our study instead looked at those persistent down markets that occurred before 1980. Using S&P 500 index data from 1926–2002, we identified the three longest and worst bear markets: 1928–1935, 1936–1942 and 1973–1975. For each of the three periods, the beginning year was set at the peak of the portfolio value. The length was determined by following the peak down through the trough and up again to an approximate break-even with the starting point. This ensured that complete market cycles were included in the analysis. The conclusion: do not rebalance just when there is a bad market, but rebalance during good, bad and recovering phases of the cycle.

This historical data has some limitations, as index data for many asset classes and investment styles do not reliably exist during the time periods studied. Instead, we used the broad S&P 500 index to represent the 60-percent allocation to equity. The fixed income part of the portfolio was assumed to be invested in taxable bonds rather than municipal debt, with the analysis accounting for the tax due. Tax assumptions remained unchanged.

The results of this second study are much more dramatic than the first. Table 5 shows the difference between never rebalancing and always rebalancing on a pre-tax basis. In the first time period, the eight years between 1928 and 1935, rebalancing produced a cumulative return 13 percent greater than the nonrebalanced portfolio. The same held true for the seven years from 1936–1942, which was the latter stage of the Great Depression, with five-percent cumulative outperformance. In the more modern time period, the three years from 1973–1975, the market was characterized by the troubles of Watergate, the Arab oil embargo and war in the Middle East. Nevertheless, rebalancing outperformed its never-rebalanced counterpart by 1.5 percent cumulatively. This second study analyzed return differential only; the shorter time periods prevent a risk analysis with statistical significance, although the risk reduction benefits of rebalancing were demonstrated in our 1980–2002 study.

Factoring in taxes does not change the conclusion favoring rebalancing, as shown in Table 6. Taxes somewhat dampen the relative benefit of rebalancing. This effect is especially strong during the 1936–1942 and 1973–1975 time periods, when the top marginal tax rates were very high. Nevertheless, rebalanced portfolios outperformed their nonrebalanced counterparts in all three time periods, even after giving up a good portion of their profit to taxes.

Conclusion

This study analyzed the results of rebalancing on portfolio performance, both before- and after-tax. It first examined a taxable, diversified portfolio during the time period from 1980–2002, which was primarily a bull market for all asset classes. Next, it focused on the three longest and worst bear markets between 1926 and 2002. The results from these different sets of market conditions demonstrate that rebalancing makes sense whether the economy is in the throes of a terrible recession or in the midst of a great, manic bubble.

Results support the advantages of rebalancing. Rebalancing prevents the portfolio from drifting to higher risk levels than intended by the investment policy. A portfolio of 60-percent equity and 40-percent fixed income that was never rebal-

Table 5 Results of Study #2, 60-Percent S&P 500, 40-Percent Taxable Bond Portfolio: 1928–1975 (Pre-Tax Results)

	Cumulative Returns		Annual Returns	
	Never Rebalance	Always Rebalance	Never Rebalance	Always Rebalance
1928–1935	26.7%	40.0%	3.0%	4.3%
1936–1942	14.5%	19.6%	1.9%	2.6%
1973–1975	-0.7%	0.8%	-0.2%	0.3%
Source: Altair Advisers, LLC				

Table 6 Results of Study #2, 60-Percent S&P 500, 40-Percent Taxable Bond Portfolio: 1928–1975 (After-Tax Results)

	Cumulative Returns		Annual Returns	
	Never Rebalance	Always Rebalance	Never Rebalance	Always Rebalance
1928–1935	10.8%	19.6%	1.3%	2.3%
1936–1942	-4.2%	-2.3%	-0.6%	-0.3%
1973–1975	-8.9%	-7.4%	-3.0%	-2.5%
Source: Altair Advisers, LLC				

anced from 1980 to 2002 quickly became overweighted in equity and remained so for almost the entire time period. By contrast, rebalancing lowered risk and improved risk-adjusted performance as measured by the Sharpe Ratio. In volatile markets, rebalancing actually increased returns. During the three longest and worst bear markets prior to 1980, the rebalanced portfolio clearly outperformed its never rebalanced counterpart.

The study also addressed the potential disadvantages of rebalancing. Some investors fear that the tax liability generated by the rebalancing process will wipe out its benefits. They also are concerned that the long-term return of a portfolio could be reduced as winning asset classes are sold. Instead, the results showed that returns on a rebalanced portfolio are equivalent and possibly higher. The test portfolio outperformed, albeit slightly, during the bull market era of 1980 through 2002. Rebalanced returns were substantially higher during volatile markets, as demonstrated in the three bear markets in the second study. Taxes mitigated but did not eliminate these benefits.

Rebalancing works in both good and bad market conditions. It improves absolute performance and ensures compliance with an investor's investment policy. Our study lends support to these advantages and demonstrates that the disadvantages are not sufficient to outweigh the benefits. Hopefully, advisors can use the results of our study to educate their clients on the merits of portfolio rebalancing.

ENDNOTES

[1] David Brief. The research findings have been summarized in *Asset Allocation Summit,* Oct. 5–8, 1997, Scottsdale, Arizona, *Dow Jones Asset Management,* Jan.–Feb. 1998.

[2] *See* Nicholas Barberis and Richard Thaler, *A Survey of Behavioral Finance*, National Bureau of Economic Research Working Paper 9222 (Sept. 2002), available online at *www.nber.org/papers/w9222*.

[3] Cindy Sin-Yi Tsai, *Rebalancing Diversified Portfolios of Various Risk Profiles,* J. Fin'l Planning, Oct. 2001, available online at *www.fpanet.org*.

[4] Roger G. Ibbotson and Mark W. Riepe, *Growth Vs. Value Investing: And the Winner Is …* J. Fin'l Planning, June 1997, available online at *www.fpanet.org*.

[5] Andre F. Perold and William F. Sharpe, *Dynamic Strategies for Asset Allocation*, Fin'l Analysts J., Jan.–Feb. 1988.

Appendix A—Realized Gains Assumptions

1. Every year, a certain portion of capital gain is considered to be realized. It is then taxed at the highest marginal long-term capital gain tax rates. The portions for Study #1 are 40 percent of large growth appreciation, 20 percent of large value, 55 percent of small growth, 25 percent of small value, 35 percent of international equity, and 10 percent of municipal bonds. The portions for Study #2 are 40 percent of equity and 10 percent of fixed income.
2. A portion of the portfolio needs to be liquidated when paying taxes and rebalancing. This generates more realized capital gains. It is assumed that for stocks, 30 percent of the sales proceeds are taxed at the highest marginal long-term capital gain rate. For bonds, the sales process is assumed to not generate capital gains.
3. Taxes are paid from the portfolio. In the case of annual rebalancing, taxes are taken out of proceeds from rebalancing, *i.e.,* selling winners. In the never rebalanced cases, taxes are deducted from the investment vehicle itself.