Investment Management Reflections

Tax Management, Loss Harvesting, and HIFO Accounting

Andrew L. Berkin and Jia Ye

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Virtually all companies and individuals are faced with the management of taxable assets. To manage these assets efficiently, investors need to be aware of the impact of taxes on investment returns. In the study we report in this article, we quantified the benefits of loss harvesting and highest in, first out accounting by using Monte Carlo simulations, and we investigated the robustness of these strategies in various markets and with various cash flows and tax rates. We concluded that a market with high stock-specific risk, low average return, and high dividend yield provides more opportunities to harvest losses. In addition, a steady stream of contributions refreshes a portfolio and allows the benefits of loss harvesting to remain strong over time. Conversely, withdrawals reduce the advantages of realizing losses. Our findings show that no matter what market environment occurs in the future, managing a portfolio in a tax-efficient manner gives substantially better after-tax performance than a simple index fund, both before and after liquidation of the portfolio.

All companies and individuals are faced with the management of taxable assets. In fact, a large portion of all investment capital is taxable. Apart from personal, high-net-worth assets and mutual funds, institutional examples include insurance reserves, voluntary employees' beneficiary association trusts, nuclear decommissioning trusts (NDTs), and nonqualified pensions for senior managers. To manage taxable assets efficiently, investors need to be aware of the impact of taxes on investment returns. Until recently, however, after-tax performance information was not available to many investors; additionally, the cost of taxes was overshadowed by the long-lasting bull market and by investors' zealous quest for active alphas.

Most investment managers serving the taxable investing market are quite happy to trade off known (and often large) tax costs in the quest for stock selection alpha, which may or may not materialize. But the alpha for a taxable portfolio consists of a pretax alpha, which is highly uncertain, and a "tax alpha" (the tax consequences of active management), which can be managed with precision. The largest source of negative tax alpha is capital gains taxes, which are incurred on any profitable sale; the largest source of positive tax alpha is tax savings

Andrew L. Berkin, Ph.D, Associate Director, First Quadrant, L.P.

Jia Ye, Ph.D. Director, Equity Research, First Quadrant, L.P.

from realized losses—that is, the strategy that has become known as "loss harvesting."

We previously used Monte Carlo simulations to study the benefits of loss harvesting under standard market conditions (Arnott, Berkin, and Ye 2001b). This article expands on that work in several significant ways. First, in the study we report here, we systematically varied the market conditions to examine their effects on the rewards from loss harvesting. Second, we addressed the effects of portfolio considerations, such as cash flow, on the alpha obtainable through tax efficiency.

Past Studies

Not until the past couple of years has the effect of taxes received the attention it deserves. Several studies have shown that active alphas are highly uncertain whereas the cost of taxes is very real (Jeffrey and Arnott 1993; Dickson and Shoven 1993; Arnott, Berkin, and Ye 2000). More and more investors realize that when they take profits after the market appreciates, taxes take a big bite out of their wealth. Furthermore, the recent increase in "new wealth" individuals (who have not used the family offices of "old wealth" families) that resulted from the boom years of the 1990s has created a new class of tax-conscious investor. A recent development is the increased focus on after-tax performance measurement (Stein 1998; Brunel 2000). In October 1999, the Vanguard Group announced that it would start publishing the after-tax performance of 47 of its mutual funds. On 16 April 2001, the U.S. SEC (2001) adopted a rule requiring mutual funds to disclose their after-tax returns, and AIMR (2001) has proposed new standards for after-tax performance measurement. These new regulations and standards should enhance the tax consciousness of investors.

With the increasing attention devoted to tax-efficient investing, various ways have been proposed to improve after-tax returns (Dickson and Shoven 1994; Jeffrey and Arnott; Apelfeld, Fowler, and Gordon 1996; Stein and Narasimhan 1999; Arnott, Berkin, and Ye 2001a). Among them are loss harvesting (taxable investors should harvest losses to generate tax credits that can be used to offset capital gains), HIFO (highest in, first out) accounting procedures (taxable investors should use HIFO accounting whenever a security holding is sold), and yield management (whereas corporate taxable portfolios should tilt toward high-yield stocks to take advantage of the dividend exclusion, taxable investors should hold mostly low-yield assets to avoid income taxes on the yield). Although the rationale behind all these strategies is straightforward, the investment literature contains little documentation quantifying the benefit of each strategy in terms of tax savings, nor are the strategies widely used.

Dickson and Shoven (1994) were among the first to measure the benefits of loss harvesting and the HIFO accounting procedure. They constructed closed-end and open-end SURGE (strategies using realized gains elimination) funds that tracked the S&P 500 Index from August 1976 through December 1991. Not surprisingly, Dickson and Shoven found that the strategy of realizing large capital losses extracts greater tax benefit for the closed-end fund than for the open-end fund. (Because share prices typically rise over time, an open-end fund tends to have a higher cost basis from cash inflow than its closed-end counterpart. Therefore, an open-end fund is endogenously more tax efficient than a closed-end fund.) For the open-end fund, the tax benefit of HIFO accounting was 65–95 bps, with only 5–8 bps of value added derived from loss harvesting. The loss-harvesting strategy increased after-tax returns by 14–27 bps a year over the HIFO-only closed-end fund. In summary, this Dickson–Shoven study showed that both the open-end and closed-end SURGE strategies improve after-tax performance without harming before-tax returns.

The simulations in Dickson and Shoven (1994) were based on only one type of market environment (the U.S. market from 1976 through 1991, largely a bull market environment), so the applicability of their results in other market conditions is not clear. In this article, we use Monte Carlo simulations to examine the contributions from loss harvesting and HIFO accounting methods in various market environments.[1] We can thus show that the benefits of these techniques are not unique to a particular set of returns but consistently add value under a wide array of possible future market environments. In addition, we can quantify the value added.

Loss Harvesting and HIFO

"Loss harvesting" refers to realizing losses by selling shares that have fallen below the original cost to generate tax credits. Tax credits can be used to offset capital gains either within or outside the portfolio. Because virtually all diversified portfolios have stocks that suffer losses, selling stocks that have fallen in value (or covering short positions in stocks that have rallied) is perhaps the easiest way to reduce taxes. Although the idea underlying this strategy is simple, its implementation requires diligence and discipline: To achieve the maximum tax savings, an investor should dispose of stocks with losses whenever a loss-harvesting opportunity is large enough to justify the trading costs. This discipline has been ignored by many investors, who tend to wait until year-end to realize losses.

[1] We do not consider the effects of yield management. Our approach is to consider portfolios that exactly replicate the index, which would not be possible with a dividend tilt. We note that in today's low-dividend environment, yield management is less important; in the section called "Varying Market Conditions," we show that the overall market dividend rate has little influence on the efficacy of tax-efficient investing.

In a world with nonzero transaction costs, one should harvest losses only to the extent that the tax credits they generate substantially outweigh the trading costs from loss realization.[2] Another constraint on loss harvesting is the "wash sale" rule, which prohibits the purchase of any securities that were sold at a loss during the previous 31 days. The wash sale rule introduces a source of risk to loss harvesting. An obvious way to minimize this risk is to simultaneously purchase stocks that share similar risk and return characteristics as the stocks that were sold at a loss. For active management, losses should be realized only when the tax benefit can overcome the cost of trading *and* the expected short-term gains of a stock. Given that the tax credit is a "bird in the hand" whereas short-term market prices are hard to predict, however, the wash sale rule should not have a significant effect on the trading strategies of a tax-efficient portfolio.

In HIFO accounting, whenever one must sell a security, one sells the shares with the highest cost basis first. The rationale is straightforward: The higher the cost basis, the lower the capital gains tax. This strategy minimizes capital gains taxes without any changes in portfolio weights. It is, therefore, a Pareto optimal strategy from any perspective.

Monte Carlo Simulations

In this section, we spell out the assumptions and results for the base case and then report robustness tests by (1) varying the market conditions (the assumptions) and rerunning the simulations (2) varying the portfolio conditions and rerunning the simulations.

Base-Case Assumptions. As strategies, loss harvesting and HIFO accounting share a desirable feature—simplicity. Not only can investors implement these strategies easily, they can also measure the tax benefit with precision. We have carried out this measurement in a series of Monte Carlo simulations.

Our model for asset returns is based on the standard capital asset pricing model (Sharpe 1964):

$$r_i = (1 - \beta_i) \cdot r_f + \beta_i \cdot r_M + \varepsilon_i$$

where

r_i = expected return on stock i

β_i = risk exposure of stock i to the market

r_f = the risk-free rate

r_M = expected return on the market portfolio

ε_i = the residual

The risk-free rate in the base case was fixed at 0.54 percent a month, or 6.5 percent a year, which approximately matches the average of 1977–2002. We set the betas to be normally distributed, with a mean of 1 and standard deviation of 0.3, and capped them at –1 and 3.

We adapted historically typical values for the base-case scenario:

- an average monthly market return of 0.66 percent (8 percent a year, which represents a total return, or Price Return + Dividend),
- average monthly market volatility of 4.3 percent (15 percent a year on a geometric basis), and
- dividend yield of 0.12 percent a month (1.44 percent a year based on current market yields).

We simulated a 300-month (25-year) performance history for a portfolio with 500 assets—in effect, a synthetic S&P 500. The monthly return on each asset was this market return plus a normally distributed random variable with 0 mean and 9 percent volatility. To simulate corporate actions and index rebalancing, we assumed that one existing company disappeared and one new company was added to the portfolio every month, which corresponds to an average of 2.4 percent annualized turnover in index composition.[3] For simplicity, we assumed the replacement stock was at the same index weight as the stock removed. The turnover of the portfolio each month and reinvestment of dividends led to tens of thousands of tax lots over the 25 years of the portfolio's life. We also assumed in the base case that no cash contributions or withdrawals occurred over time.

As for the tax rate, we noted that some investors pay nearly 50 percent marginal tax in combined federal, state, and local taxes whereas others, such as qualified nuclear decommissioning trusts (NDTs), pay as little as 20 percent.[4] In the simulations, we adopted a tax rate that is in the middle of the spectrum, 35 percent. This 35 percent assumption is exactly the federal rate that a corporate account would face. Individual investors are subject to differing long-term and short-term tax rates, and because of market appreciation, many of the losses will be at the more advantageous short-term rates. For simplicity, we did not explicitly consider different short-term and long-term tax rates, but this simplification should not have had a qualitative

[2] One should take into account not only the round-trip trading costs but also the net present value of the extra tax that will have to be paid on eventual liquidation, because realizing a loss lowers the cost basis of the portfolio.

[3] For a discussion of the tax effects on benchmark returns from corporate activity, see Minck (1998).

[4] Most investors do not realize that with a top federal tax bracket of 38.6 percent, marginal rates can rise to almost 50 percent. It can happen as follows: Top-tax states range as high as 10 percent, and even with federal deductibility, 6.2 percent is added to the total tax bill, pushing marginal taxation to 44.8 percent. Itemized deduction phase-outs

effect on our conclusions, although exact quantitative results would have varied. The interpretation of our results in light of the simplification is that the 50 percent taxpayer should care more about taxes than we suggest and the 20 percent taxpayer should care somewhat less.

To simulate the loss-harvesting strategy, we made three assumptions that minimized market friction and had marginal effect on the results.

- We assumed that transaction costs are zero and that the portfolio manager has no ability to discern which stocks are likely to perform well or badly. Under this assumption, we realized losses whenever the market price fell below the purchase price of a holding or exceeded the sale price of a short position. The impact of this assumption should not be large because the turnover of a tax-advantaged portfolio is fairly low after the first few years. The effect of assuming zero transaction costs was that our turnover was larger than would actually be realized; a large number of trades were conducted for only slight loss realization. An actual managed tax-advantaged program would obviously sell only when the loss exceeded some threshold; selling at the first penny of loss is, to borrow a cliche, "penny wise and pound foolish."
- We assumed that we were not constrained by the wash sale rule. This assumption effectively took away the risk associated with loss harvesting; we could sell a stock at a loss and then buy it back immediately. Although the assumption might have produced a higher tax benefit from loss realization than in reality, the overstatement should be marginal because we could always purchase stocks that shared similar risk and return characteristics as the stocks we sold at a loss to achieve a similar effect.
- We assumed that the tax alpha created by harvesting losses could be treated as cash and reinvested in the portfolio. This assumption is reasonable because tax savings from loss harvesting provide a nearly immediate cash flow benefit. Whether dealing with corporate quarterly tax estimates or an individual investor's quarterly tax estimates, one can garner the benefit of tax savings from loss harvesting almost immediately. Consider, for example, a high-net-worth individual with assets in both a high-returning but tax-inefficient hedge fund and a tax-efficient S&P 500 fund similar to what we describe in this article. The losses realized from the S&P 500 portfolio translate directly into tax savings on the realized gains of the hedge fund, and this saved money can continue to remain invested.

One assumption we did not make is the presence of momentum (Jegadeesh and Titman 1993). A strategy that keeps winners and sells losers tends to acquire a momentum bias. Although the presence of short-term reversals would hurt such a strategy, longer-term gains from positive momentum should ultimately have a positive impact on performance—as long as the historical tendency for markets to exhibit momentum persists. For example, Chincarini and Kim (2001) found that momentum effects would have been beneficial to a tax-aware investor during the 1990s. We assumed this added value to be 0; our tax-efficient and naive portfolios have identical pretax returns.

In each simulation, we generated three portfolios.

- *Portfolio One* is a simple buy-and-hold portfolio with cost-averaging accounting, in which liquidations are presumed to have the average cost basis of the holding.
- *Portfolio Two* is a buy-and-hold portfolio with HIFO accounting.
- *Portfolio Three* is a tax-advantaged portfolio that incorporates both loss harvesting and HIFO accounting.

In each portfolio, for each month of each simulation, we tracked the three portfolio values in two ways: (1) gross value of the portfolio and (2) net value after subtracting the deferred taxes that remained unpaid. The latter measure is the net-of-tax liquidation value of the portfolio.

In the tax-advantaged portfolio, we swept through the portfolio each month to find all assets that had losses, sold those, and bought them back immediately (because we assumed away the wash sale rule). In the event of sales, we always sold the shares with the highest cost basis first, as the HIFO accounting strategy suggests. Once every quarter, we took any tax obligations from dividends and realized gains out of the portfolio and reinvested any tax savings from loss harvesting back into the portfolio. We repeated this exercise 500 times to generate a distribution of portfolio performance for the 25-year period.

Base-Case Results. The tax benefit of HIFO accounting alone is the difference between the market values of Portfolio Two and Portfolio One; the value added to the HIFO strategy by loss harvesting is the difference between the market value of Portfolio Three and Portfolio Two. The results of these base-case simulations reveal how much value these two strategies can add in normal market conditions.

Figure 1 and **Figure 2** plot the 25th percentile, 50th percentile, and 75th percentile cumulative value added (before liquidation) of, respectively, the HIFO accounting strategy (Portfolio Two return minus Portfolio One return) and the loss-harvesting strategy (Portfolio Three return minus Portfolio Two return). As Figure 1 shows, the median cumulative tax benefit of HIFO accounting over the 25 years is a modest (but useful) 8.6 pps. Because of the limited selling that occurs with a buy-and-hold strategy, the accounting method has little impact in this base case (as the later analyses show, it has a much

Figure 1. Cumulative Alpha of HIFO Accounting Strategy

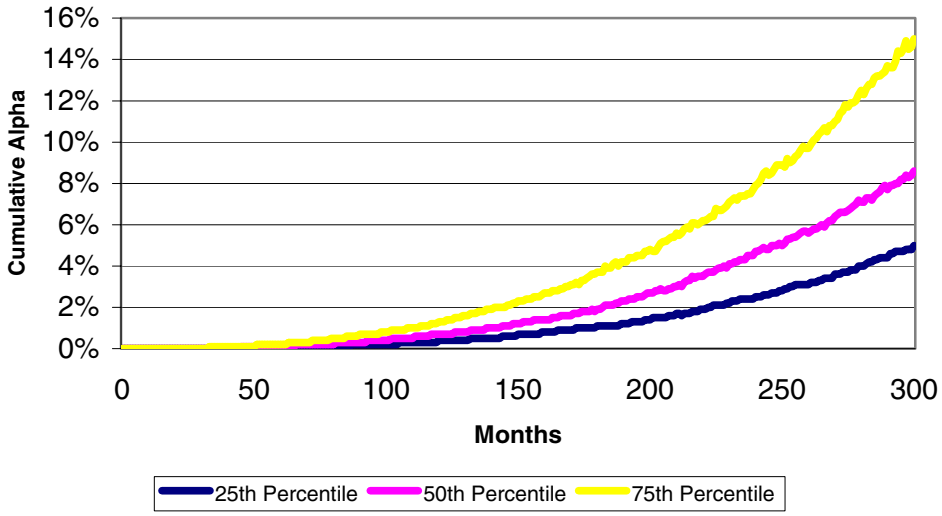
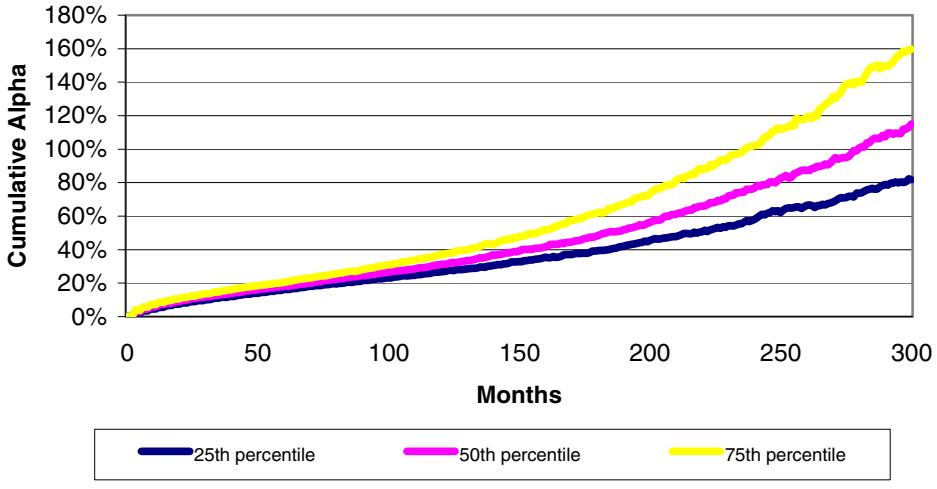


Figure 2. Cumulative Alpha of Loss Harvesting



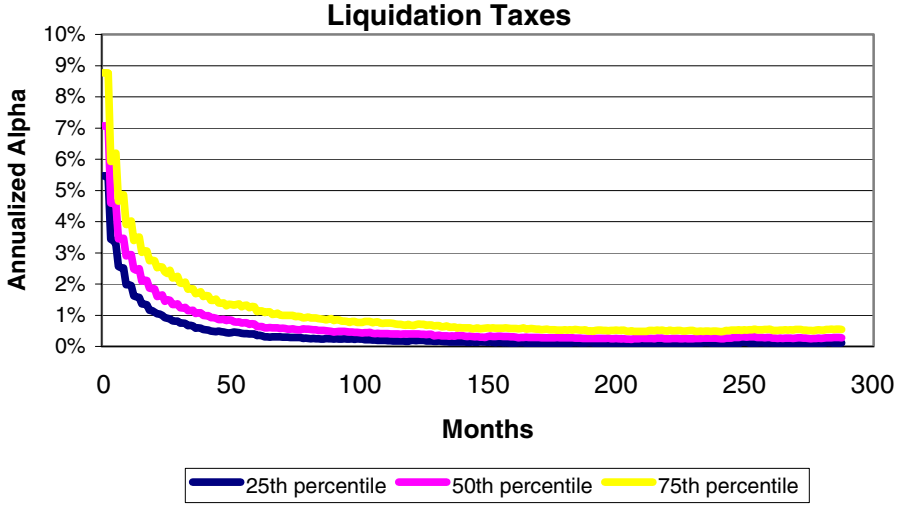
greater impact when cash flows are considered). The median cumulative benefit of the loss-harvesting strategy, shown in Figure 2, is a far more impressive 115 pps, much of which is from reinvestment and market appreciation over the years. The median cumulative value added by using both tax-efficient accounting and loss harvesting is 122 pps. If each loss-harvesting opportunity had been viewed as a chance to take out an interest-free loan (because most of these loans are taken out in the early years), then a tremendous amount of benefit would have accumulated after 25 years.

In our previous articles (e.g., Arnott, Berkin, and Ye 2001b), we quoted a median 27 percent value added before liquidation for the tax-efficient portfolio versus a standard buy-and-hold strategy. This value is, of course, much lower than the 122 pps gain shown here, but the two results are equivalent. The difference lies in accounting. In the study reported in our earlier paper, we used a ratio of final portfolio values, which is 1.27. Here, we calculated the return of each portfolio for each time period as the final portfolio value for that time minus the cash flow during the period divided by the initial portfolio value. The returns for each portfolio were then accumulated geometrically, and the difference between the tax-advantaged portfolio's return and that of the standard portfolio is the value added.[5] In essence, in this study, we were comparing value added with the original portfolio amount by using cumulative return comparisons. Not only is this metric standard accounting, it is indispensable for considering cash flows, which we report later.

One concern investors may have about the loss-harvesting strategy is that the opportunity for loss realization could diminish as the portfolio ages (because the market goes up more often than down over the long run). Indeed, **Figure 3** shows that a great deal of the benefit from loss harvesting is generated during the first few years. A typical alpha from loss harvesting can be as large as 7 pps in the first year of a program for a portfolio that is funded initially with cash. It quickly diminishes, however, falling to below 2 pps a year before three years are finished and to below 1 pp a year before five years is finished. Yet even after 25 years, the median tax alpha is still adding about 0.3 pp a year to portfolio wealth, an alpha that most active managers cannot add reliably before tax, let alone after tax.

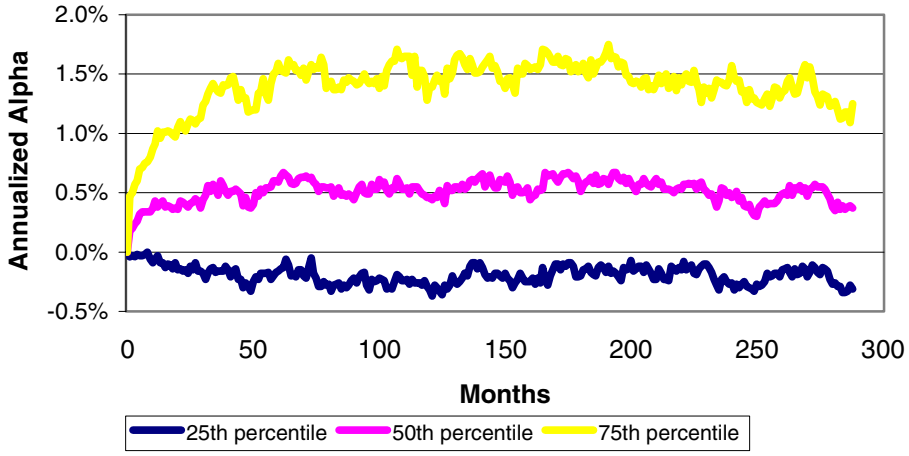
Another concern is that the realization of losses over time gradually reduces the cost basis of portfolio holdings, which may mean more tax obligation at the time of portfolio liquidation. To address this concern, we calculated the after-tax benefit of loss harvesting, net of all liquidation taxes, each month. The annualized results are presented in **Figure 4**. Here, we find a much more moderate early benefit (compared with Figure 3) from loss harvesting, indicating that the benefit of loss harvesting is almost exactly offset by a higher tax bill owed

Figure 3. Annualized Alpha of Loss Harvesting Before Liquidation Taxes



[5] Specifically, the median returns of the two portfolios are 472 percent for the tax-advantaged portfolio and 350 percent for the standard portfolio, for a difference of 122 pps. The ratio of final values would then be 5.72/4.50, or 1.27. Our previous papers used the more conservative "relative wealth" approach to measuring the value added from loss harvesting. In this article, we use the more aggressive, *but more widely accepted*, "cumulative return differences" approach, which would be the AIMR-compliant measure if these were live composite results rather than a simulation.

Figure 4. Annualized Alpha of Loss Harvesting After Liquidation Taxes

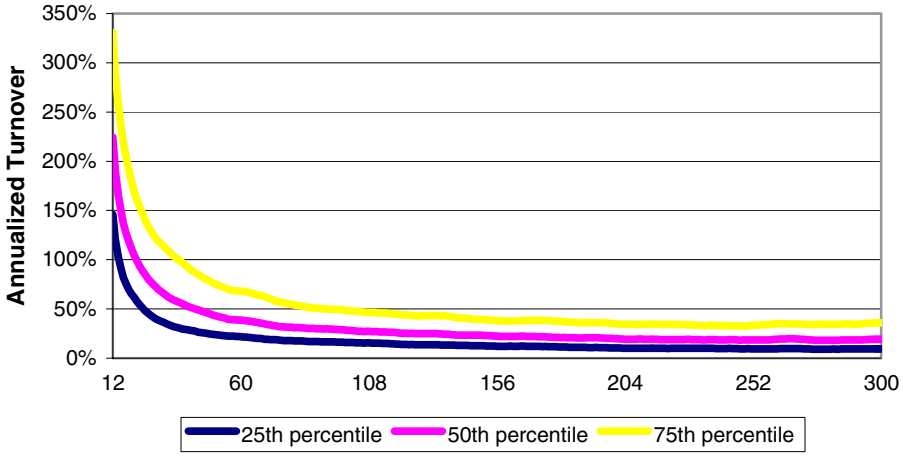


on liquidation. The "interest-free loan" of loss harvesting has not yet in the early months had time to accumulate returns. But the value added quickly stabilizes after three years to a median of 0.5 pps. When liquidating after 25 years, the cumulative value added is an impressive 58 pps.

Not surprisingly, the turnover generated by a loss-harvesting strategy is high at first, as shown in **Figure 5**, because the prices of almost half the stocks in the starting portfolio fall. As those assets fall in value and the losses are harvested, the proceeds are reinvested in new assets, almost half of which also fall, and so forth. This pattern has two implications. The first is that an assiduous effort to harvest losses is highly rewarding. The so-called tax-sensitive investment manager who engages in loss harvesting only once a year at the end of a fiscal year has probably seen numerous loss-harvesting opportunities appear and disappear during the course of that year. The second implication is that a "virtuous cycle" occurs in any sort of assiduous effort to harvest losses whenever they occur and whenever the tax alpha is large enough to justify the round-trip trading costs for the investor. The more careful one is to pounce on any meaningful loss-harvesting opportunity, the longer the opportunity lingers into the future because of the new loss-harvesting opportunities created from the reinvestment of loss-harvesting proceeds. This pattern is illustrated in Figure 5, which shows substantial annualized turnover for the first year of a loss-harvesting program, with the turnover diminishing sharply over the next five years and then, remarkably, stabilizing over the next 20 years at a level higher than the level explained by corporate actions.

Varying Market Conditions. The Monte Carlo simulations presented in the previous section depended on the base-case assumptions. We used historically typical market conditions, which obviously may not persist into the future. In this section, we describe our explorations of the benefits of tax-

Figure 5. Annualized Turnover of the Loss Harvesting Strategy



efficient investing in a variety of market environments; for example:

- What if stock price volatility rises or falls?
- What if our assumption of returns is too aggressive or too conservative?
- What if the dividend yield changes?

We addressed these questions by running Monte Carlo simulations with varying assumptions. The simulations' results, of which we focus mainly on after-liquidation tax benefits, shed light on the robustness of the loss-harvesting and HIFO accounting strategies.[6]

Risk. We first examined how the risk of stocks, either systematic or idiosyncratic, affects the performance of the tax–efficient strategy. We expected the tax-advantaged strategy to generate more value when stocks are more turbulent because more opportunities to harvest losses should appear when stock prices are volatile. In a similar vein, Brunel (1997) recommended that active managers take a positive volatility tilt, all else being equal, to increase loss-harvesting opportunities. In Panel A of **Table 1**, we show the average annualized alpha after-liquidation for three levels of stock-specific volatility. We calculated the average alpha for three periods—the full 25 years, the first 5 years, and the last 5 years. *Market volatility* in this simulation was assumed to be uniform at 4.3 percent monthly. In the columns, the stock-specific risk is varied down or up from the historical norm of 9 percent monthly residual volatility, given in the middle column.

We found that the average annual alpha, net of all liquidation taxes, over 25 years fell from 56 bps to 42 bps when we lowered the specific risk from 9 percent to 7 percent. If idiosyncratic (residual) risk is 2 pps higher than the historical norm, the alpha rises to 66 bps on average over 25 years. A comparison between the average alpha for the first five years and that for the last five years shows that the distribution of value added is not uniform over time. Not surprisingly, a long holding horizon is more tax efficient than a short horizon. These results are encouraging in light of the growing consensus that the quiet markets from the mid-1980s through the mid-1990s were anomalous and that increased volatility, particularly this sort of cross-sectional risk caused by the idiosyncratic variation of individual stocks, is here to stay.

Panel B of Table 1 shows the results for variation in marketwide volatility from the base case of 4.3 percent a month. In contrast to stock-specific risk, marketwide volatility has a mixed effect on the efficiency of the tax-advantaged portfolio; high systematic volatility does not necessarily lead to better opportunity in tax management. This result may come as a surprise, but it should not: The key source of loss-harvesting opportunities will be cross-sectional risk, not systematic market risk. Systematic risk drives the broad market return across time, whereas cross-sectional risk leads to loss-harvesting opportunities in every period. Because risk is symmetrical by our definition, for every month with low average market returns and ample loss-harvesting opportunities, there will be other months with large returns and minimal lots in which to harvest losses.

Table 1. Impact of Risk on Average Annualized Alpha after Liquidation Taxes

Period	7% Specific Risk	9% Specific Risk (base case)	11% Specific Risk
A. Impact of idiosyncratic risk			
25-year average	42 bps	56 bps	66 bps
First 5-year average	30	42	49
Last 5-year average	47	53	67
	3% Systematic Risk	4.3% Systematic Risk (base case)	5.6% Systematic Risk
B. Impact of systematic risk			
25-year average	54 bps	56 bps	52 bps
First 5-year average	39	42	37
Last 5-year average	55	53	59

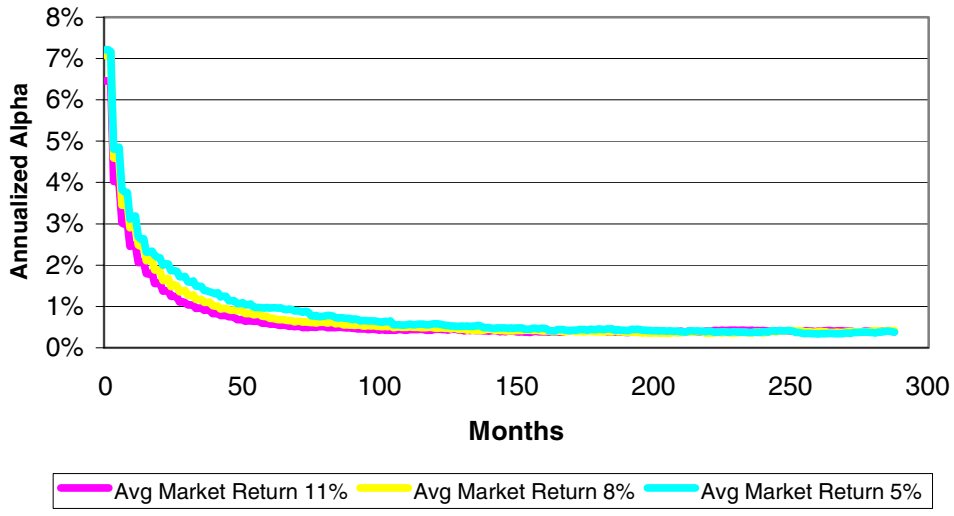
[6] In this section, we combine treatment of the loss-harvesting strategy and the HIFO accounting strategy. The analysis deals with tax-advantaged portfolios that incorporate both. As noted previously, without cash flow, the benefits of HIFO accounting are modest, so not only does this approach simplify the presentation, but it also optimizes tax benefits. We also focus the discussion on the after-liquidation tax benefit, which is most appropriate for investors who will eventually liquidate; thus, we present a conservative view of how tax-efficient strategies can add value.

Market returns. Our next investigation was the impact of the average market return. Recall that the base case had an average annual market return (or total return equal to price return plus dividend yield) of about 8 percent. Returns in the 1990s were, of course, much higher. Although few analysts expect such high returns to continue over the next 25 years, expectations vary greatly. Indeed, various articles suggest that expectations should be sharply reduced, relative to long-term past returns, because of the low dividend yield and earnings yield levels for the markets today (Arnott and Ryan 2001; Arnott and Bernstein 2002). We ran three sets of simulations (500 simulations in each set) under the assumption of average market returns of 5 percent (the expectation in the Arnott–Ryan and Arnott–Bernstein articles), 8 percent (the base case), and 11 percent (the base case used by William Sharpe's Financial Engines organization, www.financialengines.com). The median cumulative after-liquidation value added for each market-return scenario is plotted in **Figure 6**. The graphs in Figure 6 show that the more the market appreciates, the greater the cumulative tax benefit. This result is not as surprising as it may seem; it is a consequence of a pure compounding effect, in that with a higher market appreciation rate, the tax benefit is compounded faster.

Of course, greater loss-harvesting *opportunity* should be expected when the market has lower returns, and indeed, this intuition is confirmed in **Figure** 7, where the median annualized value added of the tax-advantaged portfolios is plotted. Figure 7 shows that the benefit of the tax-efficient strategies is negatively related to the level of market appreciation during the first few years and then converges over time. More loss harvesting does indeed occur when market returns are lower; the median annualized benefit is up to 1 pp higher as the scenario varies from the lowest to the highest market return.

Figure 6. Impact of Market Returns - Median Cumulative Alpha After Liquidation Taxes

Figure 7. Impact of Market Return - Median Annualized Alpha before Liquidation Taxes



Dividend rates. What happens to the returns from loss harvesting if the overall average total return remains fixed but dividends vary from the base case? This question is important because dividend yields of stocks marketwide have dropped sharply in the past 20 years—from more than 5 percent a year in 1982 to 1.5 percent in 2002. High dividend yields should have a mixed effect on the benefits of a tax-efficient strategy relative to a naive buy-and-hold strategy: On the one hand, the dividends paid are reinvested in new shares at a zero cost basis, which increases loss-harvesting possibilities in the future as some of those assets decline in value; on the other hand, dividends experience an immediate tax hit, which reduces the tax efficiency of all portfolios equally.

Table 2 is a report of the average annualized alpha after liquidation for dividend rates of 0.08 percent and 0.16 percent a month as well as the base case of 0.12 percent a month. Higher dividend rates in the simulations did increase opportunities for loss harvesting, but the greater tax drag accompanying the beneficial effects resulted in not much difference between the two higher-yield cases. Also note that, in reality, different stocks have different dividend yields and these yields are persistent. Consequently, tax-aware active managers can take an appropriate yield tilt. Individual investors, for example, will prefer to avoid high-yielding assets and their immediate short-term tax burden. Corporate investors, however, typically receive a dividend exclusion and hence may be better off with a high-yield tilt.

Varying Portfolio Conditions. We have so far explored various market conditions to see their impact on a tax-advantaged investment strategy compared with a standard buy-and-hold strategy. Tax-advantaged investing always produces significantly favorable returns, no matter the market scenario. This finding is comforting because although market conditions are not known in advance, taxable investors can know that they should always manage with loss harvesting and HIFO accounting. But the final outcome of tax-aware investing is also affected by factors that investors or managers may have some control over. For example:

- What if the turnover in the index is greater than we assumed because of more corporate actions or more active changes in the composition of the benchmark?
- What if additional cash is regularly contributed to the portfolio over time?
- How about withdrawals?
- What if tax rates are higher or lower?

Turnover. The composition of an index changes because of corporate actions (e.g., bankruptcies, mergers, and acquisitions). It may also change as a consequence of decisions made by the managers of the index itself. Standard & Poor's sometimes makes conscious decisions to delete small or less important companies to make room for new, large-capitalization, bellwether companies. The same happens on an even larger scale in the Russell indexes, where the composition varies annually with changes in market caps.

Our base case assumed that 1 out of the 500 stocks vanished every month, equivalent to an average 2.4 percent annual turnover associated with corporate actions in the hypothetical S&P 500. This turnover was typical for the S&P 500 itself until the mid-1990s. Recent turnover in the actual S&P 500, however, has been notably higher than the base-case rate, typically 5–11 percent in names and 5–9 percent in market cap since the mid-1990s (CSFB 2002). In this section, therefore, we consider two cases—one in which the effective "index turnover" is two times (4.8 percent) the pace of the base case and one in which it is four times (9.6 percent) the pace of the base case.

We assumed that the tax-aware portfolios had to match all index changes. As the index composition changes, a benchmark will be forced to liquidate holdings whether they are well above cost basis or not. Often, a tax-advantaged investor does not face such an onerous obligation. Active managers will not hold every stock in the index and also may choose to retain the shares of an acquiring company (e.g., keep Daimler after its acquisition of Chrysler). In the simulations we ran, however, we made a conservative assumption that liquidation was also mandatory for the tax-advantaged portfolios in the event of index rebalancing. This assumption obviously reduced the advantage of a tax-efficient portfolio because it had to liquidate the stock and incur the tax obligations sooner than intended.

Table 2. Impact of Dividend Yield on Average Annualized Alpha after Liquidation Taxes

Period	0.08% a Month	0.12% a Month (base case)	0.16% a Month
25-year average	50 bps	56 bps	55 bps
First 5-year average	42	42	38
Last 5-year average	54	53	58

The simulation results for these scenarios with increased turnover costs, shown in **Table 3**, suggest that the tax benefit is slightly less when the index turns over more frequently, but the difference is modest enough to be erased with a more liberal assumption about the behavior of the managers of tax-efficient portfolios. We thus conclude that turnover in a broad market index such as the S&P 500 does not have a significant impact on the effectiveness of tax-advantaged strategies.

Some indexes are not tax efficient because they have far greater turnover than we have assumed, and high turnover is likely to lead to the realization of capital gains. For example, the Russell 2000 can have well more than 20 percent turnover in its annual reconstitution at the end of June, when the largest components are promoted to the Russell 1000. The turnover in the growth and value portions can exceed 40 percent from style reclassification. An investor who desires exposure to smaller-cap stocks, for example, would be better off using an index such as the Russell 3000.

Some taxable investors, however, may *want* a high-turnover index. For example, investors seeking a broad market exposure might be interested in only small-cap, low-cost-basis equities if they already have a great deal of money in large-cap stocks. In these cases, active tax management can nevertheless have large benefits. Loss harvesting can offset gains realized on stocks sold when they leave the index, and the purchase of new stocks entering the index increases the likelihood of further loss harvesting. Reinvested cash can be used to buy stocks likely to enter the index, and stocks likely to leave can be avoided. The sale of stocks leaving the index can be delayed if the sale will turn a short-term gain into a long-term one. And, of course, one can simply not sell the stocks when they leave the index. Ultimately, for an index with high turnover, the issue is the trade-off between tax efficiency and tracking error. This choice is up to the investor and not within the scope of this article.

The trade-off between tax efficiency and tracking error is part of the issue of portfolio lockup, which arises when gains are deferred and the increase in the market value of the portfolio becomes substantially larger than its cost basis. For passive investors, deferring gains comes at the expense of increased risk as the portfolio deviates from its benchmark, although having an appropriate benchmark minimizes this danger. For active investors, lockup involves the trade-off between tax efficiency and the quest for additional alpha. As we have noted (Arnott, Berkin, and Ye 2000), making the trade-off, given the high cost of taxes and the uncertainty of alpha, can be a difficult task. But the techniques outlined in this article can help offset the tax burden. Figures 4 and 5 show that even in passive portfolios, loss-harvesting opportunities persist well into the future. For active portfolios, greater turnover will lead to even more opportunities for tax management, because even the best managers have some stocks that will decline in value.

Cash flows. The ultimate benefit of tax-efficient investing can be drastically affected by cash flows into and out of the portfolio, and in this case, unlike the case of market conditions, the investor may have a reasonable idea of what to expect. For example, NDTs may experience fairly steady inflows during the life of the nuclear plant, and some individual investors may regularly take cash out of a portfolio for living expenses. Mutual funds have both contributions and redemptions. Therefore, we turned our attention to exploring these effects through simulations.

The simulation results based on different levels of cash contributions before liquidation taxes are in Panel A of **Table 4**. In addition to the base case of no contributions, we also considered constant contributions of 0.5 percent and 1.0 percent of the benchmark portfolio value a month.[7] As is clearly shown, the value added before liquidation increases with the amount of cash contribution. Each time cash is infused, more shares are bought at a higher cost basis. This strategy creates many more opportunities for loss harvesting than in the zero-contribution case, where most of the shares were purchased in the first few periods at a low cost basis.

Interestingly, although the benefits of loss harvesting are enhanced by cash inflows prior to liquidation, the impact is reversed after liquidation, as Panel B of Table 4 shows. This result is not surprising because the cash contribution effectively raises the cost basis in a portfolio. The impact of the

Table 3. Impact of Index Changes on Average Annualized Alpha after Liquidation Taxes

Period	1 a Month (base case)	2 a Month	4 a Month
25-year average	56 bps	55 bps	54 bps
First 5-year average	42	42	39
Last 5-year average	53	62	57

Table 4. Impact of Cash Contributions on Average Annualized Alpha before and after Liquidation Taxes

Period	0% Contribution (base case)	0.5% Contribution	1% Contribution
A. Before liquidation taxes			
25-year average	74 bps	121 bps	169 bps
First 5-year average	210	241	270
Last 5-year average	40	90	147
B. After liquidation taxes			
25-year average	56 bps	51 bps	49 bps
First 5-year average	42	37	38
Last 5-year average	53	55	48

increased cost basis is clearly nonlinear. The benchmark portfolio, being less tax efficient than the tax-advantaged portfolio, benefits from the higher cost basis much more than the tax-efficient portfolio does.

We next considered the opposite situation, cash withdrawals. The results are shown in **Table 5**. Panel A clearly shows that cash outflows reduce the benefit of the tax-advantaged portfolios before liquidation. These results are intuitive because withdrawal forces the realization of capital gains. Given that the tax-advantaged strategy has a lower cost basis than the benchmark because of loss harvesting, the forced capital gain realization has a more negative impact on the tax-advantaged portfolio than on the benchmark portfolio. Furthermore, the withdrawals reduce the opportunity for loss harvesting later because some of the shares sold might have fluctuated below their purchase price in the future. This outcome is the exact opposite of the case with contributions.

The simulations with cash withdrawals also provide good evidence of the benefit of HIFO accounting. The tax-advantaged portfolios sold shares on a HIFO basis, realizing the least gains and allowing the largest possible portfolio value to continue to accrue market appreciation. In contrast, the benchmark portfolio used cost averaging, which led to a larger capital gains tax than in the HIFO accounting method. The value added of HIFO accounting is readily seen in Panel B of Table 5. The negative effect of cash withdrawal largely disappears after liquidation taxes have been subtracted, and the tax-advantaged cases with many securities sold on a HIFO basis all outperform their tax-naive counterparts no matter the amount of withdrawal.

We also ran simulations in which both cash inflows and outflows occurred. In these cases, each month a random amount of cash was added or removed from the portfolios, with a mean of zero and different variance for each set of simulations. Prior to liquidation, the average annual alpha increased as cash flows were increased, going from 74 bps to 85 bps and 98 bps over 25 years as the flows grew from 0 percent to 1 percent to 2 percent of the benchmark portfolio a month. Such figures are reasonable in light of our prior results. When cash comes in, it creates new loss-harvesting opportunities, and the subsequent benefit overrides the tax drag of forced liquidation when cash is withdrawn. After liquidation, the value added rose from 56 bps to 66 bps as cash flow variance went from 0 percent to 2 percent.

Tax rates. Finally, we tested the impact of marginal tax rates on the benefits of tax-aware investing. As shown in **Table 6**, the *before-liquidation* tax advantage associated with our tax-efficient portfolios (Panel A) is roughly linearly related to tax rates. The marginal benefit of our strategies narrows with the tax rate, however, on an *after-liquidation* basis (Panel B). The tax-advantaged strategies yield for an investor in a 35 percent tax bracket an average annualized alpha of 73 bps over 25 years before liquidation and 56 bps after liquidation. This gain is impressive. For the investor in the 50 percent marginal tax bracket, the improvement leaps to, respectively, 115 bps and 74 bps.

Keep in mind that to achieve that 74 bp benefit with conventional active investing, one would have to earn a 148 bp alpha with no capital gains taxes on those trades, which most observers of active investing would consider nearly impossible. In "How Well Have Taxable Investors Been Served in the 1980's and 1990's?" (Arnott, Berkin, and Ye 2000), we found that only 5 percent of all funds outpaced the S&P 500 on an after-tax basis, with an average margin of victory of a scant 74 bps; so a 148 bp after-tax alpha is not a plausible target for most

Table 5. Impact of Cash Withdrawal on Average Annualized Alpha before and after Liquidation Taxes

Period	0% Withdrawal (base case)	0.1% Withdrawal	0.25% withdrawal
A. Before liquidation taxes			
25-year average	74 bps	66 bps	54 bps
First 5-year average	210	207	194
Last 5-year average	40	30	26
B. After liquidation taxes			
25-year average	56 bps	54 bps	54 bps
First 5-year average	42	41	41
Last 5-year average	53	57	58

Table 6. Impact of Tax Rates on Average Annualized Alpha before and after Liquidation Taxes

Period	20% Tax Rate	35% Tax Rate	50% Tax Rate
A. Before liquidation taxes			
25-year average	40 bps	73 bps	115 bps
First 5-year average	116	209	304
Last 5-year average	21	40	65
B. After liquidation taxes			
25-year average	31 bps	56 bps	74 bps
First 5-year average	26	42	48
Last 5-year average	27	52	82

active managers—unless they place tax management at the very top of their asset management priorities. Surprisingly, even for the investor in a modest 20 percent tax bracket, Table 6 shows that the average annual alpha of loss harvesting and HIFO accounting over 25 years is still a lofty 40 bps before liquidation and 31 bps after liquidation.

Conclusion

We simulated monthly returns over 25 years for index portfolios, run both efficiently and naively with respect to taxes. The tax-efficient manager used HIFO accounting and harvested all losses, whereas the naive manager used cost averaging and simply held positions at a loss. We used standard market conditions for our base case and then varied those parameters to study their effects.

Our main finding is that no matter the environment, managing a portfolio in a tax-efficient manner provides substantially better after-tax performance than a simple index fund, both before and after liquidation of the portfolio. Active management would need to deliver a startlingly large alpha without triggering capital gains taxes merely to match a simple loss-harvesting strategy.

Taxes matter—a lot. But at least they are the one aspect of asset management known with certainty in advance, and therefore, portfolios can be managed effectively to minimize the tax impact.

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800 E. Colorado Boulevard, Suite 900
Pasadena, California 91101
Tel: (626) 795-8220
Fax: (626) 795-8306

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Wellesley Hills, Massachusetts 02481
Tel: (781) 283-5700
Fax: (781-283-5701

The Bishop's House
63-65 High Street
Sevenoaks, Kent TN13 1JY
United Kingdom
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