

The Double Bottom Line

Tax-Loss Harvesting for the Altruistic Investor

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Optimal Gifting

Tax-Loss Harvesting and Optimal Gifting

- Tax-loss harvesting (TLH) in an optimized, index-tracking portfolio has historically generated substantial after-tax alpha.
- But TLH lowers cost basis, making it more difficult to harvest losses over time.
- A strategy that elevates cost basis can improve after-tax alpha.
- Optimal gifting is such a strategy.

What Makes Gifting Optimal?

- Donating a tax lot only if it has a high appreciation ratio:

$$\text{Appreciation Ratio} = \frac{\text{Market Price}}{\text{Cost Basis}}$$

- Replenishing with cash, which elevates cost basis and provides fresh loss-harvesting opportunities.

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Historical Study

Guiding Questions

- How much excess after-tax alpha is in an optimal gifting strategy?
- What is the relative impact of optimal gifting on after-tax alpha in the estate/donation versus liquidation dispositions?
- How does optimal gifting affect after-tax alpha at different horizons?
- What is the ideal frequency at which to gift and replenish with cash?

Some Limitations of This Study

- The results reflect the period in which the study was run. The future may differ from the past.
- The strategies in our historical study are robotic, while live strategies may reflect real-time judgment.
- Tax-loss harvesting strategies may have higher fees than straightforward indexing, and that cost can diminish benefits.
- A historical test is subject to look-ahead bias, no matter how hard a researcher tries to eliminate it.

Empirical Study: Rolling 20-Year Strategies

Methodology

1. Launch a TLH strategy in the S&P 500[®] Index every six months during the period December 1972 to January 2017.
2. Donate a fixed percentage of the portfolio at each monthly rebalancing.
3. Track return and risk at annual horizons as strategies evolve.
4. Aggregate results by horizon.

Horizon (years)	No. of Observations
5	77
10	67
20	47

Assumptions

Capital Gains Rate

Long-term: 23.8%

Short-term: 43.4%

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Results

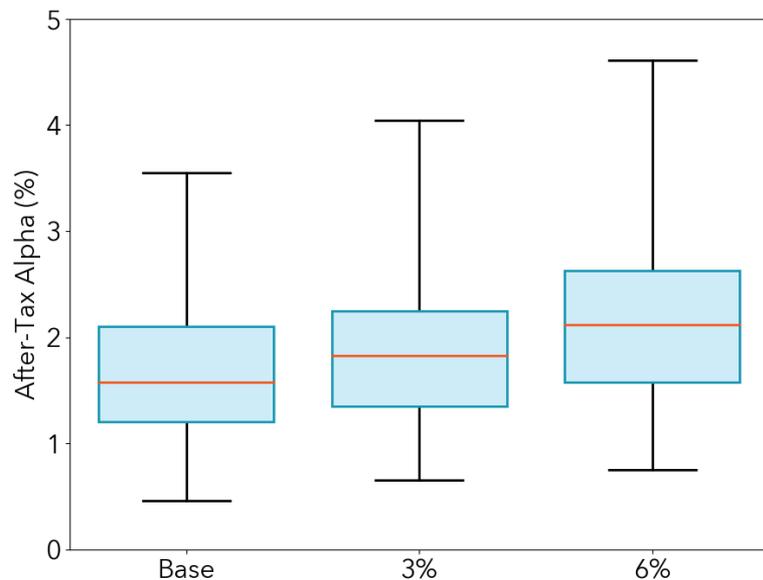
Return

- **After-tax alpha** is the difference between portfolio and benchmark returns after tax.
- Two varieties:
 - **Estate/donation disposition:** wealth is either bequeathed or donated to a charitable organization (taxes are never paid in this situation).
 - **Liquidation disposition:** payment of taxes is delayed but not indefinitely.

10-Year After-Tax Alpha

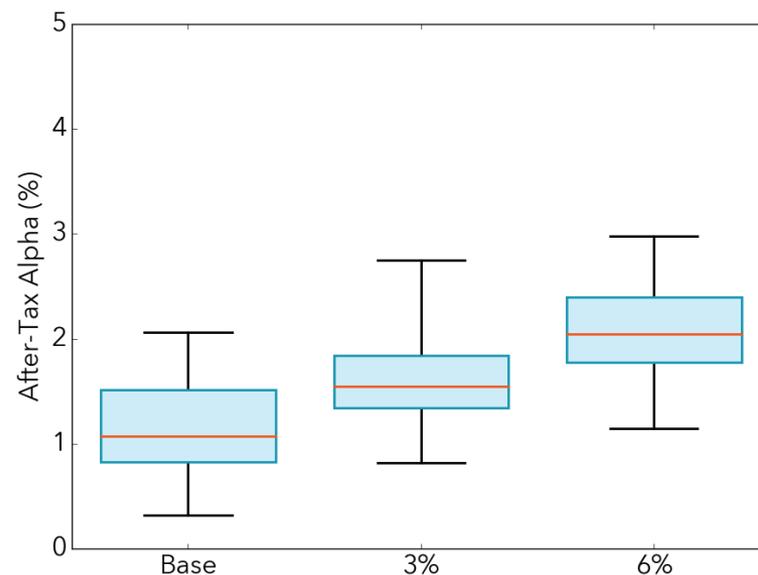
December 1972-January 2017

Estate/Donation



Strategy	Base	3%	6%
Median	1.58	1.83	2.12

Liquidation



Strategy	Base	3%	6%
Median	1.07	1.55	2.04

Note: Tax alpha excludes any fee differential between a tax-loss harvesting strategy and a simple indexing strategy. A difference could lower tax alpha.

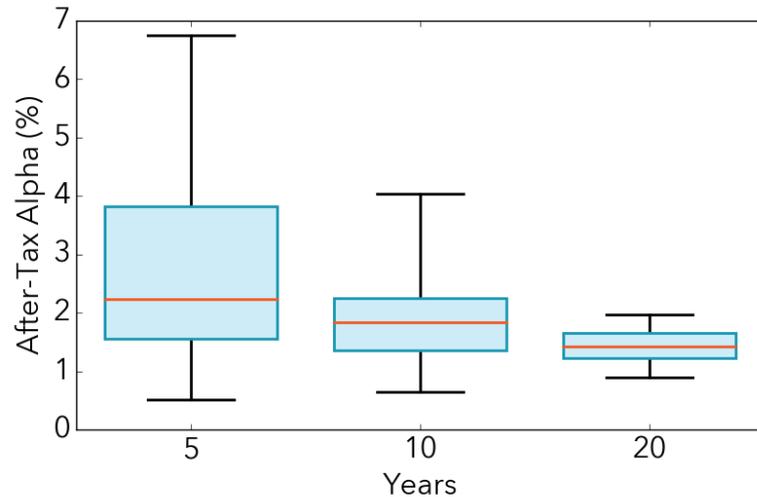
Ranges of annualized after-tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at 10-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

Horizon Dependence of After-Tax Alpha: 3% Optimal Gifting

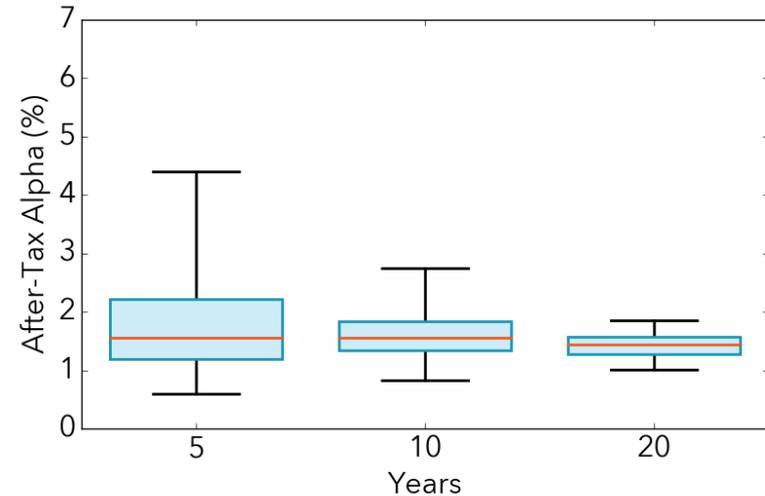
December 1972-January 2017

Estate/Donation



Years	5	10	20
Median	2.24	1.83	1.43

Liquidation



Years	5	10	20
Median	1.55	1.55	1.44

Note: Tax alpha excludes any fee differential between a tax-loss harvesting strategy and a simple indexing strategy. A difference could lower tax alpha.

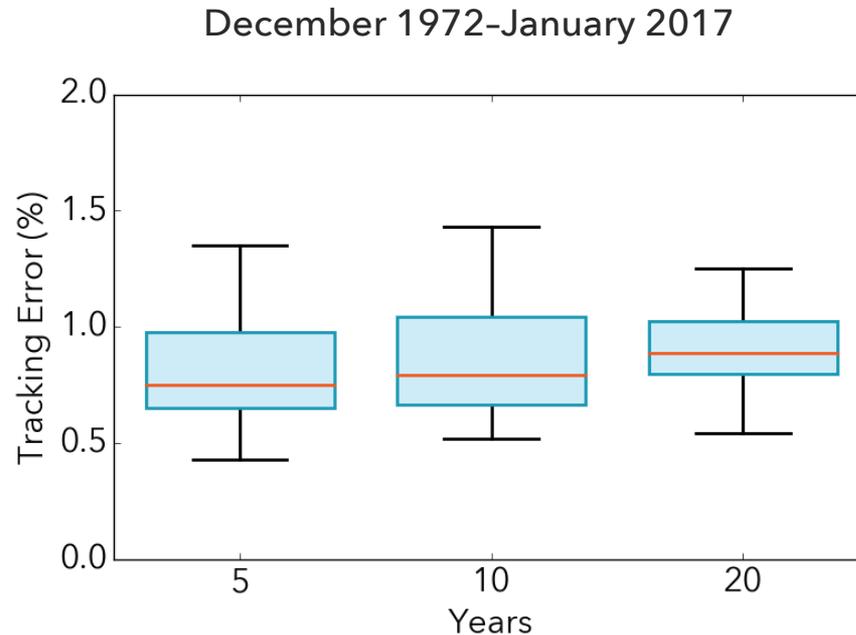
Ranges of annualized after-tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at five-, 10-, and 20-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

Risk

- **Tracking Error**, the standard deviation of the difference in return between a portfolio and its benchmark, is our risk measure.
- Lower tracking error translates into more index-like returns.

Horizon Dependence of Tracking Error: 3% Optimal Gifting



Years	5	10	20
Median	0.75	0.79	0.89

- The median tracking error for the 6% optimal gifting strategy was 0.74% at a five-year horizon, 0.77% at a 10-year horizon, and 0.79% at a 20-year horizon.
- The median tracking error for the 6% base strategy was 0.65% at a five-year horizon, 0.72% at a 10-year horizon, and 0.95% at a 20-year horizon.
- Gifting tended to align with the median values of tracking error at different horizons.

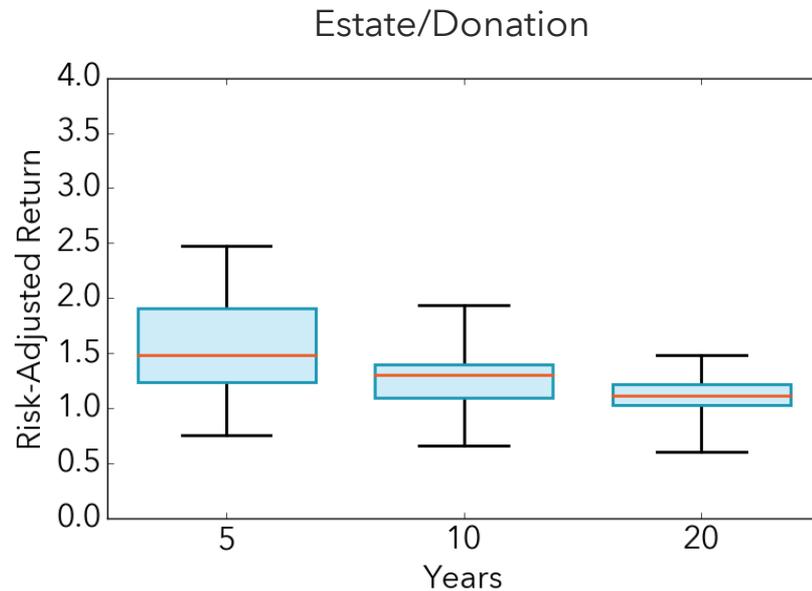
Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

Risk-Adjusted Return

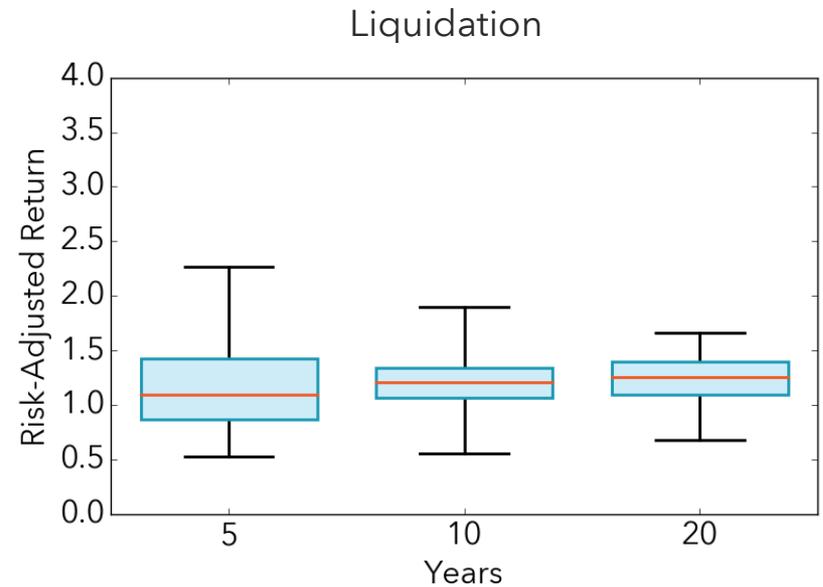
- We measured realized return per unit of risk taken in order to earn the return.
- **Risk-Adjusted Return** is after-tax alpha divided by tracking error.

Horizon Dependence of Risk-Adjusted Return: 3% Optimal Gifting

December 1972-January 2017



Years	5	10	20
Median	1.48	1.31	1.12



Years	5	10	20
Median	1.09	1.21	1.25

Note: Tax alpha excludes any fee differential between a tax-loss harvesting strategy and a simple indexing strategy. A fee differential between a tax-loss harvesting strategy and a simple indexing strategy would lower tax alpha, thereby diminishing the benefit to the investor shown in this historical study.

Ranges of annualized model and the tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at five-, 10-, and 20-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

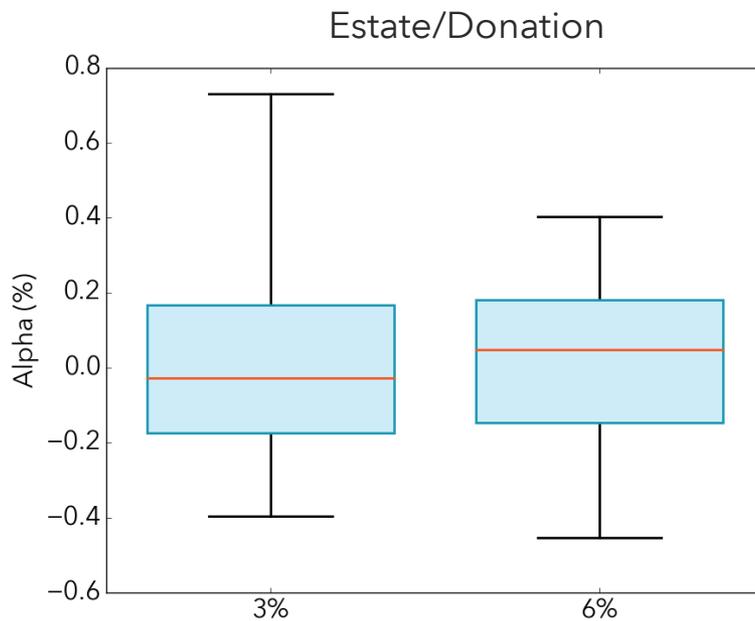
Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

Frequency

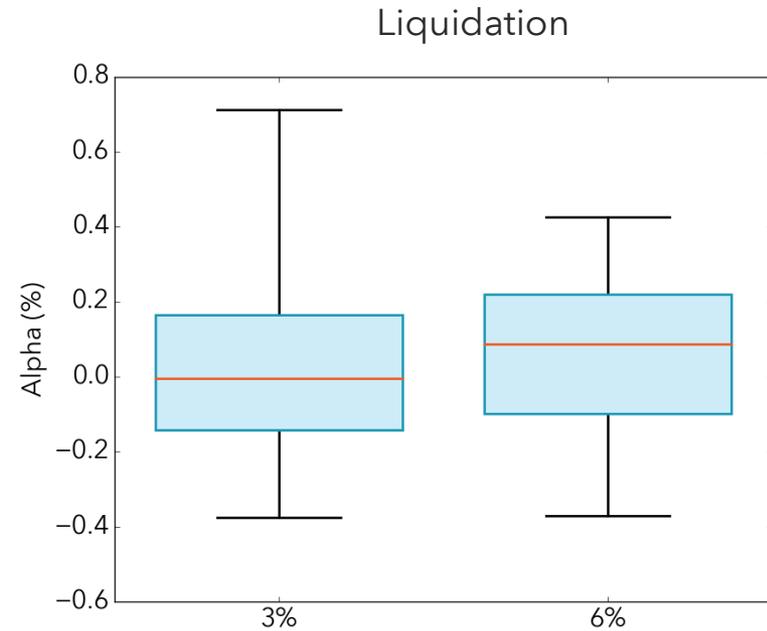
- In the results so far, we gifted and replenished with cash on a monthly basis.
- What happens if we optimally gift only in December of each year?

Incremental After-Tax Alpha at a 10-Year Horizon: Annual Minus Monthly Optimal Gifting Frequency

December 1972-January 2017



Strategy	3%	6%
Median	-0.03	0.05



Strategy	3%	6%
Median	0.00	0.09

Note: Tax alpha excludes any fee differential between a tax-loss harvesting strategy and a simple indexing strategy. A difference could lower tax alpha.

Ranges of annualized after-tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at 10-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

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Summary

Summary

- We quantified the impact of optimal gifting in a historical study over the period December 1972 to January 2017.
- By elevating cost basis, optimal gifting augmented after-tax alpha in both the estate/donation and liquidation dispositions.
- At a 10-year horizon, the incremental after-tax alpha over the base case observed in our study was:

After-Tax Alpha over Base*		
	3%	6%
Estate/Donation	0.25	0.54
Liquidation	0.48	0.97

*percentage points

Findings from Our Historical Study

- Optimal gifting, donating highly appreciated stock and replenishing with cash, had a bigger impact on after-tax alpha in the liquidation disposition than in the estate/donation disposition.
- As we have seen for tax-loss harvesting strategies with no gifting, tracking error tended to drift upward as horizon lengthened.
- However, for 3% optimal gifting, tracking error was under 1% even at a 20-year horizon.
- Median risk-adjusted returns exceeded 1.0 at all horizons for 3% optimal gifting.
- At a 10-year horizon, the median difference in after-tax alpha earned by gifting at annual and monthly frequencies ranged between -0.03% and 0.09% across the estate/donation and liquidation dispositions.
- We believe the incorporation of optimal gifting with tax-loss harvesting has the potential to increase both financial and philanthropic return.

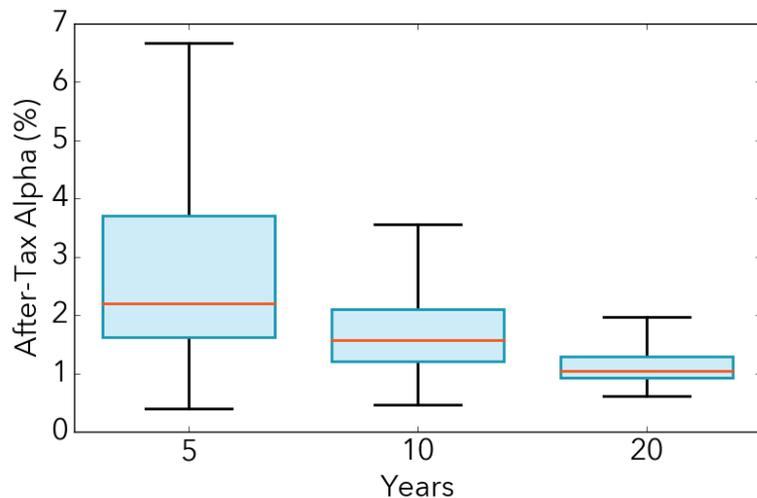
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Appendix

Horizon Dependence of After-Tax Alpha: Base

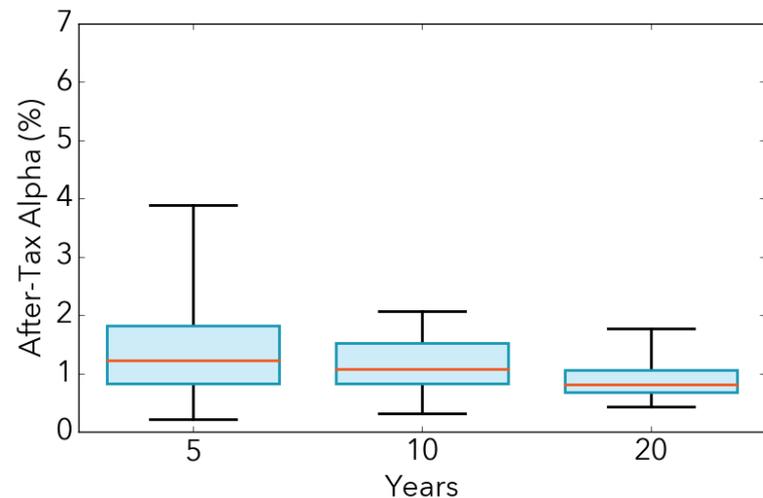
December 1972-January 2017

Estate/Donation



Years	5	10	20
Median	2.20	1.58	1.04

Liquidation



Years	5	10	20
Median	1.23	1.07	0.81

Note: Tax alpha excludes any fee differential between a tax-loss harvesting strategy and a simple indexing strategy. A difference could lower tax alpha.

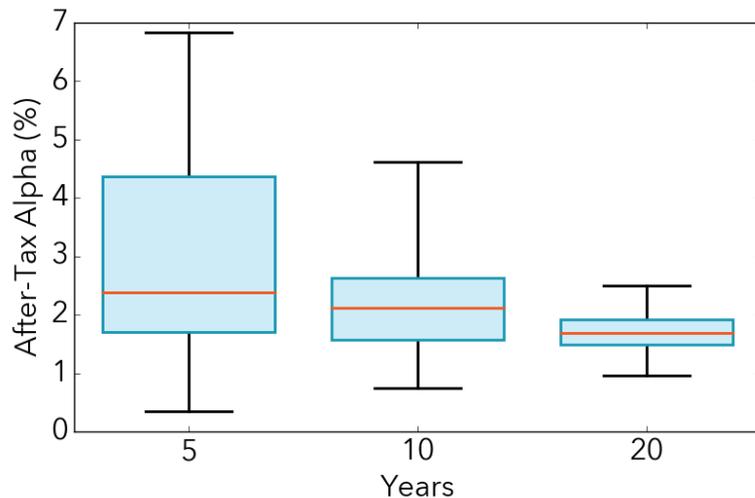
Ranges of annualized after-tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at five-, 10-, and 20-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

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Horizon Dependence of After-Tax Alpha: 6% Optimal Gifting

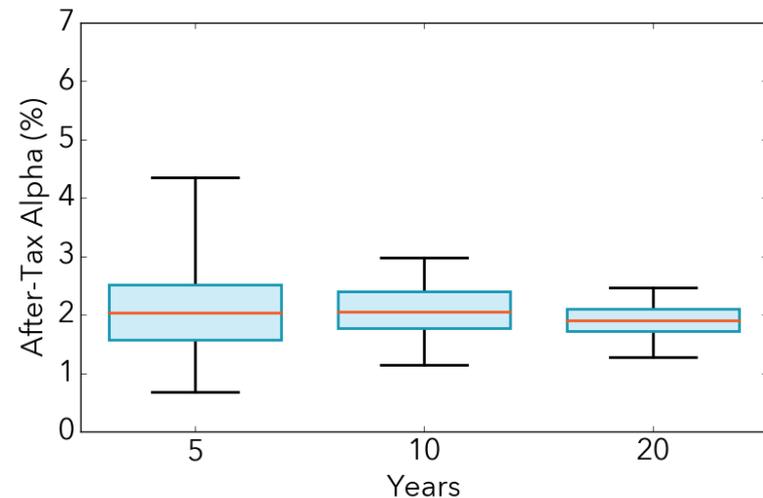
December 1972-January 2017

Estate/Donation



Years	5	10	20
Median	2.38	2.12	1.68

Liquidation



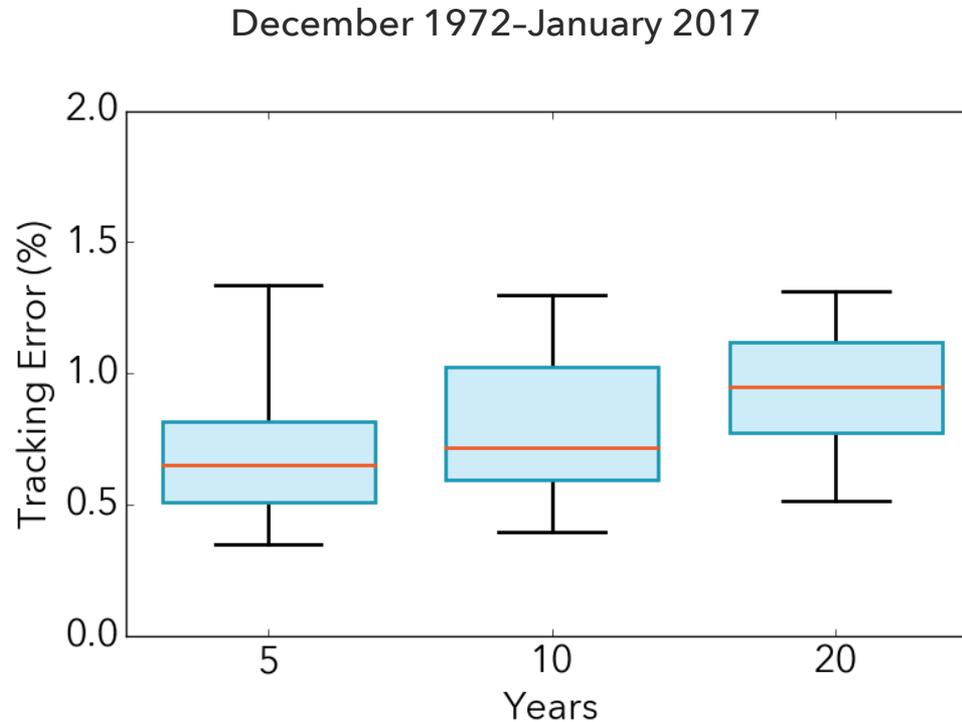
Years	5	10	20
Median	2.03	2.04	1.90

Note: Tax alpha excludes any fee differential between a tax-loss harvesting strategy and a simple index strategy. A difference could lower tax alpha.

Ranges of annualized after-tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at five-, 10-, and 20-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

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Horizon Dependence of Tracking Error: Base

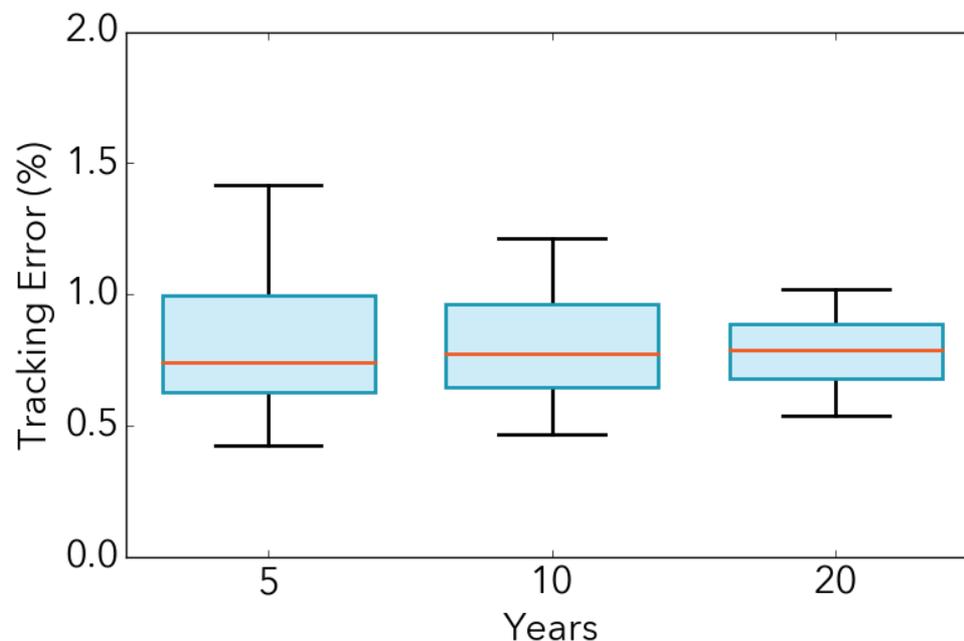


Years	5	10	20
Median	0.65	0.72	0.95

Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

Horizon Dependence of Tracking Error: 6% Optimal Gifting

December 1972-January 2017



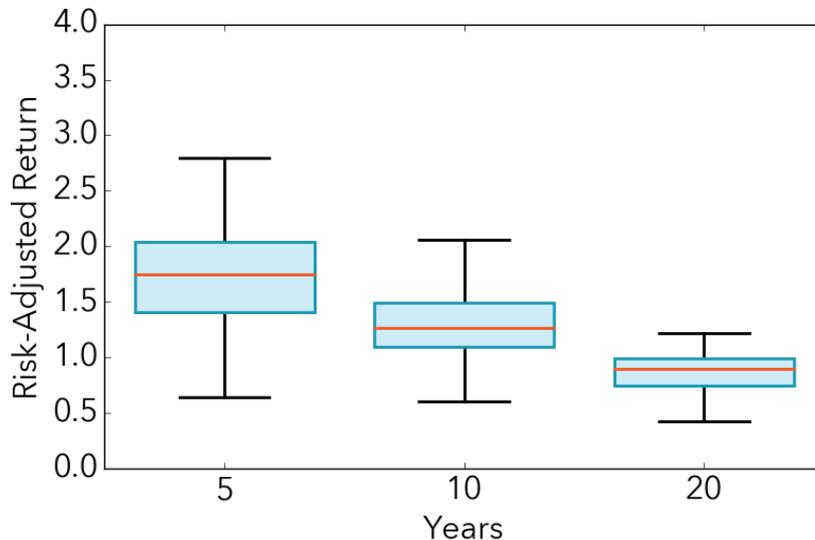
Years	5	10	20
Median	0.74	0.77	0.79

Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

Horizon Dependence of Risk-Adjusted Return: Base

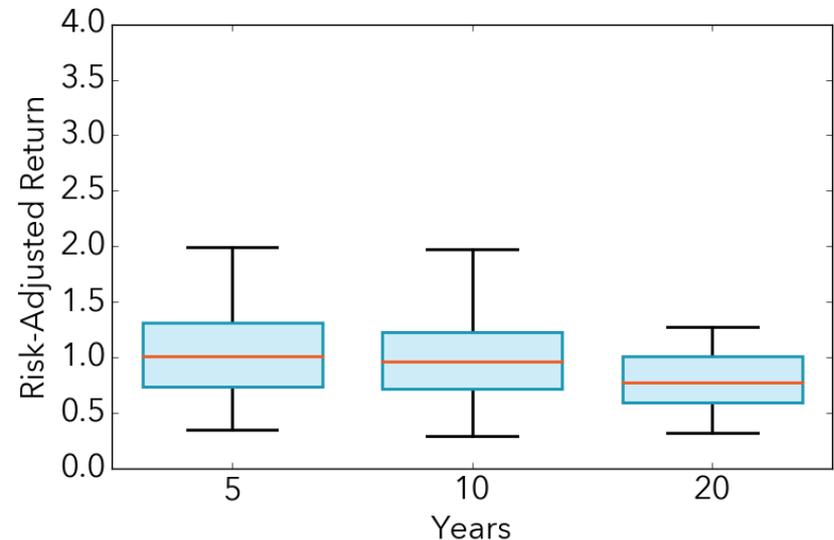
December 1972-January 2017

Estate/Donation



Years	5	10	20
Median	1.75	1.27	0.90

Liquidation



Years	5	10	20
Median	1.01	0.96	0.77

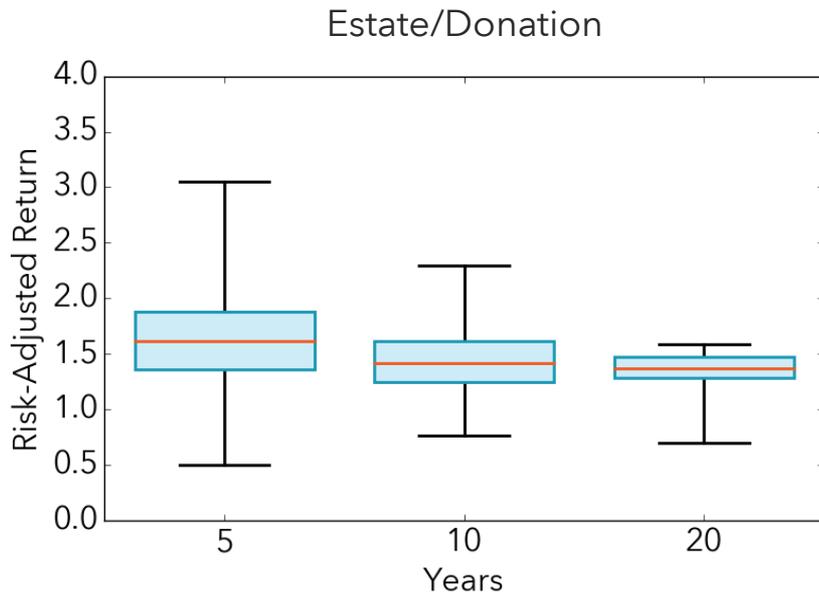
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Ranges of annualized tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at five-, 10-, and 20-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

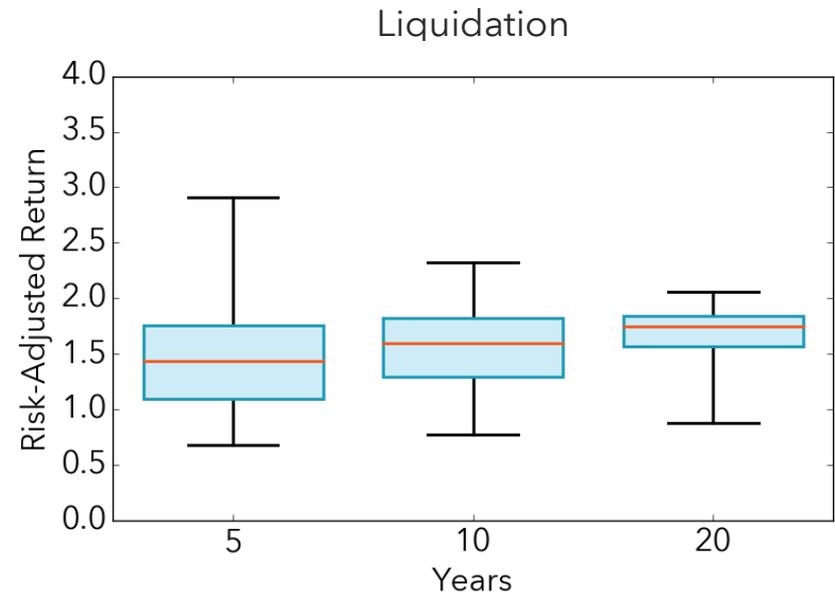
Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

Horizon Dependence of Risk-Adjusted Return: 6% Optimal Gifting

December 1972-January 2017



Years	5	10	20
Median	1.61	1.42	1.37



Years	5	10	20
Median	1.43	1.60	1.75

Note: Tax alpha excludes any fee differential between a tax-loss harvesting strategy and a simple indexing strategy. A difference could lower tax alpha.

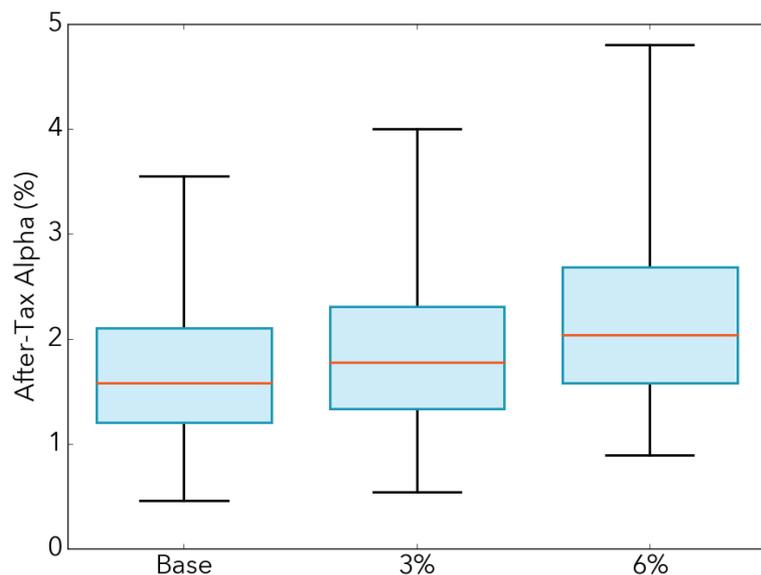
Ranges of annualized tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at five-, 10-, and 20-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

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10-Year After-Tax Alpha (December Optimal Gifting)

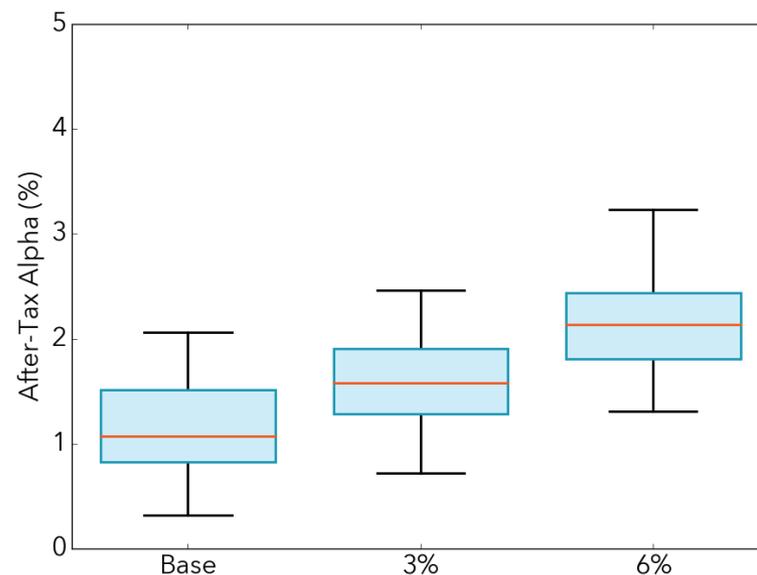
December 1972-January 2017

Estate/Donation



Strategy	Base	3%	6%
Median	1.58	1.77	2.04

Liquidation



Strategy	Base	3%	6%
Median	1.07	1.58	2.14

Note: Tax alpha excludes any fee differential between a tax-loss harvesting strategy and a simple indexing strategy. A difference could lower tax alpha.

Ranges of annualized after-tax alpha of a historically simulated S&P 500 tax-loss harvesting strategy at 10-year horizons over the period from December 1972 to January 2017. The estate/donation disposition is shown in the left panel, and the liquidation disposition is shown in the right panel. Simulated returns are gross of fees. Round-trip trading costs of 12 basis points are assumed.

Sources: Barra United States Equity Version 3 for Long-Term Investors, Barra Optimizer.

Disclosure

The information contained within this presentation was carefully compiled from sources Aperio believes to be reliable, but we cannot guarantee accuracy. We provide this information with the understanding that we are not engaged in rendering legal, accounting, or tax services. In particular, none of the examples should be considered advice tailored to the needs of any specific investor. We recommend that all investors seek out the services of competent professionals in any of the aforementioned areas.

With respect to the description of any investment strategies, simulations, or investment recommendations, we cannot provide any assurances that they will perform as expected and as described in our materials. Past performance is not indicative of future results. Every investment program has the potential for loss as well as gain.

Due to the complexity of tax law, not every single taxpayer will face the situations described herein exactly as calculated or stated; i.e., the examples and calculations are intended to be representative of some but not all taxpayers. Since each investor's situation may be different in terms of income tax, estate tax, and asset allocation, there may be situations in which the recommendations would not apply. Please discuss any individual situation with tax and investment advisors first before proceeding. Taxpayers paying lower tax rates than those assumed or without taxable income would earn smaller tax benefits from tax-advantaged indexing or even none at all compared to those described.

The performance of a taxable strategy is sensitive to its age as well as market attributes such as turbulence. We address this by aggregating characteristics of tax-loss harvesting strategies over many historical periods and at different investment horizons.

Study Assumptions: We launched long-horizon, tax-loss harvesting strategies in the S&P 500 every six months over the period from December 1972 to January 2017. To avoid risk associated with leverage, we disallowed short positions, and we set tax rates to the highest US federal level as of January 2017. Our portfolio construction process relied on factor-based, mean-variance optimization, and we rebalanced monthly.

To create the after-tax returns for the benchmark, we constructed back-tested portfolios that approximated the performance of an index fund in a separately managed account. These portfolios had very high aversion to tracking error. Portfolio trading was optimized in order to follow index changes and corporate actions, as well as dividend reinvestment.

We present ranges of tax alpha observed in our study. To highlight the aging process of tax-loss harvesting strategies, we show outcomes at horizons of five, 10, and 20 years. At each horizon, we generated a box-and-whiskers plot, which identifies the median outcome, the 25th and 75th percentiles delimiting the interquartile range, and the worst and best cases at the extremes. We believe this provides a concise presentation of the ranges of historical outcomes at fixed horizons achieved by strategies in different periods.

We focus on forecast pre-tax, post-trade tracking error since it is an essential element of our portfolio construction process, and it avoids technical complications inherent in realized tracking error, after-tax tracking error, and pre-trade tracking error. Realized tracking error is averaged over disparate volatility regimes. After-tax tracking error intertwines tax alpha and pre-tax tracking return. Pre-trade tracking error can be artificially high due to unresolved corporate actions.

Disclosure *(continued)*

In the estate/donation version of the analysis, any portfolio reflects realized capital gains over the course of the holding period, be it five, 10, or 20 years. At the end of the period, the hypothetical account is presumed to be either passed through an estate (and subject to basis step-up) or donated to a charity, for which the taxpayer receives a full income tax deduction. In both cases, any unrealized gain built up since the inception of the portfolio would not be subject to income tax, although it could be subject to estate tax in the estate case. The average after-tax return is generally higher for the estate/donation case than for the liquidation case since, in the former, the final unrealized gain is never subject to income tax. If a portfolio were held over a period where the value declined, then the relationship between the estate/donation and the liquidation cases could conceivably change; so mathematically, it is not always the case that in every situation the after-tax return for the estate/donation disposition would automatically be higher than that for the liquidation disposition.

In the liquidation version of the analysis, the ongoing realized gains or losses are treated the same way as they are in the estate/donation case, i.e., taxed on an ongoing basis over the period studied. Then, at the end of any holding period, be it five, 10, or 20 years, all assets in the portfolio are presumed to be sold off at the end of the final year. The after-tax returns then reflect payment of that final tax liability at the capital gains rate (long-term or short-term, as appropriate) applied to the taxable gain, i.e., the difference between the ending market value and the final cost basis.

Back-testing involves simulation of a quantitative investment model by applying all rules, thresholds, and strategies to a hypothetical portfolio during a specific market period and measuring the changes in value of the hypothetical portfolio based on the actual market prices of portfolio securities. Investors should be aware of the following: 1) Back-tested performance does not represent actual trading in an account and should not be interpreted as such; 2) back-tested performance does not reflect the impact that material economic and market factors might have had on the manager's decision-making process if the manager were actually managing client's assets; and 3) there is no indication that the back-tested performance would have been achieved by a manager had the program been activated during the periods presented in this study. For back-tested performance comparisons, the benchmark returns were simulated using historical constituents' weights and total returns.

The S&P 500® Index is an equity benchmark for US stock performance. It is a capitalization-weighted index covering 500 large US companies chosen by Standard & Poor's for market size, liquidity, and industry group representation.