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Tax Alpha: Managing Equity Portfolios for Tax-Efficiency

Actively using tax-efficient strategies can be a powerful tool to enhance after-tax investment returns. During the lifetime of a portfolio, the two most important aspects of tax management are tax loss harvesting (realizing a loss by selling a security, which can then offset other taxable gains) and tax deferral (delaying taxation so that money remains invested and continues to generate returns).

In this paper we focus on tax loss harvesting. We show that even a naïve tax loss harvesting strategy can add value ("tax alpha"), but also that the available level of tax alpha depends upon the market environment—specifically, its availability is higher when market returns are lower and stock volatility is higher.

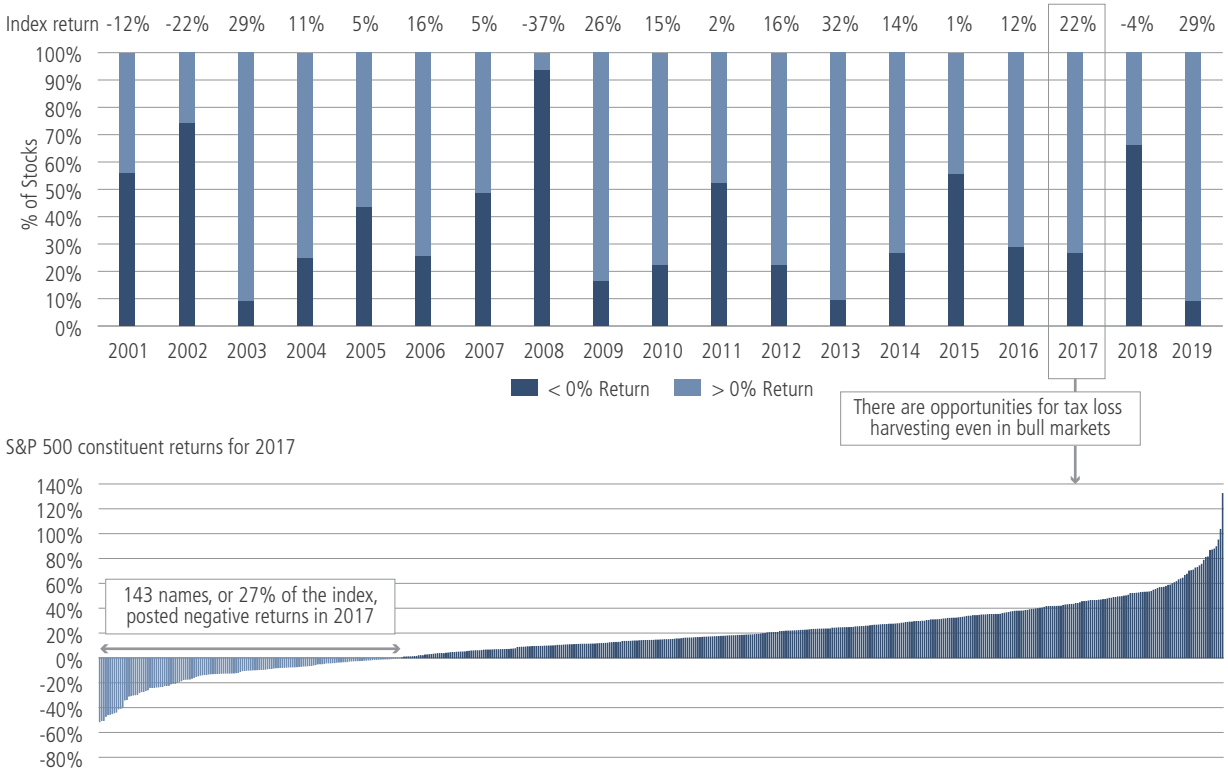
Executive Summary

- Actively using tax-efficient strategies can be a powerful tool to enhance after-tax investment returns.
- In this paper we focus on tax loss harvesting.
- We define "tax alpha" as the difference between excess after-tax return and excess pre-tax return relative to a benchmark.
- We describe our methodology for assessing the potential availability of tax alpha.
- We find that the available level of tax alpha depends upon the market environment—specifically, its availability is higher when market returns are lower and stock volatility is higher.
- While the availability of tax loss harvesting opportunities diminishes over time, the immediate savings it generates continue to compound for as long as taxation on those gains is deferred.
- We compare our results to a historical backtest on S&P 500 stocks, as well as results reported by a peer group from eVestment.
- While acknowledging some potential upward biases in our results, as well as the cumulative effect that tax loss harvesting has on portfolio concentration, we believe that the overall benefit of tax-efficient strategies is clear.

The impact of taxes on the overall performance of a portfolio can be meaningful. Therefore, actively using tax-efficient strategies can be a powerful tool to enhance after-tax investment returns. During the lifetime of a portfolio, the two most important aspects of tax management are tax loss harvesting (realizing a loss by selling a security, which can then offset a taxable gain from another security) and tax deferral (delaying taxation so that money remains invested and continues to generate returns).

While no investor has portfolio losses as their objective, they occur with regularity and they can be exploited throughout the year with a tax loss harvesting strategy. As figure 1 shows, the opportunity set can be substantial even during bull markets.

FIGURE 1. TAX LOSS HARVESTING OPPORTUNITIES CAN BE SUBSTANTIAL EVEN DURING BULL MARKETS
Positive vs. negative return dispersion in the S&P 500 Index, 2001–2019



Source: Neuberger Berman, Bloomberg.

In this paper we introduce a naïve tax loss harvesting strategy to quantify the value of tax management. We assume the joint distribution of stock returns with two essential parameters, the market return and stock volatility, and simulate tax alpha based on hypothetical market environments. We also use historical data from the past 10 years to validate the model.

Our results show that tax loss harvesting can generate excess return ("tax alpha"). But we also found that the level of tax alpha available from tax loss harvesting changes with different market environments and diminishes the longer the strategy is applied. The implication is that, over time, tax deferral, rather than tax loss harvesting, becomes the greater contributor to excess after-tax return.

What Is Tax Alpha?

We define tax alpha as the difference between excess after-tax return and excess pre-tax return, relative to a benchmark.

Tax Alpha = Excess After-Tax Return – Excess Pre-Tax Return
Excess After-Tax Return = After-Tax Return$_{portfolio}$ – After-Tax Return$_{benchmark}$
Excess Pre-Tax Return = Pre-Tax Return$_{portfolio}$ – Pre-Tax Return$_{benchmark}$

Methodology

We measured the impact of a tax loss harvesting strategy over a period of 10 years based on hypothetical market environments.

We assumed that stock log returns follow a multivariate normal distribution with the same mean, variance and covariance. We assumed three different market return levels (0%, 6% and 10% annualized) and two stock volatility levels (25% and 35% annualized). Stock volatility levels are for individual stocks within the index; due to diversification, the index itself is expected to experience much lower volatility. Return correlation is assumed to be 0.3 for all stocks, similar to the level observed historically between constituents of the S&P 500 Index.

We assumed that there are 500 stocks in the portfolio and the benchmark, and that the initial portfolio weights are equal. We also explored weights based on the S&P 500 Index. Since the stock returns have the same characteristics, we found that initial portfolio weighting does not make a big difference to the simulated tax alpha if the number of simulations is large enough.

The threshold for tax loss harvesting was -5%; that is, each month, the cumulative simple return of each stock is calculated, and those with a return of less than -5% are loss harvested, meaning that they are sold and stocks with the same characteristics are immediately repurchased.

Many tax jurisdictions prohibit the sale and immediate repurchasing of stocks for tax loss harvesting purposes. In the U.S., this is known as a "wash sale," and in the U.K. it is sometimes referred to as "bed and breakfasting." Losses from stocks that are sold and then repurchased within 30 days cannot be used to offset realized gains for tax purposes. Although we sell and immediately repurchase stocks, we avoid wash sales by repurchasing stocks that are different from those that are sold, but which exhibit very similar risk factor exposures; for example, we might replace Coca-Cola stock with Pepsi stock. In our methodology, this approach does not have a critical effect on the simulated tax alpha because we are assuming the stock returns are homogeneous; however, when evaluating these results with a historical methodology, we would handle wash sales carefully on a case-by-case basis.

We have applied only the federal tax rate, and the highest level is applied for both long-term and short-term gains, at 23.8% and 40.8%, respectively. Annual dividend return is assumed to be 2%, and after-tax dividends are fully reinvested. Advisory fees are assumed to be 35 basis points per annum and two-way 100% turnover transaction cost is assumed to be 10 basis points (in other words trading 100% of the portfolio into a new portfolio is assumed to cost 0.10%). The annual one-way turnover for both the portfolio and the benchmark is assumed to be 5% to capture the natural change of the constituents of the benchmark and potential corporate actions associated with the stocks in the portfolio. Therefore each year, 25 securities are randomly selected from the benchmark and the portfolio, to be sold and repurchased immediately.

With these assumptions in place, we carried out 1,000 Monte Carlo simulations. Our headline finding was that tax alpha was highest when market return was lower and stock volatility was higher. The annualized tax alpha, when the market return was 6% and stock volatility was 35%, was 1.7%.

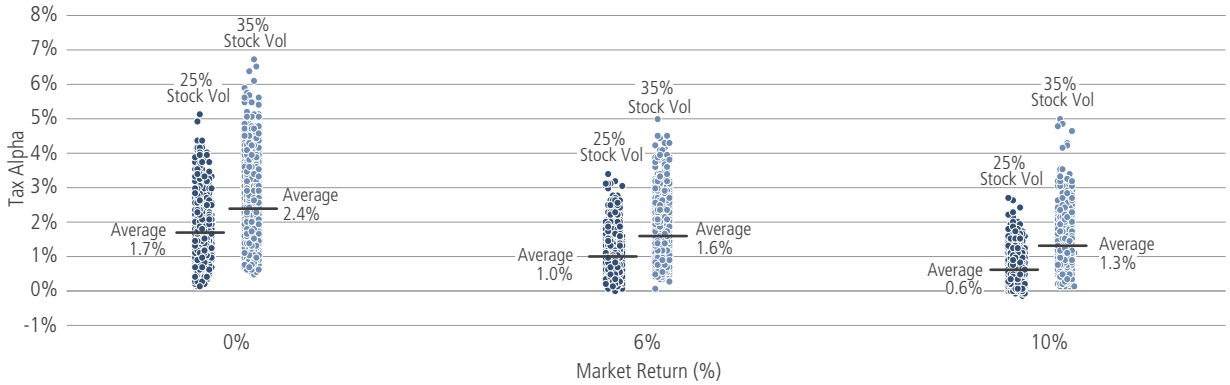
Monte Carlo Simulations Based on Hypothetical Market Environments

Higher Volatility Generates More Tax Alpha Opportunity

Figure 2 illustrates the annualized tax alpha achieved under our six different hypothetical return and volatility environments. The plot shows the results for all 1,000 Monte Carlo simulations as well as the average result for each environment. These results suggest that it is reasonable to expect annualized tax alpha to be between -0.2% and 4.4%. The lower the market return and the higher the stock volatility, the higher the value of tax alpha; this is an intuitive result, as low return and high volatility generate more losses that can be harvested to offset against gains.

FIGURE 2. SIMULATED PORTFOLIO TAX ALPHA IN SIX DIFFERENT RETURN AND VOLATILITY ENVIRONMENTS, OVER 10 YEARS

Tax alpha from 1,000 Monte Carlo simulations for each market-return and stock-volatility scenario



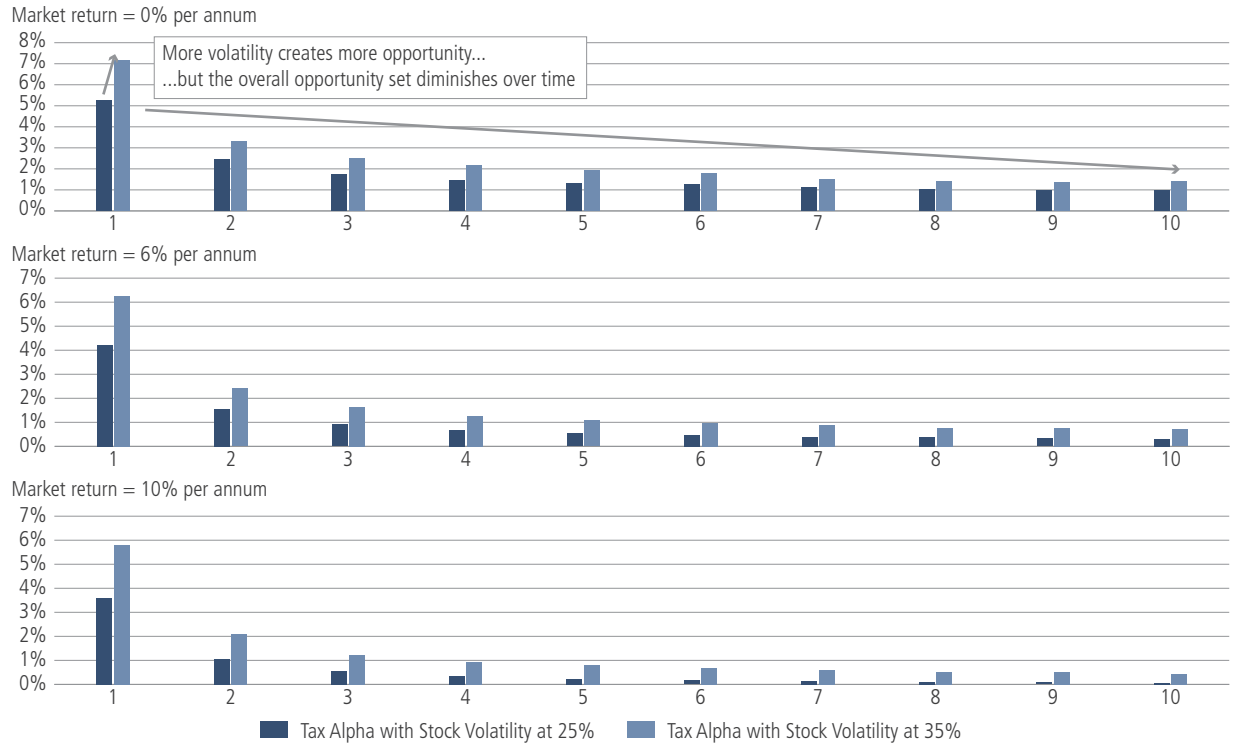
Source: Neuberger Berman. See the main text for the methodology, assumptions and our definition of tax alpha.

Tax Loss Harvesting Opportunity Diminishes Over Time

Figure 3 shows the average simulated tax alpha in each discrete year for the six different return and volatility environments. We can see that tax alpha diminishes as time goes by—even in the scenario where the market return level is zero.

This can be explained by the fact that, while the loss that can be harvested from a single stock does not diminish over time, the stocks that suffer greater losses will have less weight in the portfolio regardless of whether the market as a whole is up or down. That limits the amount of tax alpha they can contribute, and the contribution becomes more limited over time as more and more loss-generating stocks have their losses harvested and their cumulative returns set back to zero.

FIGURE 3. SIMULATED TAX ALPHA IN SIX DIFFERENT RETURN AND VOLATILITY ENVIRONMENTS, YEAR-BY-YEAR



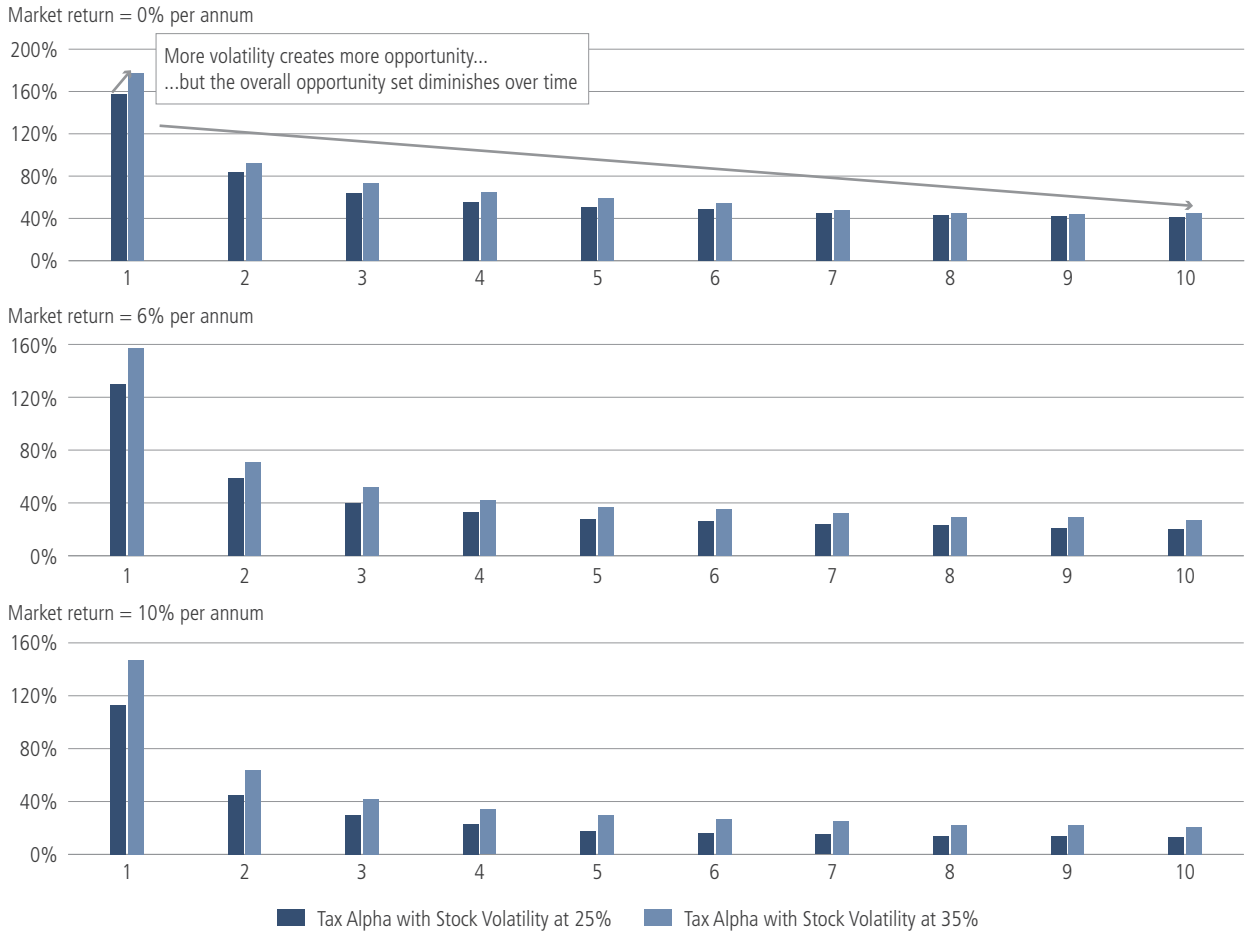
Source: Neuberger Berman. See the main text for the methodology, assumptions and our definition of tax alpha. The charts show the average result from 1,000 Monte Carlo hypothetical simulations for each market-return and stock-volatility scenario.

Fewer Stocks Meet Tax the Loss Harvesting Threshold Over Time

We can see this effect when we look at the proportion of the portfolio that is harvested each year, shown in figure 4. This is calculated as the sum of the weights of stocks that have been sold and repurchased each quarter. The annual harvested proportion can therefore be larger than 100%, which is exactly the case at the beginning of the 10-year period for many of the scenarios. In all environments, the proportion of the portfolio used for tax loss harvesting diminishes substantially within the first three years, and continues to diminish throughout the 10-year period.

We also note that, intuitively, just as the level of tax alpha is highest when stock volatility is high and market return is low, so is the proportion of the portfolio used for tax loss harvesting.

FIGURE 4. PROPORTION OF THE PORTFOLIO USED FOR TAX LOSS HARVESTING IN SIX DIFFERENT RETURN AND VOLATILITY ENVIRONMENTS, YEAR-BY-YEAR

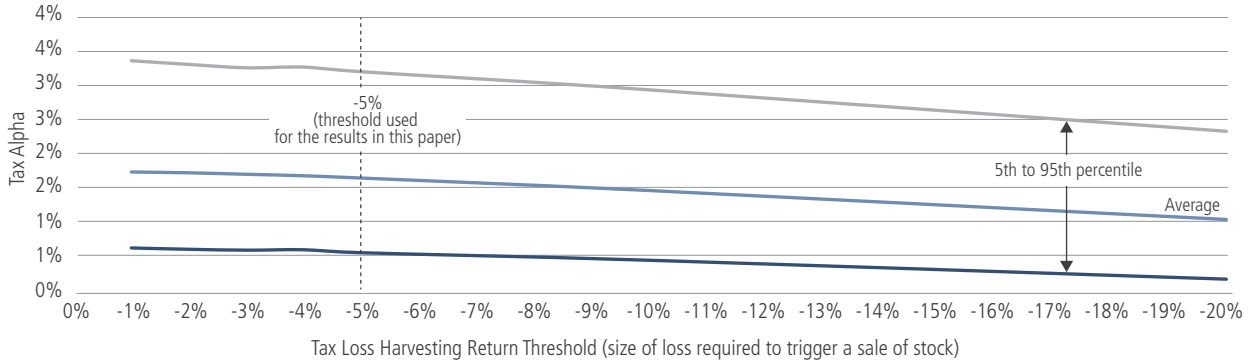


Source: Neuberger Berman. See the main text for the methodology, assumptions and our definition of tax alpha. The charts show the average result from 1,000 Monte Carlo hypothetical simulations for each market-return and stock-volatility scenario.

Importance of the Tax Loss Harvesting Threshold

As we mentioned above, the threshold for tax loss harvesting was -5%. For the scenario where market return is 6% and stock volatility is 35%, we explored different thresholds and found that the influence of transaction cost was marginal, and that the absolute value of simulated tax alpha diminished as the tax loss harvesting return threshold decreased (figure 5).

FIGURE 5. SIMULATED TAX ALPHA DIMINISHES AS THE TAX LOSS HARVESTING RETURN THRESHOLD IS MADE MORE NEGATIVE
Tax alpha from 1,000 Monte Carlo simulations for the 6% market return and 35% stock volatility scenario



Source: Neuberger Berman. See the main text for the methodology, assumptions and our definition of tax alpha.

Portfolio Risk Becomes More Concentrated Over Time

One interesting additional impact of tax loss harvesting is that, while the number of names in the portfolio remains the same (because stocks are repurchased immediately after they are sold), the effective number of names can decrease substantially, indicating growing portfolio concentration.

We define the effective number of names as the inverse of the Herfindahl-Hirschman Index (HHI). In figure 6, we use S&P 500 weights (which have an effective number of names of 144) to initialize the portfolio, and then show the effective number of names in the portfolio after 10 years of tax loss harvesting in our six different return and volatility environments. The higher the stock volatility, the more concentrated the portfolio. However, there is no clear relationship between the level of market return and the level of portfolio concentration.

FIGURE 6. TAX LOSS HARVESTING MAKES A PORTFOLIO MORE CONCENTRATED OVER TIME
Effective number of names after 10 years of tax loss harvesting in six different return and volatility environments

Number of Names in Benchmark: 505
Initial Effective Number of Names: 144

		Market Return		
		0%	6%	10%
Stock Volatility	25%	103	102.8	102.8
	35%	78.1	77.2	78.3

Source: Neuberger Berman. See the main text for the methodology and assumptions. The table shows the average result from 1,000 Monte Carlo hypothetical simulations for each market-return and stock-volatility scenario.

This drift toward concentration and away from the benchmark is intuitive when one remembers that this naïve strategy does not rebalance by selling any of its best-performing stocks—because it aims simply to maximize the tax loss harvesting potential. Over time, therefore, the best performers will come to dominate the portfolio as the values of the worst performers fall.

In practice, an investor may wish to mitigate this concentration effect by pursuing a strategy that occasionally sells some of its better-performing stocks in order to rebalance, realizing capital gains and accepting a modest tax liability.

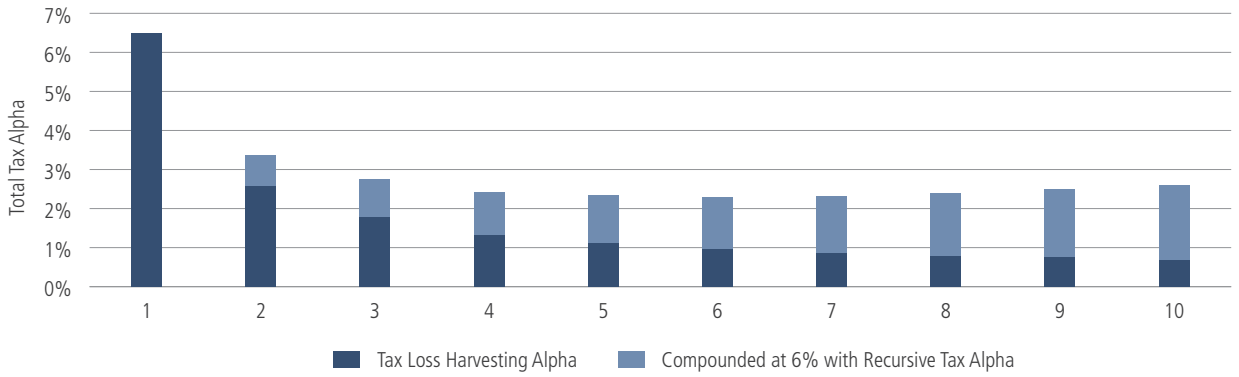
Early Savings From Tax Loss Harvesting Continue to Add Value Over Time via Compounding

This loss of portfolio diversification, combined with a decline in tax loss harvesting opportunity, might appear frustrating at first. However, the value of tax management, broadly defined, does not evaporate as a portfolio ages; it is simply that, in later years, the bigger tax management benefit comes from deferred gains rather than loss harvesting. And the important thing to remember is that immediate savings realized from tax loss harvesting in earlier years mean more money for the investor instead of the taxman—money

that can be reinvested in the strategy and continue to compound over subsequent years, as well as potentially adding further value in the form of future tax alpha, for as long as the realization of those gains are deferred.

Figure 7 shows the tax alpha generated over 10 years in an environment in which the market return was 6% and stock volatility was 35%, as well as the value added by reinvesting this tax loss harvesting alpha in a portfolio that compounds at 6% per year and continues to generate further tax alpha. A similar cumulative growth pattern is seen throughout the period for other return and volatility environments.

FIGURE 7. TAX ALPHA CAN GROW EVEN AFTER TAX LOSS HARVESTING STOPS GENERATING SUBSTANTIAL ALPHA



Source: Neuberger Berman. The chart shows the average result from 1,000 Monte Carlo hypothetical simulations in which market return was set at 6% and stock volatility was set at 35%. See the main text for the methodology, assumptions and our definition of tax alpha.

Confirmatory Methodologies

While this paper has focused on how our simple tax loss harvesting strategy performed in hypothetical market environments, we confirmed the robustness of the results by testing the same strategy with historical market data.

We applied tax loss harvesting directly to the price history of S&P 500 Index members from 2009 to 2019. The annualized tax alpha was about 2%. As an additional note, we observed that the returns history of existing tax-managed equity strategies that are included in the eVestment database also indicate that tax alpha has been around 2% per annum (with the added consideration that cashflows into composite portfolios in later years can have further tax implications).

Conclusions and Potential Upward Biases in Our Results

Our results show that actively using tax-efficient strategies can be a powerful tool to enhance after-tax investment returns. Specifically, tax loss harvesting in a portfolio's early years can generate tax alpha that, in turn, can be allowed to compound over many years by deferring tax on gains. We show that tax alpha is available in almost all environments, but is potentially highest when market returns are lower (presenting a lower hurdle for outperformance) and stock volatility is higher (creating more and bigger losses to offset against gains).

We acknowledge that there are three sources of potential upward bias of the simulated tax alpha. To start with, we assume that all stock returns follow homogeneously distributed random walks. When applying the strategy to real stocks, we must make portfolio construction trade-offs: Coca-Cola and Pepsi may be similar, but they do not offer perfectly identical exposures. Differences in initial portfolio weights can also affect outcomes when stock returns are heterogeneous and extreme scenariosare thereby more likely. Those scenarios could result in high trading fees. Our model does not have a turnover limit, which may be a prudent measure in practice. Furthermore, we assume that all dividends are qualified, which means that we use a long-term tax rate for all the dividends in the calculation of tax alpha. Last but not least, in our hypothetical scenario, there were no corporate actions simulated that would have resulted in realized gains and tax liabilities.

Acknowledging these potential upward biases in the results, as well as the cumulative effect on portfolio concentration, we believe that the overall benefit of tax-efficient strategies is clear from both our hypothetical modelling and our backtesting with historical market data.

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INDEX DEFINITIONS

The **S&P 500 Index** consists of 500 U.S. stocks chosen for market size, liquidity and industry group representation. It is a market value-weighted index (stock price times number of shares outstanding), with each stock's weight in the Index proportionate to its market value.

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