

Parametric Portfolio Associates

Research Brief

Methodology for Computing After-Tax Returns

Parametric reports pre-tax and after-tax returns of both portfolios and their benchmarks. This document describes our performance-reporting methodology¹.

Parametric reports on separate account after-tax performance are consistent with the Performance Presentation Standards of the Association for Investment Management and Research (AIMR-PPSTM).² AIMR has not been involved with the preparation or review of these reports.

Pre-Tax Performance

Portfolio

Pre-tax performance for the portfolio is computed using a standard time-weighted total return methodology. We compute returns daily and link them geometrically to arrive at monthly total returns for the portfolio. Each asset flow (contribution or withdrawal) is thus weighted by the amount of time invested. This fairly compares the performance of the portfolio to its benchmark when there are flows. For this reporting, we use Axys (Advent) Software.

¹ Parametric has long been a leader in after after-tax performance reporting and benchmarking. For additional background, see our published work on the subject:

- David M. Stein, *Measuring and Evaluating Portfolio Performance After Taxes*, Journal of Portfolio Management, Winter 1998, Vol. 24 No. 2.
- David M. Stein, Brian D. Langstraat and Premkumar Narasimhan, *Reporting After-Tax Returns: A Pragmatic Approach*, Journal of Private Portfolio Management, Spring 1999, Vol. 1 No. 4.
- David M. Stein, *Reporting After-Tax Returns: Errata*, Parametric Portfolio Associates Research Report, unpublished.

² The following is the latest (at March 2003) redraft of the AIMR After Tax Performance Presentation Standards: http://www.aimr.org/pdf/standards/aftertax_changes.pdf

Parametric Portfolio Associates is dedicated to advancing the state of the art of tax-sensitive investing. Parametric Research Briefs provide a technical understanding of topics in the area as well as an overview of related original research.

To receive copies of other Parametric Research Briefs please contact us at:

Parametric Portfolio Associates, 1151 Fairview Avenue N., Seattle, WA 98109. 206.694.5575. <http://www.paraport.com>

Benchmark

Pre-tax total returns for standardized benchmarks are obtained from reliable published sources.³ For non-conventional benchmarks with un-published returns, we maintain the benchmarks as portfolios in an accounting system, updating for regular corporate actions and M&A activities. We compute pre-tax total returns for the benchmarks as we do for portfolios, using the daily linked time-weighted method.

After-Tax Performance

Portfolio

For after-tax performance reporting we use the method specified in the After-Tax Provisions of the AIMR-PPS Standards. These report “pre-liquidation” returns -- taxes are computed only on transactions that create taxable events, and a future tax liability may still exist when there is an unrealized gain position.

The after-tax return is calculated as follows:

$$\frac{\text{Pre-Liquidation}}{\text{After-Tax Return}} = \frac{\text{Before-Tax Return} - \frac{\text{Realized Taxes}}{\text{Weighted Market Value}}}{\text{Weighted Market Value}}$$

In this expression,

$$\text{Weighted Market Value} = \text{Start Value} + \text{Sum of Day-Weighted Asset Flows}$$

$$\text{Realized Taxes} = (\text{Realized Gains}) * (\text{Capital Gains Tax Rate}) + (\text{Taxable Interest and Dividend Income}) * (\text{Income Tax Rate}).$$

For the anticipated tax rate, we apply the maximum federal tax rates in effect at the time.⁴ If the investor or advisor requests otherwise, we apply the rate they specify.

Benchmark

After-tax benchmark performance computation is more complex than pre-tax and does require some approximations. After-tax benchmark computations have not yet been standardized by the industry, although AIMR has made some recommendations, and we follow these.

We employ the notion of a “shadow benchmark,” imagining what would have happened had the investor invested in a passive vehicle such as a passive mutual fund or an exchange traded fund indexed to the target benchmark. We simulate an investment in such a shadow

³ We use returns published by Russell-Mellon for Russell indices and Vestek Systems for all other standard benchmarks.

⁴ In 2002, this rate was 38.6% on net short-term realized capital gains and dividend income, and 20% on long-term capital gains.

benchmark for each investor using the actual benchmark's pre-tax price returns, dividends and turnover.

Our benchmark simulation runs monthly. It shadows the investor's actual investment flows and tax rates, and keeps track of the market value, cost basis and taxes generated by the investment over time. With these, we can calculate after-tax performance in the same manner that we do for the portfolio.

A more detailed discussion of the shadow benchmark is Appendix 1. In particular, it is the investment flows that add complexity.

Appendix 1: Shadow Benchmark

Benchmark calculations should be relatively simple to compute, be repeatable, depend on readily available data, and should be conservative in making assumptions (i.e., over-estimate benchmark performance rather than under-estimate it).

Our shadow benchmark simulation runs monthly. It shadows the investor's actual investment flows and tax rates, and keeps track of the market value and cost basis of the investment over time. As with all simulations, it makes simplifying approximations. It models the evolution of a single-security investment, but it does distinguish between short-term and long-term tax lots. We model thirteen tax lots, twelve short-term (ages 0-11 months), and one long-term (age over one year).

Once we have the capital gains and dividends for the shadow investment, we can calculate after-tax performance in the same manner that we do for the portfolio. The following sections delineate how we obtain the shadow capital gains and dividends. In particular, it is the investment flows that make this complex.

The Initial Cost-Basis for the Shadow Benchmark

We assign the starting shadow benchmark the same market value and cost basis as the actual starting portfolio. For a portfolio beginning from cash, this means that the shadow benchmark's cost basis and market value will be the same, and equal to the inception cash amount. For a portfolio beginning with in-kind securities, the shadow benchmark is assigned the same cost basis and market value as these securities.⁵ The initial portfolio is then re-balanced to its designated benchmark and in doing so incurs either capital gains or losses (see discussion of initial transition below).

⁵ Note that this reflects the cost basis of the initial in-kind portfolio, *prior* to Parametric's re-balance to a benchmark-optimized portfolio.

Ongoing Evolution of the Shadow Benchmark

We maintain the cost basis and market value of each tax lot each month. In the absence of asset flows, we roll over the simulation at the end of each month as follows:

- 1) We calculate a weighted market value for the benchmark and adjust the end market value for pre-tax price changes.
- 2) We realize capital gains in the shadow benchmark at the rate at which the actual benchmark realizes gains. In some cases we approximate, using the average turnover rate of the pre-tax benchmark for previous year.
- 3) We advance the age of each tax lot by one month after adjustment of the cost basis and market value due to asset flows.
- 4) We generate a new lot for the re-investment of after-tax dividends and sale proceeds.

Initial Transition of In-kind Securities in the Shadow Benchmark

For a portfolio starting with in-kind securities, we need to transition the initial investment in the shadow benchmark – the benchmark needs to realize capital gains in order to calculate its first month’s after tax returns and to set its cost basis for moving forward. We do this in a conservative manner, and do *not* liquidate the initial holdings as would typically be required by an indexed investment. Instead, we subject the shadow benchmark to the same gains and losses as those incurred by the actual portfolio. This is conservative in that we do not give ourselves performance credit for tax savings in the initial transition. In comparison, the Parametric portfolio not only incurs this same initial transition cost but also incurs a tracking risk.

Ongoing Asset Flows in the Shadow Benchmark

In the case of ongoing *cash* flows, the cost basis and market value of the simulated benchmark are adjusted by the value of the cash contribution or redemption. In the case of *in-kind* asset flows, the cost basis and market value of the benchmark are adjusted by the cost basis and market value of the securities transferred into or out of the actual portfolio. There is one more detail when handling subsequent in-kind asset flows: we adjust the cost basis and returns of the simulated benchmark only when net *gains* are realized during the re-balance, not *losses*.⁶

In the monthly rollover, we adjust the market value of each asset flow for its price movement from the date of the flow. For cash inflows, we assign the cost basis to the current month. For in-kind inflows, we assign the cost basis to the existing lots. For cash outflows (redemptions), we assign the cost basis proportionately across all short- and long-term lots; i.e., the simulated benchmark realizes gains proportionately across the adjusted lots as a percentage of the redemption. For in-kind outflows, we adjust the benchmark’s cost basis by the cost basis of the security that is transferred out.

⁶ An in-kind transfer of securities into an existing portfolio typically requires a re-balance to the target benchmark. We assume that the investor transfers in securities that have appreciated over time and therefore any losses taken during the re-balance are due to capital losses on the pre-existing portfolio; the simulated benchmark does not receive any performance credit for this, while the portfolio does.