

# Parametric Portfolio Associates

## Research Brief

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### Enhancing Active Tax–Management through the Realization of Capital Gains

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#### Abstract

*We explore the tax-management strategy of realizing long-term capital gains in a portfolio of equities and quantify how much it can add to after-tax performance. This approach is counter to the more common strategy of deferring the realization of capital gains as long as possible while only realizing capital losses. We evaluate the associated costs and benefits: benefits accrue if there is a large difference between tax rates on long-term and short-term gains, if the investor has a surfeit of short-term gains that are generated externally to the portfolio, and if the value of deferring taxes is low. Finally, we discuss how the benefits vary as market conditions change and address some associated implementation issues.*

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## Introduction

The value that the equity portfolio manager can add by actively managing taxation accrues in numerous ways. First, there is value from deferring the realization of capital gains – the longer taxes can be deferred, the better. Then, it is worth monitoring individual tax lots each time a security is sold or a withdrawal or deposit is made (either in cash or in kind). It is also possible to actively anticipate tax-rate changes and determine the right time to pay taxes. Always, a trade-off exists between taxation and risk (either absolute volatility or the tracking deviation from preferred or target holdings), and there is value to balancing this tradeoff. A well-discussed topic – perhaps because it is most easily quantified– is the value one derives from active loss harvesting.

Most pragmatic loss-harvesting strategies realize losses subject to portfolio risk constraints. One can think of loss harvesting not only as reducing the rate at which a portfolio realizes taxes, but also as driving this rate negative – the losses offset other taxes the investor incurs and, thus, provide an economic benefit. The costs of doing this are (a) an increased portfolio turnover and (b) a risk of deviating from the ideal target portfolio's security weights. Academics Constantinides [1984], Dammon and Spatt [1996], and Zivney et al [2002] and practitioners Stein and Narisimhan [1999], and Arnott, Berkin, and Ye [2001] discuss loss harvesting in an equity portfolio.

One of the characteristics of a loss-harvesting strategy is that its annual alpha declines as the portfolio appreciates or as more losses are realized; that is, when the cost basis of the portfolio becomes a lower proportion of the market value. A low-basis portfolio, assuming it is broadly diversified and suitably targeted, may require few ongoing changes, making it an ideal passive portfolio for a long-term investor.

On the other hand, it is sometimes possible to further improve the management of capital gains and losses. Consider the realization of capital gains. Clearly, deferring capital gains is not always best. For example, it is often necessary to realize gains to reduce concentrated risk (Stein et al [2000]); or, if one expects tax rates to increase substantially, it may be preferable to lock in a lower tax rate by prepaying taxes.

The careful realization of long-term gains can also enhance loss harvesting. When the long-term tax rate is below the short-term tax rate, the investor has the opportunity to realize a long-term capital gain, reset the cost basis, and prepare the portfolio for higher short-term capital losses in the next year. While there is a tax cost to recognizing the capital gain, doing so resets the holding period and buys the option to recognize future capital losses. By thinking ahead and paying a long-term capital gain today, the investor can derive a net tax benefit in future years. It is this type of active tax management that we address in this paper.

There is little in the practitioner literature that addresses this topic, though a number of academic papers do<sup>2</sup>. In general, the academic literature focuses on mathematical aspects of idealized formulations of the problem and offers little guidance on issues relevant to real investors—such as portfolio risk and flexible implementation. In this paper, we do not seek “optimal” strategies, but explore methods that work in practice. We think explicitly about a portfolio of securities and manage the simulated portfolios with an eye towards risk. Our goal is to quantify costs and benefits as a decision-making aid and to understand what affects them.

In what follows, we assume that the investor has a large appetite for short-term capital losses. Our analysis compares a strategy of gain realization with a simpler loss-harvesting approach. We start by discussing the capital gain realization on a single tax lot, generalize to a portfolio of tax lots, and finally extend the analysis to consider a portfolio program, which routinely realizes long-term capital gains.

Our analysis uses Monte-Carlo simulations, enabling us to model securities and portfolios over time, under different investment management strategies, and in different market environments. These methods are flexible and can easily be applied to specific investors or portfolio management processes. Of course, we need to make some analytical simplifications for this presentation: we assume that investors can obtain both favorable long-term and short-term rates in the same period and that all realizations are taxed separately; that

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<sup>2</sup>Examples are : Constantinides [1984], Dammon and Spatt [1996], Zivney et al [2002], Marmorstein[2005]. Most, for example, focus on “optimal” realization policies under artificial trading conditions and artificial stock price behavior. It is common, for example, to limit trading to once a year, to consider infinite investment horizons, and endogenously-generated stock-price movements. Conclusions are sometimes “obvious” to a practitioner and don’t always explore the value of tax deferral, portfolio issues, or liquidation at the horizon.

is, we disregard the offset rule, which requires that investors offset net long- and short-term realizations.

Our measurement and comparison of after-tax returns follows those found in Stein [1998]. *Return* is the rate of change of *value*; we obtain different types of return depending on how we define value. *Pre-liquidation return* is defined as the rate of change of after-tax pre-liquidation value; it does not measure unrealized gain. *Liquidation return* is defined as the rate of change of after-tax liquidated value. We use the term “Tax Alpha” as the excess pre-liquidation return of a portfolio above the pre-liquidation return of its benchmark.

## Enhanced tax management through capital gain realization

### A. Realizing the Gain on a Single Tax Lot

As a conceptual example of the strategy of gain realization, consider an investor who holds a security with value \$105 and cost basis \$100—a long-term holding. The price of the security is volatile and, a few months later, its value drops to \$95.

A simple *loss-harvesting strategy* would defer gains and systematically harvest losses. When the stock drops to \$95, a \$5 capital loss will be realized. At a tax rate of 15%, this action will have an economic value (assuming the investor can offset the capital loss) of  $.15 \times \$5 = \$0.75$ .

However, consider a *gain-realization strategy* which realizes the long-term gain of \$5 when the stock is at \$105 and immediately repurchases the holding. The tax cost is  $.15 \times \$5 = \$0.75$ . When the stock drops to \$95, a *short-term* capital loss will be available; at a short-term rate of 35%, it will be worth  $.35 \times \$10 = \$3.50$ . The net tax benefit will be \$2.75 compared to that of the simple loss-harvesting strategy of \$0.75.

Of course, this is an over-simplified illustration and takes into account neither the uncertainties involved nor the value of tax deferral. To more closely quantify the costs and benefits of realizing a long-term gain, consider a tax lot with the following characteristics:

<i>Market Value</i>	\$100
<i>Cost Basis</i>	\$90 ( <i>long-term holding period</i> )

To fix ideas, we assume the following parameters,

*Investment Horizon: 10 years*  
*Discount rate: 4.0%*  
*Tax rates on gains 15% long term, 35% short-term*  
*Expected return of the security 8%, dividends 2%*  
*Expected volatility of the security 35%*

and compare two cases:

- (a) Hold the security until the horizon time, then liquidate; the security is volatile, and if there is an opportunity to realize capital losses in the interim, we will, by repurchasing the security.
- (b) Liquidate the holding, pay the taxes, and repurchase the security. We hold it to maturity and then liquidate; again, if there is an opportunity to realize capital losses in the interim, we will.

Our simulation analysis is a probabilistic one. For each simulated path of price movements of the security, and for each of the two strategies, we obtain the after-tax cash flows due to dividends, the amount and nature of the loss realization, and the final after-tax value of the security at the horizon time. We reinvest dividends in the portfolio. Taxes on dividends, realized gains, and losses accrue outside the portfolio and are discounted to their present value using the discount rate specified. We evaluate the final after-tax liquidation value and discount it to its present value. From a large number of price-movement paths, we compute the expectation and standard deviation of the present value of the security for each of the two cases. Table 1 shows the results: by realizing the gain in (b), we can expect to increase the present value of our holding by \$1.50 compared to (a), and Table 2 attributes this difference into its various components.

**Table 1.**  
**Comparison of two strategies (a) and (b) for a single tax lot, value \$100, basis \$90.**

	<b>(a) If we hold:</b>	<b>(b) If we sell:</b>	<b>Difference</b>
<b>Expected PV</b>	\$139.56	\$141.07	\$1.50
<b>Stddev of PV</b>	\$3.98	\$4.88	\$1.57

**Table 2. Attribution of Table 1 performance.**

	<b>(a) If we hold:</b>	<b>(b) If we sell:</b>
Immediate taxes		<b>(\$1.50)</b>
PV of final portfolio, pre-tax	\$144.41	\$143.74
PV of tax benefit of losses	\$8.22	\$11.57
PV of future taxes on capital gains	<b>(\$13.07)</b>	<b>(\$12.74)</b>
<b>Net PV</b>	<b>\$139.56</b>	<b>\$141.07</b>

Some comments at this point:

- For simplicity, the analysis in Table 1 assumes no transaction costs on the initial transaction.
- For long-term investors, the value of deferral is high and the investor should simply harvest losses rather than realize the gain.
- Note that if we are looking at pre-liquidation values rather than the liquidation values shown here (i.e. the investor has an extremely long horizon or expects a basis step-up, then realizing the long-term gain is less attractive.
- If there is an expectation for higher tax rates in the future, the benefit to gain realization will be higher.
- The initial cost basis/market value is a key parameter in this analysis. Appendix 1 generalizes Table 1, comparing strategies (a) and (b) as a function of the initial basis. With lower basis, the up-front tax cost is higher. For bases low enough (below 50% of market value), the one-time gain realization cannot be justified.

While these comments apply to the one-time realization of long-term gains, we will see in Section C that the tradeoffs change if we repeat the exercise in an ongoing program which regularly realizes capital gains.

## **B. Realizing Capital Gains in a Portfolio of Tax Lots**

We can readily generalize the single-tax-lot example to a portfolio of tax lots by deciding, for each tax lot, whether to realize its capital gain or not, and summing the associated costs and benefits.

Consider an initial portfolio with the following characteristics:

Market Value \$21,815,500  
 Cost Basis \$15,578,700

*Unrealized:*

<i>Gains LT</i>	\$6,217,400
<i>Gains ST</i>	\$ 76,100
<i>Losses LT</i>	\$ 131,300
<i>Losses ST</i>	\$ 32,700

Suppose we rebalance the portfolio, realizing gains on all tax lots for which the initial cost basis/market value exceeds 70%. Turnover will be about 45%, and we will realize \$1,698,000 in capital gains. The immediate tax cost will be \$254,700. The expected net benefit from this trade over the next 10 years is \$158,300, or .73% of the portfolio<sup>3</sup>. By being more (or less) aggressive with respect to gain realization, we can increase (or decrease) the immediate tax cost and the expected net benefit (Table 3).

**Table 3: Evaluation of the one-time realization of capital gains in a portfolio**

<b>Realize Gains by Selling Tax Lots With Cost Basis Above (% of MV):</b>	<b>90%</b>	<b>80%</b>	<b>70%</b>	<b>60%</b>	<b>50%</b>
Market Value of Tax Lots Sold	2,279,686	5,551,679	9,747,269	13,776,907	17,092,007
Gains Realized	134,209	635,600	1,698,062	3,092,532	4,558,867
Turnover	0.6%	2.9%	7.8%	14.2%	20.9%
<b>Benefits</b>					
Expected PV of Loss Harvesting on Lots Sold*	224,986	547,904	961,974	1,359,666	1,686,838
<b>Costs</b>					
Expected PV of Loss Harvesting if Trade Not Done	-165,732	-345,516	-500,199	-586,625	-607,733
Current Taxes	-20,131	-95,340	-254,709	-463,880	-683,830
Transaction Costs	-11,398	-27,758	-48,736	-68,885	-85,460
<b>Expected Net Benefit</b>	<b>27,724</b>	<b>79,290</b>	<b>158,329</b>	<b>240,276</b>	<b>309,815</b>
<b>Benefit as a % of Market Value</b>	<b>0.13%</b>	<b>0.36%</b>	<b>0.73%</b>	<b>1.10%</b>	<b>1.42%</b>

### C. An Ongoing Program of Long-Term Gain Realization

The prior sections discuss a one-time decision to realize long-term capital gains. If it is worth doing once, it may be worth doing regularly; indeed, one may be justified in incurring an even higher tax cost today if doing so sets one up so that the cost of the future

<sup>3</sup> As previously, we assume the following: Horizon: 10 years, Transactions cost: 0.5%, Discount rate: 4.0%, Tax rates 15% LT, 35% ST.

gain realizations will be lower. So, how can we expect an ongoing program of capital gain realization to behave over time?

Again, we can take a rough look at this, without including tax-deferral. Suppose we invest an initial \$100 in a portfolio of volatile securities which has a 6% price appreciation. With a simple loss-harvesting program, we can expect to realize about \$13 of short-term capital losses in the first year (Stein [2003]), providing a benefit at a 35% tax rate of  $\$13 \times .35 = \$4.60$ . At the end of the year, the cost basis is then \$87 and the market value is \$106. At this point, if we realize all gains at the long-term rate of 15%, the tax cost is  $\$19 \times .15 = \$2.85$ . The net tax benefit is \$1.75 or 1.75% of starting value, and we are ready to repeat the exercise.

For a more careful analysis, we compare two idealized portfolio management strategies:

- A. **Loss-Harvesting Strategy (LH):** Realize all capital losses at each rebalancing period.
- B. **Gain-Managed Strategy (GM):** Realize long-term gains and all losses at each rebalancing period. Short-term capital gains are not realized. We adjust how aggressively we implement this strategy by realizing only those long-term capital gains which fall below a trigger point.

In each case, the simulated portfolio is subject to risk controls. To ensure that the portfolio closely tracks its target, we realize losses only if we can keep the security holding to within 50bp of its target index weight. When a tax lot of a security is held at a loss, we realize this loss up to the 50bp limit. To honor the wash sale rules, we do not re-purchase the security for at least 31 days. When a long-term gain is realized, we are able to re-purchase the security immediately.

In these simulations, taxes incurred are not removed from the portfolio value – that is, the dollar value of tax costs and benefits accrue outside the portfolio – but we do measure their impact on after-tax performance.

The key parameters are:

- market price and dividend return
- investment horizon.

- aggressiveness of realization of capital gains
- frequency of trading
- cost of trading
- initial cost basis of the portfolio.

In the remainder of this section we will work with a variety of market environments in an S&P-like universe with security volatility of 35%; benchmark turnover is 4% per year; dividends are 2% per year; the investment horizon is 10 years; we rebalance the portfolio every two months at zero trading cost; tax rates are 15% on long-term capital gains and 35% on short-term capital gains. Please note that our simulations are only rough approximations intended to describe and explore the opportunity. In practice, there are additional issues which either add to or detract from performance.

The first set of simulations in Table 4 depicts the base-case LH strategy A. At each rebalance period we actively realize capital losses while avoiding the realization of gains. The table shows what can be expected in different market-return environments —0% 4% and 8% respectively, with a dividend yield of 2% in each case.<sup>4</sup> Figure 1 shows the yearly excess after-tax excess return (tax alpha) and the cost basis/market value for the simulations of LH in Table 4.

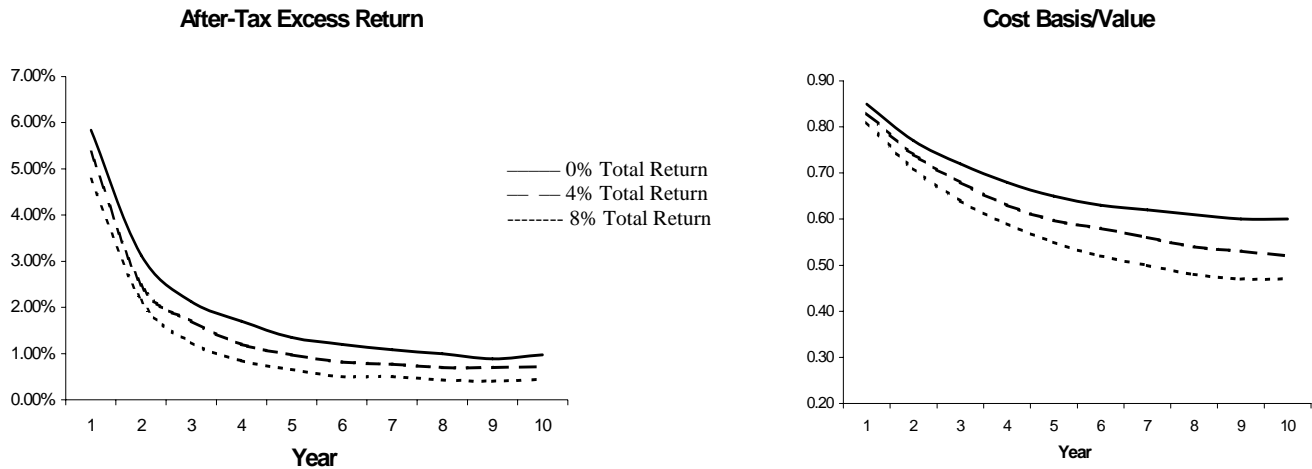
**Table 4.**  
**Strategy LH: Base-case expected performance in different market environments**

<b>Expected Pre-Tax Market Total Return</b>	<b>0%</b>	<b>4%</b>	<b>8%</b>
Pre-Tax Benchmark	-0.02	4.05	8.12
Pre-Tax Return	-0.05	3.99	8.00
Pre-Tax Excess	-0.04	-0.06	-0.12
After-Tax Return	1.83	5.39	8.98
After-Tax Benchmark	-0.22	3.66	7.57
After-Tax Excess	2.06	1.73	1.42
Liquidation Return	1.23	4.62	8.08
Liquidation Benchmark	-0.01	3.47	7.06
Liquidation Excess	1.25	1.15	1.01
Tax Alpha	2.09	1.79	1.53
Tracking Error	1.42	1.38	1.38
Turnover			

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<sup>4</sup>There is a slight cash drag in these simulations that would not exist in actual portfolios.

**Figure 1. Strategy LH: Base-case expected performance over time in different market environments**



In particular, we observe the following for LH:

- In an 8% market environment the pre-liquidation tax alpha averages 1.53% per year for 10 years; it starts strongly and declines to 0.4% in year 10. In a flat market, this tax alpha averages 2.09% per year.
- In an 8% environment, cost basis drops over time as an unrealized gain builds up; by year 10, the basis has declined to about 47% of market value.
- Turnover is relatively high at the start and drops substantially.

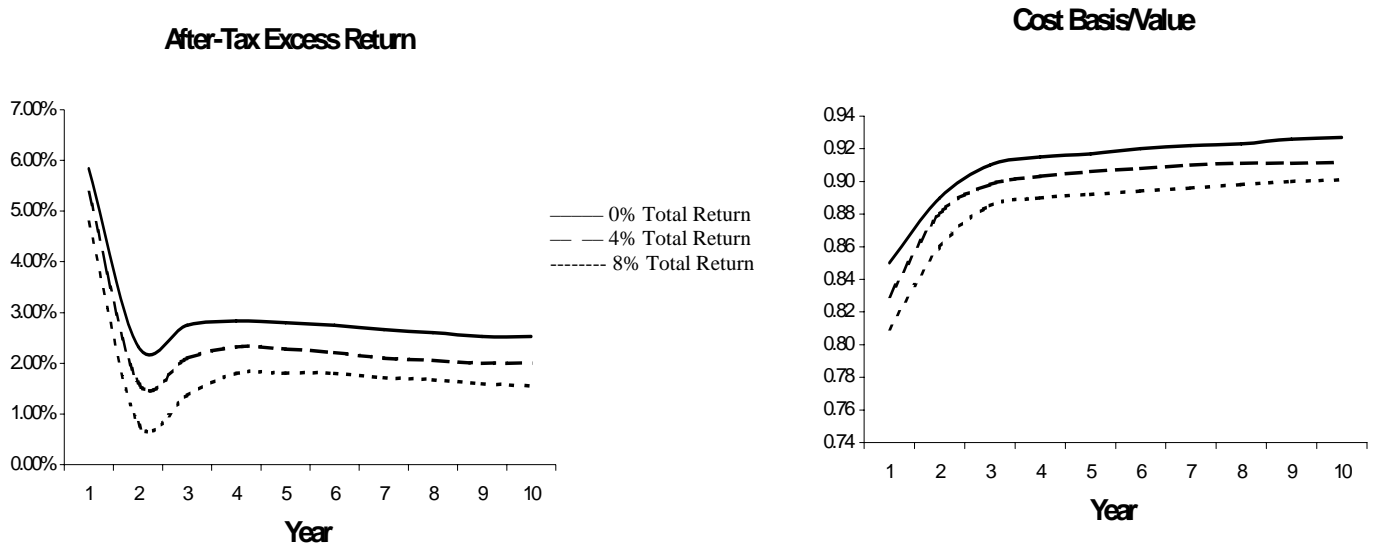
The second set of simulations, Table 5, implements the GM strategy, which realizes all losses (up to a 50bp underweight) and all long-term gains at each rebalancing period.

Figure 2 displays the behavior of tax alpha and cost basis/market value over time.

**Table 5. Strategy GM: Expected performance in different market environments**

<b>Expected Pre-Tax Market Total Return</b>	<b>0%</b>	<b>4%</b>	<b>8%</b>
Pre-Tax Benchmark	-0.02	4.05	8.12
Pre-Tax Return	-0.07	3.98	8.00
Pre-Tax Excess	-0.05	-0.07	-0.12
After-Tax Return	2.83	6.14	9.47
After-Tax Benchmark	-0.22	3.66	7.57
After-Tax Excess	3.05	2.48	1.90
Liquidation Return	2.64	5.87	9.11
Liquidation Benchmark	-0.01	3.47	7.06
Liquidation Excess	2.65	2.40	2.05
Tax Alpha	3.11	2.56	2.03
Tracking Error	1.37	1.37	1.39
Turnover			

**Figure 2. Strategy GM expected performance over time in different market environments**



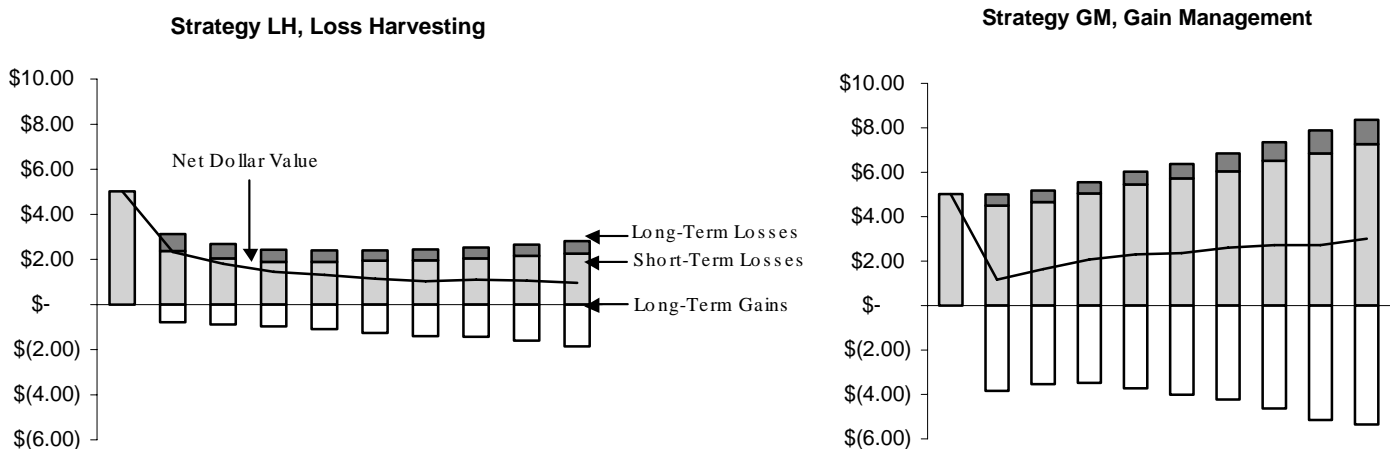
Averaged over 10 years in a flat market, the value of loss harvesting increases from LH's 2% to 3% per year; in an 8% environment, the value of loss harvesting increases from LH's 1.5% to 2% per year.

For the 8% environment, we observe the following for GM:

- Non-liquidation tax alpha starts strongly as in Table 1 but drops in year 2 when we start to realize long-term gains. It then increases, stabilizing at about 1.5% in year 10.
- Even though the above average is only about 30% higher than that of LH, it can be sustained over time: capital gain realization increases.
- The cost basis—after dropping in year 1 when only losses are realized—rises to about 90% and remains there. If we compare “liquidation return” we see a substantial improvement relative to LH.
- Turnover is high throughout the period.
- On the surface, risk management for GM is easier than for LH. Securities sold at a gain can immediately be re-purchased; cash received can be used to rebalance the portfolio and reduce portfolio risks. On the other hand, there is a benefit to deviating from the target benchmark in order to take advantage of the increased loss-harvesting opportunity.

Figure 3 shows the tax costs and benefits of the two strategies over time, broken down by the tax cost – or value – of short and long-term gains, and short and long-term losses. With GM, both long-term gains and short-term losses realized are higher; also, short-term losses are re-generated over time.

**Figure 3 Dollar value of realized gains and losses over time for each \$100 investment**



In weaker market environments, the benefit of GM increases. Here, a number of issues are at play. As with all tax management, the available capital losses—and thus the value of the tax option—are higher; when we realize a capital gain, the average tax paid is lower, and the value foregone by not deferring an unrealized gain also decreases.

Table 6 shows a less aggressive implementation of GM in which we realize gains only on those lots that have cost basis/market values (Cost/Val) more than 60%.<sup>5</sup> The benefits derived are lower, but turnover is as well.

**Table 6: Strategy GM: Realize LT gains on lots for which Basis/MV greater than 60% at each rebalance**

<b>Expected Pre-Tax Market Total Return</b>	<b>0%</b>	<b>4%</b>	<b>8%</b>
Pre-Tax Benchmark	-0.02	4.05	8.12
Pre-Tax Return	-0.07	4.03	7.95
Pre-Tax Excess	-0.05	-0.02	-0.17
After-Tax Return	2.65	6.08	9.43
After-Tax Benchmark	-0.22	3.66	7.57
After-Tax Excess	2.87	2.42	1.86
Liquidation Return	2.25	5.53	8.74
Liquidation Benchmark	-0.01	3.47	7.06
Liquidation Excess	2.27	2.06	1.67
Tax Alpha	2.93	2.45	2.04
Tracking Error	1.39	1.37	1.36
Turnover			

## Variations on the simulations

### *Transaction costs and portfolio turnover*

Since turnover increases with GM, the cost of transactions is a key issue. Certainly, we can reduce the cost of transactions by trading less frequently and only when losses or gains are large enough. The simulations here provide a rough initial approximation, and with a little more thought in a real implementation, it is possible to substantially reduce transaction costs.

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<sup>5</sup> For example, if a security was purchased for \$100, we realize the gain if the security value is under \$167, but not if the value is above \$167.

### *The investor horizon and long-term performance*

The annualized value that GM accrues depends on the investment horizon and whether one focuses on the pre-liquidation or liquidation returns. Investors with a long-term horizon derive a large benefit from the deferral of taxes; thus, they are most likely interested in the pre-liquidation return of the portfolio. On the other hand, investors with a shorter horizon do not derive as much benefit from tax deferral and may care more about the liquidation return of the portfolio.

### *Tax rates*

The benefits from GM presented so far depend on the assumed short-term tax rate of 35% and long-term rate of 15%. Of course, the benefits will change if tax rates change, and decrease as the difference between short and long-term rates narrows. In Table 4 in an 8% return environment we had a tax alpha of 2.03%; at a LT rate of 20%, the tax alpha would reduce to 1.36%; at a LT rate of 25%, the tax alpha would reduce to .6%.

### *Other issues*

With LH, the investor can carry unused losses into the next year. With GM, net capital gain realization increases and there is a possibility, depending on the investor's tax situation, that the short-term losses will be used to offset long-term gains instead. In this case, the value added by GM will be reduced. In general, it is usually necessary to carefully plan for the realization of capital gains and losses in order to exploit their full value. If the investor expects to realize only long-term gains and no short-term gains in an upcoming period, it may be appropriate to delay the realization of short-term losses.

Therefore, GM requires both careful planning and portfolio implementation.

## **Conclusion**

A gain-management strategy adds after-tax value—by realizing long-term capital gains early—and is suitable for investors who expect to pay high taxes on short-term capital gains; this tax expenditure, in turn, boosts the cost basis and buys the option value of a short-term loss. Naturally, the value of gain-management is sensitive to transaction costs, market environments and the investor's horizon, as well as the future tax rate of the investor.

For the strategy to work well there must be a large difference between the tax rate on long-term and short-term gains; the value of deferring the long-term gain must be low (either because the horizon is short or the tax rate is low). There are additional tax risks: if the anticipated need for losses does not develop, if markets are such that short-term losses are difficult to harvest, or if tax rates decline in the future, then performance benefits will be lower. As a result, the tax benefit is more uncertain compared to simple loss harvesting, where the value of the trade is known at execution time.

Portfolio implementation is crucial with a gain-management strategy and is more complex than a simpler loss-harvesting approach. With gain management, it is necessary to plan for and direct the tax experience; implemented badly, the strategy will increase turnover and realize gains at a higher tax rate relative to loss harvesting. However, managed well, gain management will reduce the high penalty of short-term capital gains and improve the investor's after-tax investment experience.

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## Appendix 1

Generalization of Table 1: Comparison of present value of the one-time realization of a capital gain in strategies (a) and (b) as a function of Cost Basis/Market Value. The expected return is 8% per year, and there is liquidation at the 10-year horizon.

