

Fall 2015

Tax Management of Factor-Based Portfolios

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The risk-adjusted returns of factor strategies can look quite attractive. However, the turnover associated with them can significantly reduce their after-tax excess returns. In this research brief, we share the results of our after-tax study of these strategies. We find that material pre-tax excess return can be gained through exposure to popular factors – up to 2.4% net of management fees. From an after-tax perspective we find that taxes can erode much of this return, but a systematic tax management process can help to mitigate tax drag.

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What is Factor-Based Investing?

Factor-based investing begins with the premise that the differences in stock returns can be explained by a set of common factors. Relative to a cap-weighted portfolio, the factor-based portfolio emphasizes certain factors in order to enhance returns. Popular factors include size, value, momentum, quality, low volatility, dividend yield and profitability. Over the years these factors have been studied and shown to deliver meaningful excess returns¹. Researchers have also found that combining factors can be effective. Value/momentum and profitability/earnings quality have been found to be complementary factor pairs. In each study, researchers found that higher risk adjusted-returns could be achieved by overweighting stocks exhibiting high exposure to these factors. The source of the excess return for these strategies is an active area of investment research. Current studies suggest that the excess returns can be attributed to systematic risk or pricing errors. For example, value factor investors may be exposed to more business cycle risk and therefore their excess return is earned by bearing this risk². Studies also suggest that the low volatility excess return can be explained by the systematic pricing errors arising from investment managers' inability to take on leverage³. While the debate over the source of excess returns remains, interest in factor-based strategies continues to grow.

Factor-based investing employs a very different approach when compared to the processes used by the traditional active manager. Traditional active managers conduct intensive bottom-up fundamental research on individual companies, and then construct a portfolio comprised of stocks determined to be most undervalued or have attractive growth prospects. On the other hand, since factor-based investors believe that much of the alpha delivered by traditional active managers can be explained by common factors, they have sought low-cost ways to gain exposure to these factors while minimizing stock specific-risk.

Parametric Factor Strategies

Many variations of the classic factor strategies have been introduced into the market place. While some differences exist as to how they are constructed, what these strategies all have in common is that they all systematically deviate from the index from a factor perspective. For example: value strategies overweight securities with high book-to-price ratios, low volatility strategies overweight securities with low historical standard deviation of returns, momentum strategies overweight stocks showing strong recent performance, etc. In general, factor-based investing seeks outperformance by maintaining a systematic bias toward an intended factor using a universe of stocks as the starting point for the portfolio.

Parametric factor strategies are designed to be transparent with a naturally high capacity. They are managed to balance factor exposure with implementation costs. Each strategy is constructed to increase exposure to the intended factors while controlling for unintended factor and sector bets through optimization constraints. For example, an unconstrained tilt on value would most likely result in a large overweight to financials due to their high book value. It could also exhibit a large negative bias to momentum since recently price-depressed companies can also show a high book-to-price ratio. While no long-only factor strategy can be perfectly neutral to non-target exposures, we mitigate the biases using relative weight constraints when constructing the portfolio. To construct each factor strategy portfolio, we start with a universe of the largest 90% of U.S. stocks from the S&P Broad Market Index, and then optimize the portfolio to maximize the targeted risk factor. Using the Barra risk model and factor scores as inputs, the target portfolio is built using several key constraints.

¹ See for example, Fama and French (1992), Asness, et al. (2013), Novy-Marx (2013), Clark, et al. (2006), Blitz and van Vliet (2007).

² See Zhang (2005).

³ See Baker et al. (2011).

- › Exposure to non-target fundamental risk factors is capped at +/- 0.20 standard deviations relative to the market cap-weighted index to control for unintended factor exposure bets.
- › The sector and industry exposures are limited to +/- 5% relative to market cap weights to control for sector and industry risks.
- › Security weights are constrained to four times their market cap weight. This constraint is the main control on tracking error and factor exposure, and results in a portfolio focused on the top 25% of stocks with higher exposure to the targeted factor. This also results in a natural control for liquidity. Respecting the market cap weight means that these strategies can be implemented at large AUM levels with results similar to our back tests.

Below in Figure 1, we list the Parametric single factor strategies and the underlying data used to build the factors.

Figure 1: Single Factor Strategies

Factor	What Is It	Definition	Universe
Dividend Yield	The Parametric Dividend Yield strategy aims to deliver high exposure to companies with high dividend yield	Historical dividend-to-price, analyst predicted dividend-to-price	US Large/Mid
Value	The Parametric Value strategy aims to deliver high exposure to stocks that have low prices relative to their fundamental value	Book to price, earnings to price	US Large/Mid
Quality	The Parametric Quality strategy aims to deliver high exposure to stocks that are characterized by high profitability, stable earnings, and low leverage	Gross profitability, earnings variability, leverage	US Large/Mid
Momentum	The Parametric Momentum strategy aims to deliver high exposure to stocks exhibiting strong recent relative performance	Prior two years daily relative returns, exponentially weighted	US Large/Mid
Low Volatility	The Parametric Low Volatility strategy aims to deliver high exposure to stocks exhibiting low return volatility	Standard deviation of returns	US Large/Mid

Each single factor strategy provides high exposure to stocks exhibiting the target factor characteristics. For example, the Quality strategy emphasizes stocks with high gross profitability, low earnings variability and low leverage; the Momentum strategy emphasizes stocks with high recent relative returns, etc. While each strategy can be used on its own to target a particular factor, they can be blended to create unique factor combinations suited to the investor's alpha forecasts and tracking error tolerance. For example, an investor can create a yield-oriented, low-volatility strategy by blending 50% Dividend Yield with 50% Low Volatility. For investors who want less tracking error, the factor strategy can be blended with an index. A 50%/50% blend of the Dividend Yield strategy with the Russell 1000 Index would result in a portfolio with a higher yield than the Russell 1000 Index but a lower tracking error than the Dividend Yield strategy. In addition to custom blended portfolios, investors can choose from a set of strategies which represent popular factor combinations. These strategies are listed in the Figure 2.

Figure 2: Multi-Factor Strategies

Factor Blend	What Is It	Definition	Universe
Value, Momentum, Profitability	The Parametric Value/Momentum/Profitability strategy aims to deliver high exposure to stocks exhibiting a low price-to-book ratio, strong relative performance and high profitability	Book to price, earnings to price, trailing relative returns, earnings variability, profitability	US Large/Mid
Value, Momentum, Profitability	The Parametric Value/Momentum/Profitability strategy aims to deliver high exposure to stocks exhibiting a low price-to-book ratio, strong relative performance and high profitability	Book to price, earnings to price, trailing relative returns, earnings variability, profitability	US Small
Value, Size, Profitability	The Parametric Value/Size/Profitability strategy aims to deliver a broad U.S. portfolio with high exposure to stocks exhibiting a low price-to-book ratio, low price-to-earnings ratio while overweighting the mid and small-capitalization market segments	Book to price, earnings to price, profitability, overweight small and mid-cap stocks	US Broad

The Value, Momentum and Profitability strategy offers high exposure to stocks exhibiting a low price-to-book ratio, strong relative performance and high profitability. Similar to the single factor strategies, the portfolio is optimized to maximize these factor exposures while controlling for unintended sector and factor exposures. To simultaneously emphasize these factors we define a composite factor score for each security. The composite factor score is defined as a weighted combination of underlying risk model factors. The factor weights are 40% Value Composite + 40% Momentum + 20% Profitability.

Both the Value and Profitability factors are composites of multiple factors from the underlying risk model. The Value composite factor is weighted more heavily toward the classic value descriptor of book-to-price and is complemented by the Earnings Yield factor which includes the earnings-to-price ratio. Similarly, the Profitability factor is weighted more heavily toward gross profitability but is complemented by the Earnings Quality factor which emphasizes low variability in earnings.

The U.S. Broad Cap Value, Size and Profitability strategy offers high exposure to stocks exhibiting a low price-to-book ratio, low price-to-earnings ratio while overweighting the mid-cap and small-cap market segments. To construct it, the U.S. investment universe is first segmented into large, mid and small cap sub-universes. Each market segment is then optimized to maximize the composite Value score while controlling for unintended sector and factor exposures. Within each market segment, the Profitability factor exposure is constrained to be equal to or higher than that of the corresponding security universe. The high exposure Value sub-portfolios are combined in a proportion which overweights small and mid-cap: 40% large cap, 30% mid-cap and 30% small-cap. This process results in a portfolio that emphasizes both value and small cap stocks.

Historical Returns

To investigate the pre- and after-tax returns of these strategies we conducted a set of back tests using the S&P® U.S. Broad Market Index dataset from the beginning January 1997 to the end of June 2015. For each factor strategy we ran two scenarios: full replication and active tax management. The full replication approach approximates the experience an investor would have if a manager were to perfectly follow the strategy portfolio without regard for transaction costs and taxes. The active tax management scenarios simulate Parametric's tax management overlay process on top of the strategy portfolio. Figure 3 shows the historical pre-tax return characteristics of these strategies.

Figure 3: Annualized Return and Risk Summary, January 1997 to June 2015

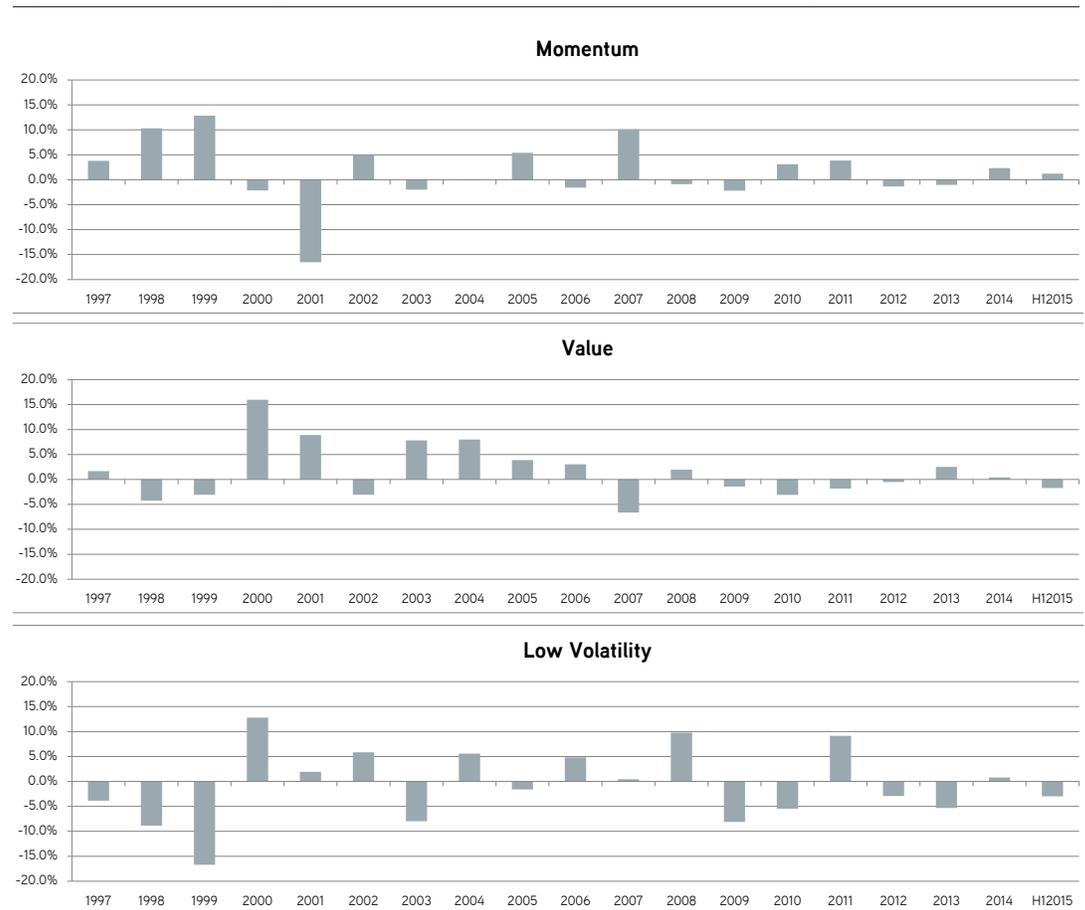
	Benchmark	Gross Return	Net of Fees Return	Volatility	Return/Risk	Net Excess Return	Tracking Error	# Stocks	Turnover
Dividend Yield	Russell 1000	8.5	8.1	15.2	0.53	0.2	4.8	150-250	20-30
Value	Russell 1000	9.9	9.5	16.4	0.58	1.6	4.2	200-300	20-40
Quality	Russell 1000	10.3	9.9	15.3	0.65	2.0	3.7	200-300	20-35
Momentum	Russell 1000	9.5	9.0	17.3	0.52	1.1	6.1	200-300	55-80
Low Volatility	Russell 1000	8.4	8.0	11.8	0.68	0.1	6.7	200-300	35-50
Value/ Momentum/ Profitability	Russell 1000	10.0	9.5	16.7	0.57	1.6	4.9	200-300	40-65
Value/ Momentum/ Profitability Small	Russell 2000	11.2	10.8	20.2	0.53	2.4	4.8	450-600	55-75
Value/Size/ Profitability	Russell 3000	9.8	9.3	16.4	0.57	1.4	4.1	1100-1300	20-40
Russell 1000		7.9		15.7	0.50				
Russell 2000		8.3		20.3	0.41				
Russell 3000		7.9		15.8	0.50				

Source: Parametric as of 06/30/2015. Past performance is not indicative of future results. Performance is presented net of 40 bps annual management fees. Performance reflects the reinvestment of dividends and other earnings. Hypothetical performance is for illustrative purposes only; it does not represent actual returns of any investor and may not be relied upon for investment decisions. Actual client returns will vary. Index performance is presented for comparison purposes. It is not possible to invest directly in an index. They are unmanaged and do not reflect the deduction of fees and expenses. See Disclosures for additional information.

Consistent with prior research, we found these factor strategies deliver excess returns over a long investment horizon spanning multiple investment cycles. Over the period we studied, the excess returns ranged from 0.1 to 2.4%, net of management fees. The highest excess return came from the multi-factor strategy which simultaneously captures the excess return from the value, momentum, profitability and small cap factors. The lowest excess return came from the low-volatility strategy; however, since this strategy is designed to reduce risk, it also shows the highest return/risk ratio at 0.68.

While the summarized annual returns show positive excess returns for each strategy each factor strategy has periods of underperformance. In Figure 4, we show the excess returns of the Momentum, Value and Low Volatility strategies year by year to demonstrate this point.

Figure 4: Excess Returns by Calendar Year for Momentum, Value and Low Volatility



Source: Parametric as of 06/30/2015. Past performance is not indicative of future results. Performance is presented net of 40 bps annual management fees. Performance reflects the reinvestment of dividends and other earnings. Hypothetical performance is for illustrative purposes only; it does not represent actual returns of any investor and may not be relied upon for investment decisions. Actual client returns will vary. See Disclosures for additional information.

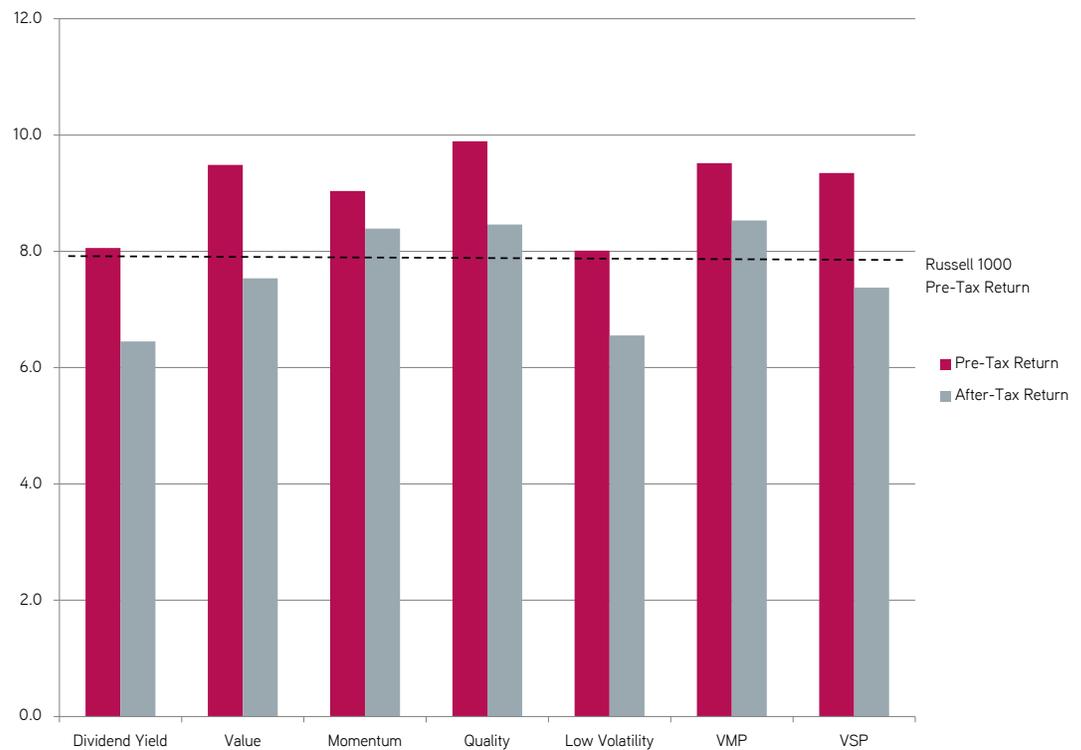
While momentum shows annualized positive excess return of 1.1%, in our back test the strategy underperformed the index by 16% in 2001. Value did well from 2000-2006, but has lagged since 2007. While low volatility consistently outperformed in down markets it lags the market in years of high return. In order to successfully reap the excess returns offered by these strategies, investors must have a high tolerance for tracking error and be prepared for periods of underperformance.

The attractive expected excess returns of these strategies is a result of a systematic bias toward (or away from) specific factors. In order to maintain the systematic bias towards the factor, the portfolio must be periodically reconstituted. For a taxable investor, this turnover can result in realized gains, taxes and ultimately a drag on after-tax returns.

The Effect of Taxes and Tax Management on Factor-Based Portfolios

To investigate the effect of taxes on the returns of factor-based portfolios we measured the after-tax returns of the strategies shown above. To measure the after-tax returns we calculated the net realized gain/loss resulting from the strategy turnover each year and applied the highest federal marginal tax rates: 23.8% for long-term capital gains and 43.4% short-term capital gains. The tax cost was then subtracted from the pre-tax portfolio return to arrive at the after-tax return. The annualized results of this study are shown in Figure 5.

Figure 5: Annualized Pre-tax and After-tax Returns for Non-Tax Managed Factor Strategies



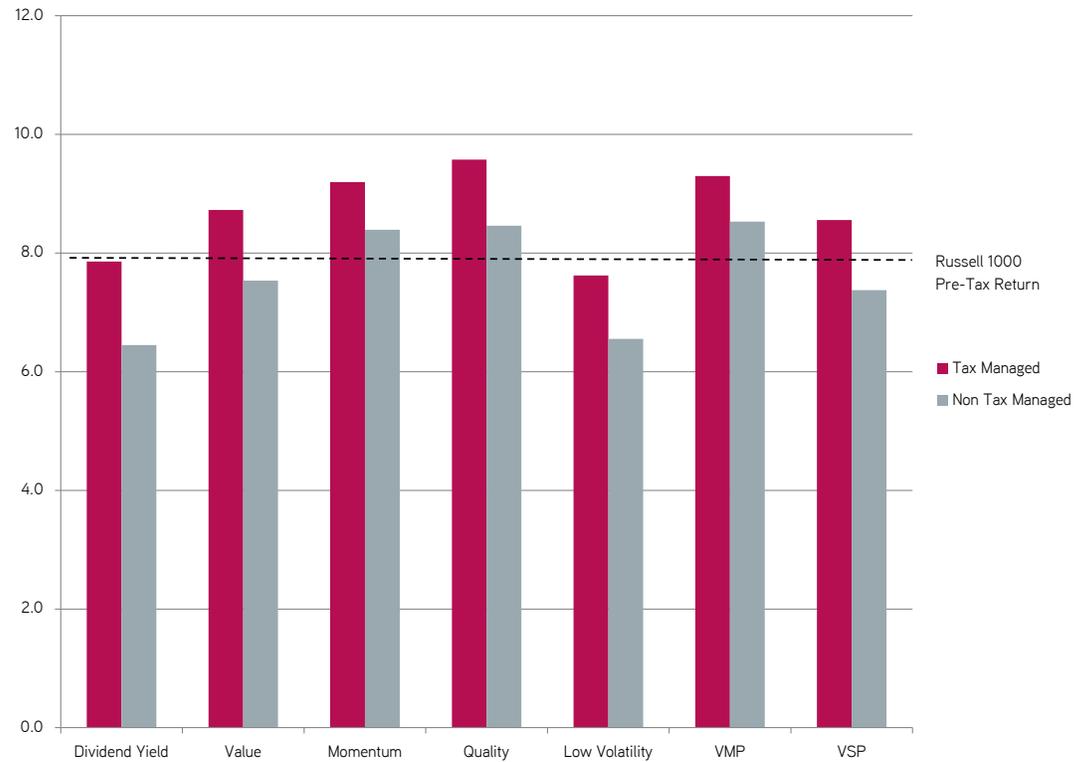
Source: Parametric as of 06/30/2015. Annualized pre-tax and after-tax returns of factor strategies. Net of management fees. Hypothetical returns. Back test period is Jan 1, 1997 to June 30, 2015.

The portfolio turnover required to maintain the systematic bias to the factors results in a tax performance drag of up to 2.0%. This is a significant amount relative to the 0.1-2.4% pre-tax excess returns delivered by these strategies. Indeed, while all of the strategies outperform the Russell 1000 on a pre-tax basis, four of them underperform it when measured on an after-tax basis. To mitigate the tax drag, we simulated the potential benefit of overlaying active tax-management tactics over the factor-based strategies. These tactics include:

- › Defer the realization of gains.
- › Manage the holding period. Tax rates are reduced on capital gains when holding longer than 12 months.
- › Harvest losses. Accelerating the realization of losses can dramatically reduce tax impact. Use tax-loss turnover in a disciplined fashion to harvest losses that can help offset gains taken elsewhere in the portfolio.
- › Pay attention to tax lots. Use specific lot accounting to help minimize capital gains realizations.
- › Avoid wash sales by waiting at least 31 days before repurchasing securities sold at a loss, and by waiting at least 31 days before selling securities recently purchased.

The results of applying these tax-management tactics to the factor strategies are summarized Figure 6.

Figure 6: Annualized After-Tax Returns For Tax Managed vs Non-Tax Managed Factor Strategies



As of 06/30/15	Non Tax-Manged Returns				Tax-Manged Returns			
	Benchmark	Pre-Tax	After-Tax	Tax Drag	Pre-Tax	After-Tax	Tax Drag	Tax Alpha
Dividend Yield	Russell 1000	8.1	6.4	-1.6	8.1	7.9	-0.2	1.4
Value	Russell 1000	9.5	7.5	-2.0	9.2	8.7	-0.5	1.5
Momentum	Russell 1000	9.0	8.4	-0.6	9.0	9.2	0.2	0.9
Quality	Russell 1000	9.9	8.5	-1.4	9.4	9.6	0.2	1.6
Low Volatility	Russell 1000	8.0	6.6	-1.5	7.9	7.6	-0.3	1.2
VMP	Russell 1000	9.5	8.5	-1.0	9.4	9.3	-0.1	0.9
VMP Small	Russell 2000	10.8	9.0	-1.8	10.2	9.6	-0.6	1.1
VSP	Russell 3000	9.3	7.4	-2.0	8.7	8.6	-0.2	1.8
Large Cap Benchmark		8.0	7.2					
Small Cap Benchmark		10.1	7.8					
All Cap Benchmark		8.2	7.3					

Source: Parametric as of 06/30/2015. Past performance is not indicative of future results. Performance is presented net of 40 bps annual management fees. Performance reflects the reinvestment of dividends and other earnings. Hypothetical performance is for illustrative purposes only; it does not represent actual returns of any investor and may not be relied upon for investment decisions. Actual client returns will vary. Annualized returns are provided for the period beginning 1/1/1997 to 6/30/2015. Index performance is presented for comparison purposes. It is not possible to invest directly in an index. They are unmanaged and do not reflect the deduction of fees and expenses. See Disclosures for additional information.

The results show that without tax-management a large portion of the excess return produced by these strategies are lost to taxes. However, we find that systematically applying tax-management tactics significantly improves the after-tax results. Our tax-management process is designed to deliver a pre-tax return similar to the target portfolio while seeking a superior return on an after-tax basis. Using the Value strategy as an example, notice that the pre-tax return of the strategy is 9.5%. Without tax-management the after-tax return is 7.5% indicating a 2.0% tax drag on returns. When we apply our tax-management overlay to the strategy we see that the after-tax return is restored to 8.7% reducing the effective tax drag to 0.5%. To measure the value of tax management we define tax alpha as the difference between the tax drag of the tax-managed portfolio and the non-tax managed strategy. We find that tax management added 0.9% to 1.8% of tax alpha relative to the non-tax managed strategies. This shows that, despite the higher turnover and associated performance tax drag of factor-based strategies, coordinated tax-management techniques may allow investors in factor-based strategies to keep most of those returns after taxes.

Conclusion

Research strongly supports factor-based investing as a source of attractive risk-adjusted returns. Classic factors such as value, momentum, quality, low-volatility, and yield have grown in popularity as have combinations such a value, momentum plus profitability and value, size plus profitability. In our study, we found these strategies to deliver excess returns of up to 2.4% with much of that return lost to tax drag. However, tax management of these strategies can mitigate much of the tax drag, allowing the investor to keep more of the investment return.

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When calculating after-tax returns, Parametric applies the client’s individual tax rate (which may include federal and state income taxes), if provided by the client. If the individual tax rate is not provided by the client, Parametric applies the highest U.S. federal tax rates. For short-term gains, the highest U.S. federal marginal income tax rate is 39.6% plus the 3.8% net investment income tax, for a combined rate of 43.4%. For long-term gains, the highest U.S. capital gains tax rate is 20% plus the 3.8% net investment income tax, for a combined rate of 23.8%. These assumed tax rates are applied to both net realized gains and losses in the portfolio. Applying the highest rate may cause the after-tax performance shown to be different than an investor’s actual experience. Investors’ actual tax rates, the presence of current or future capital loss carry forwards, and other investor tax circumstances will cause an investor’s actual after-tax performance to be over or under Parametric’s estimates presented here. In periods when net realized losses exceed net realized gains, applying the highest tax rates to our calculations illustrates the highest after-tax return that could be expected of the portfolio, and assumes the maximum potential tax benefit was derived. Actual client after-tax returns will vary. As with all after-tax performance, the after-tax performance reported here

is an estimate. In particular, it has been assumed that the investor has, or will have sufficient capital gains from sources outside of this portfolio to fully offset any net capital losses realized, and any resulting tax benefit has been included in Parametric’s computation of after-tax performance.

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