The Tax-Loss Harvesting Life Cycle

A 43-Year Retrospective of Equity Indexing Strategies for Taxable Investors

An Examination of Tax-Loss Harvesting Strategies

1. How does tax-loss harvesting work?
2. How effective has tax-loss harvesting been over time?
3. What is the relative importance of the direct vs. deferred benefits?

1 Tax-Loss Harvesting in US Equity Markets

How It Fits in a Taxable Asset Allocation

In a taxable asset allocation, a tax-loss harvesting asset class serves to:

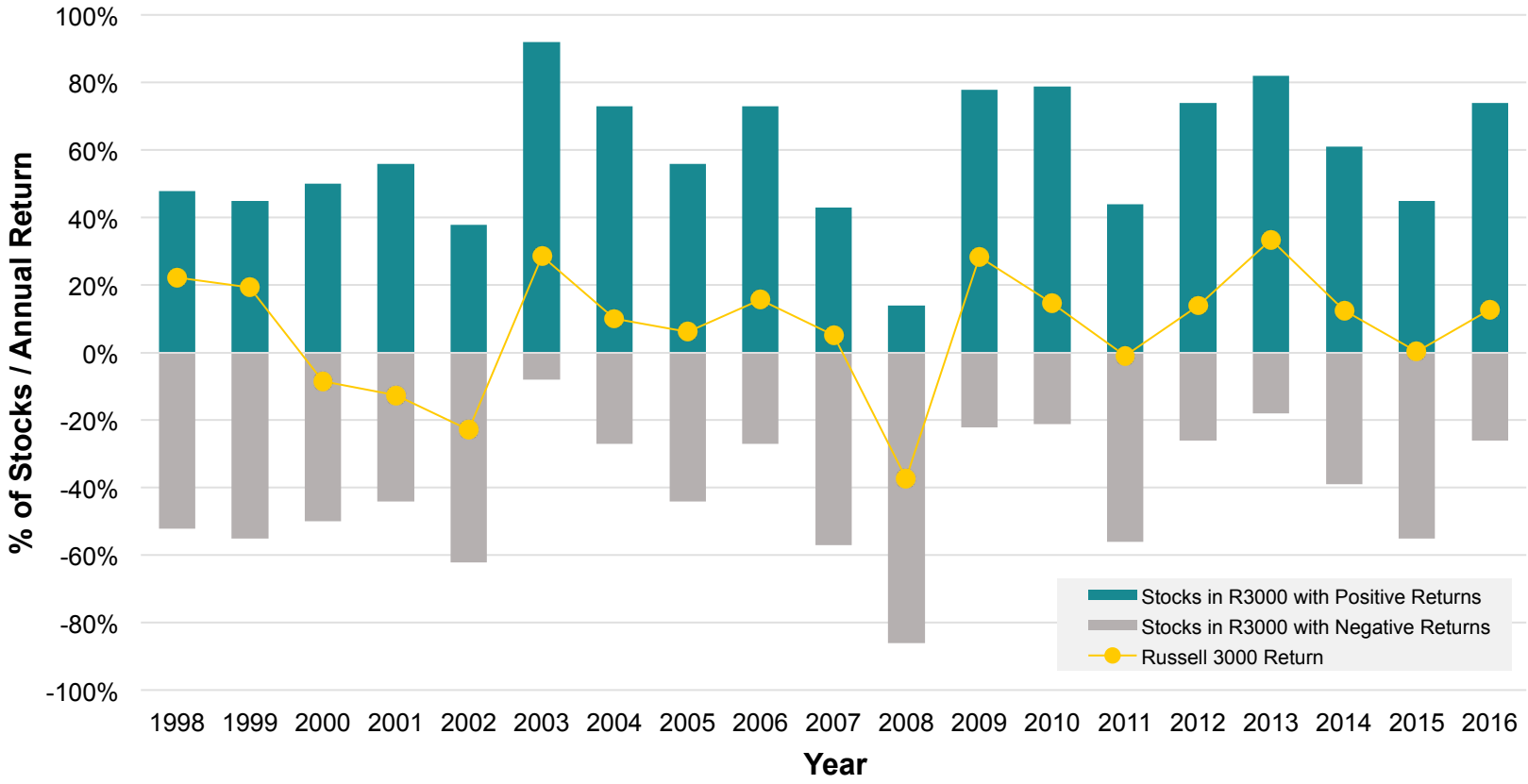
- Delay tax payments, or to avoid them entirely.
- Allow investors to more fully retain realized returns from tax-inefficient classes.

US equity is a natural setting for tax-loss harvesting.

Tax-Loss Harvesting Fueled by Abundance of Losers

% of Russell 3000 stocks up/down in a calendar year

Since 1998, the average % of stocks that fell was 41%



Note: Data as of 12/31 of each year. Past performance is not indicative of future returns. See disclosure page for important information.

The Goal of Tax-Loss Harvesting

The strategy aims to realize losses on individual stocks in conjunction with an investment objective, such as:

- **Earning index returns**
- Tilting on quality factors
- Lowering carbon footprint

It materially affects return/risk profiles of standard strategies.

Objective, Reward, and Risk

OBJECTIVE

Maximize the value of losses
while generating index-like returns.

REWARD

Harvested losses are used to offset gains from tax-inefficient asset classes—delaying or avoiding taxes.

RISK

Tracking error manages the divergence between the tax-loss harvesting portfolio return and index return.

Optimal Strategy is Facilitated by Factor Models

Constraining tracking error reduces the risk of this strategy.

- A pair of securities with similar exposures to risk factors-such as size, valuation, or industry-tend to co-move.
- Quantitative tax-loss harvesting replaces a loser with a security that has similar exposures.
- This keeps tracking error in check.

How Tax-Loss Harvesting Works

As stocks decline in value, Aperio sells a basket of stocks to realize losses and then buys a replenishment basket of similar stocks so the portfolio continues to track its index.

Starting Portfolio $5.0 Million	
# of Stocks	**350**
Tracking Error	0.5%
Volatility	13.5%
P/E	21.2
P/B	2.7
Top 3 Sectors	
Technology	21%
Financials	15%
Health Care	13%

OPTIMIZATION

Realizes losses to offset realized gains outside the portfolio

Rebalanced Portfolio $5.0 Million	
# of Stocks	**350**
Tracking Error	0.5%
Volatility	13.4%
P/E	21.1
P/B	2.7
Top 3 Sectors	
Technology	21%
Financials	16%
Health Care	13%

2 A 43-Year Retrospective of Return and Risk in US Equity Tax-Loss Harvesting Strategies

The Value of Tax-Loss Harvesting

To date, most appraisals have been based on Monte Carlo simulation or individual experience.

Here, we complement those perspectives with a broad, detailed historical study.

We emphasize ranges of observed outcomes (as opposed to simple averages) because investors' experiences vary.

We focus on a tax-loss harvesting strategy that tracks an index.

Empirical Study: Rolling 20-Year Strategies

Methodology:

1. Launch a tax-loss harvesting strategy in the S&P 500 each month between Jan 1973-Feb 2016
2. Track return and risk at annual horizons as strategies evolve
3. Aggregate results by horizon

Horizon (years)	# of Observations
5	468
10	408
20	288

Assumptions:

Capital Gains Rate

Long-term: 23.8%
Short-term: 43.4%

Performance Metrics

Tax Alpha

The difference between portfolio return and benchmark return after tax

Forecast Tracking Error

The indicator of how well the portfolio will track the benchmark pre-tax

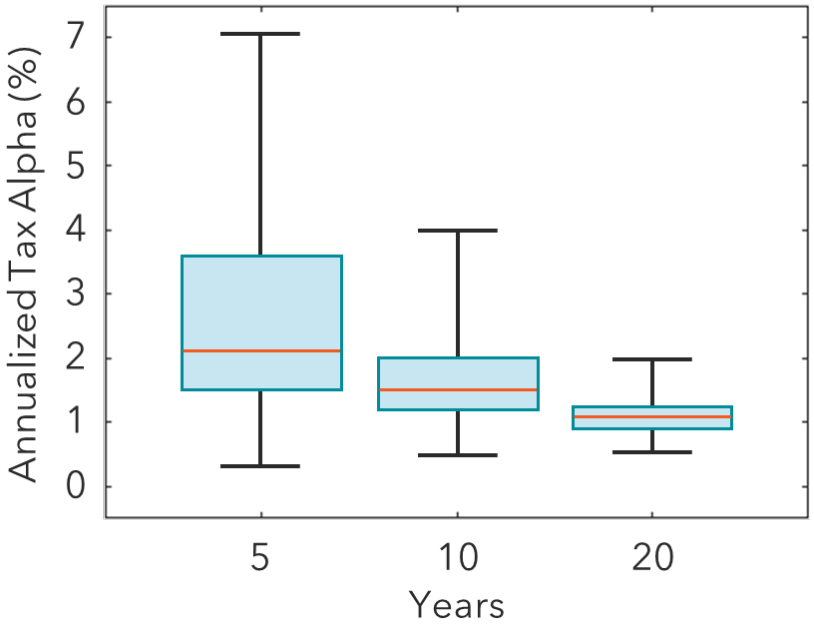
Tax Information Ratio

The risk-adjusted excess return due to loss harvesting

Tax Alpha

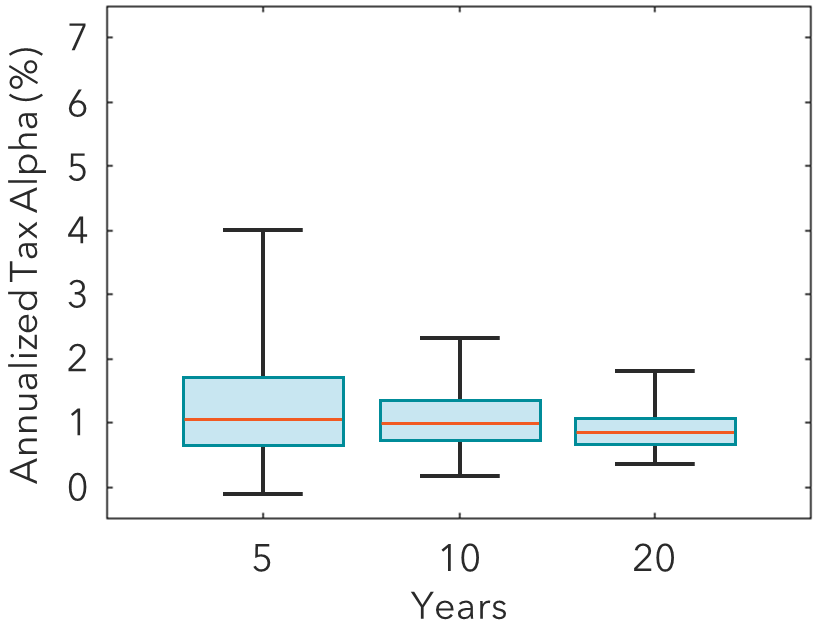
January 1973 – February 2016

Estate/Donation



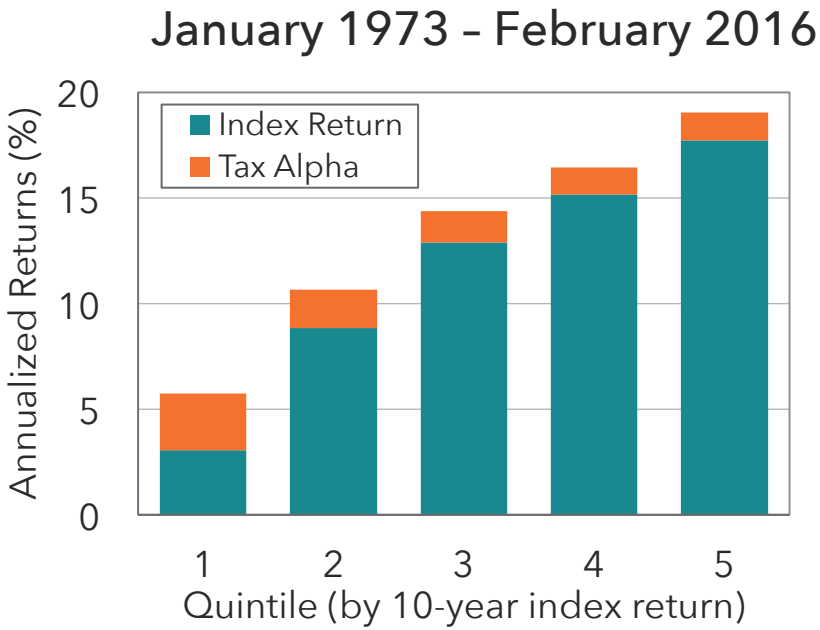
Years	5	10	20
Median	2.09	1.50	1.05

Liquidation



Years	5	10	20
Median	1.09	1.02	0.88

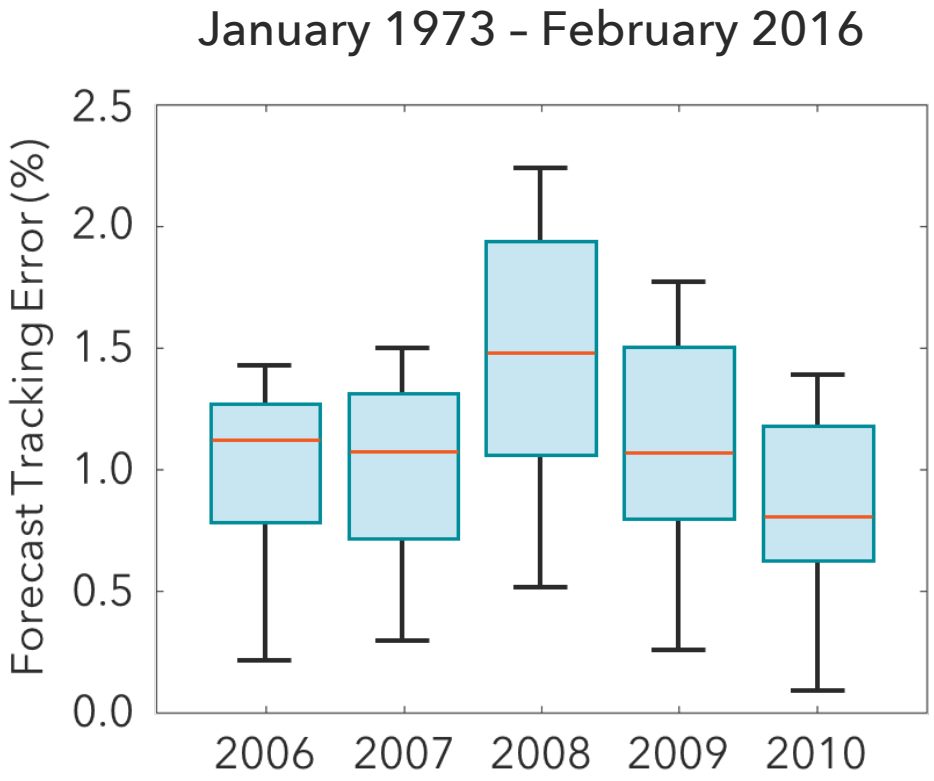
Regime Dependence of Tax Alpha



Average tax alpha sorted by average index return

	Quintile				
	1	**2**	**3**	**4**	**5**
Average Index Return	3.07	8.86	12.91	15.18	17.75
Average Tax Alpha	2.66	1.80	1.46	1.25	1.32

Tracking Error by Date

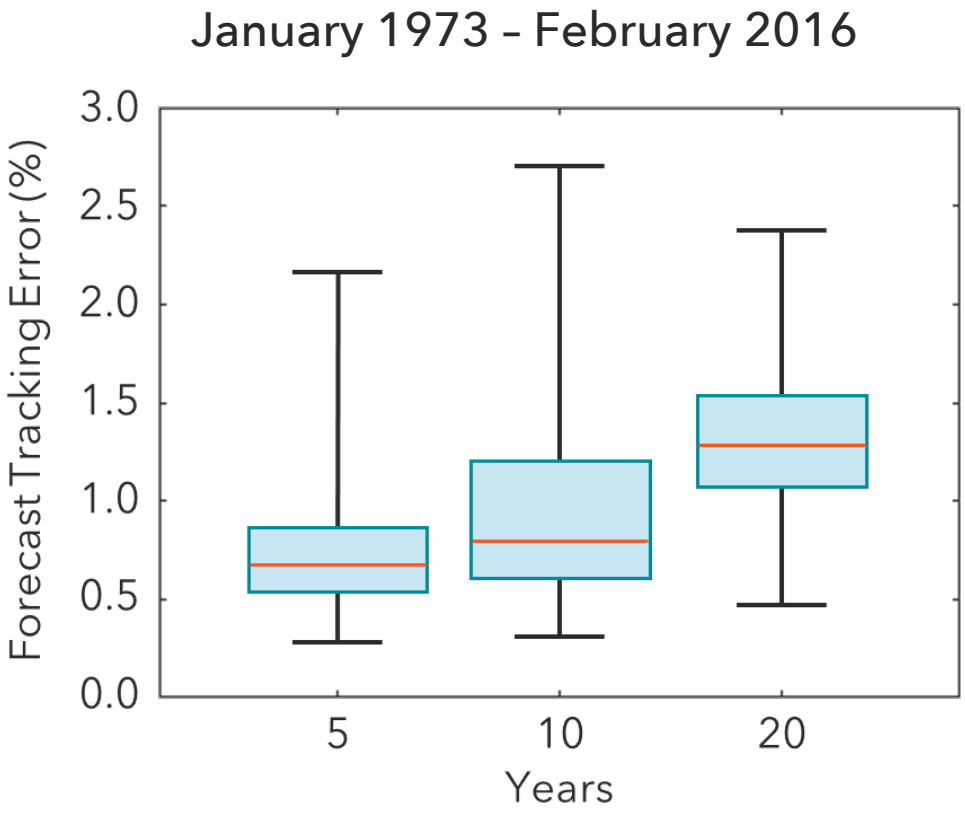


Measured in September each year

Years	2006	2007	2008	2009	2010
Median	1.12	1.07	1.48	1.07	0.81

Forecast pre-tax, post-trade tracking error

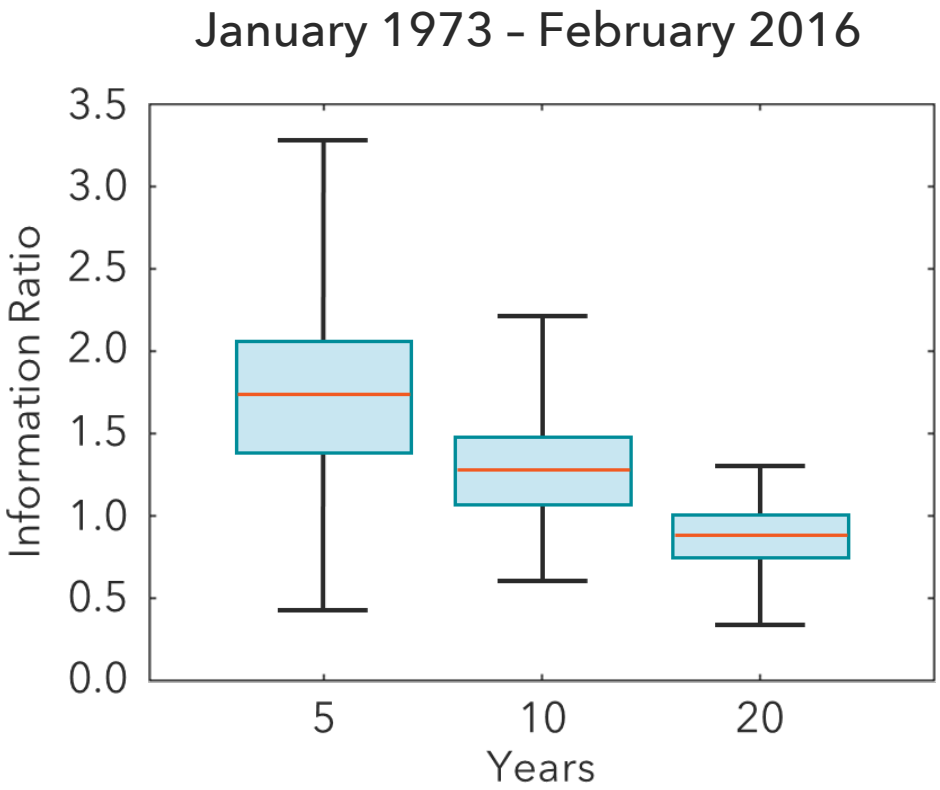
Tracking Error by Horizon



Years	5	10	20
Median	0.68	0.80	1.29

Forecast pre-tax, post-trade tracking error

Tax Information Ratio



Estate/Donation Disposition

Years	5	10	20
Median	1.73	1.28	0.88

Study Observations

Tax Alpha

- Over the life cycle, cost basis decreased and prices increased, leading to lower alpha at longer horizons.
- **At a 10–year horizon, tax alpha was uniformly positive** for the 408 strategies.
- On an annualized basis, tax alpha was greatest in turbulent & declining markets.

Forecast Tracking Error

- Tracking error showed **strong dependence on market volatility**.
- It had a discernable drift, by an average of 0.28 basis points/ month or 0.67% over 20 years.

Tax Information Ratio

- Tax information ratios were **uniformly positive at all horizons.**
- The median value a 20-year horizon was 0.88, which compares favorably with top quartile active managers.
- The smallest value that we saw at any horizon was 0.30.

3 Direct and Deferred Components of Tax Alpha

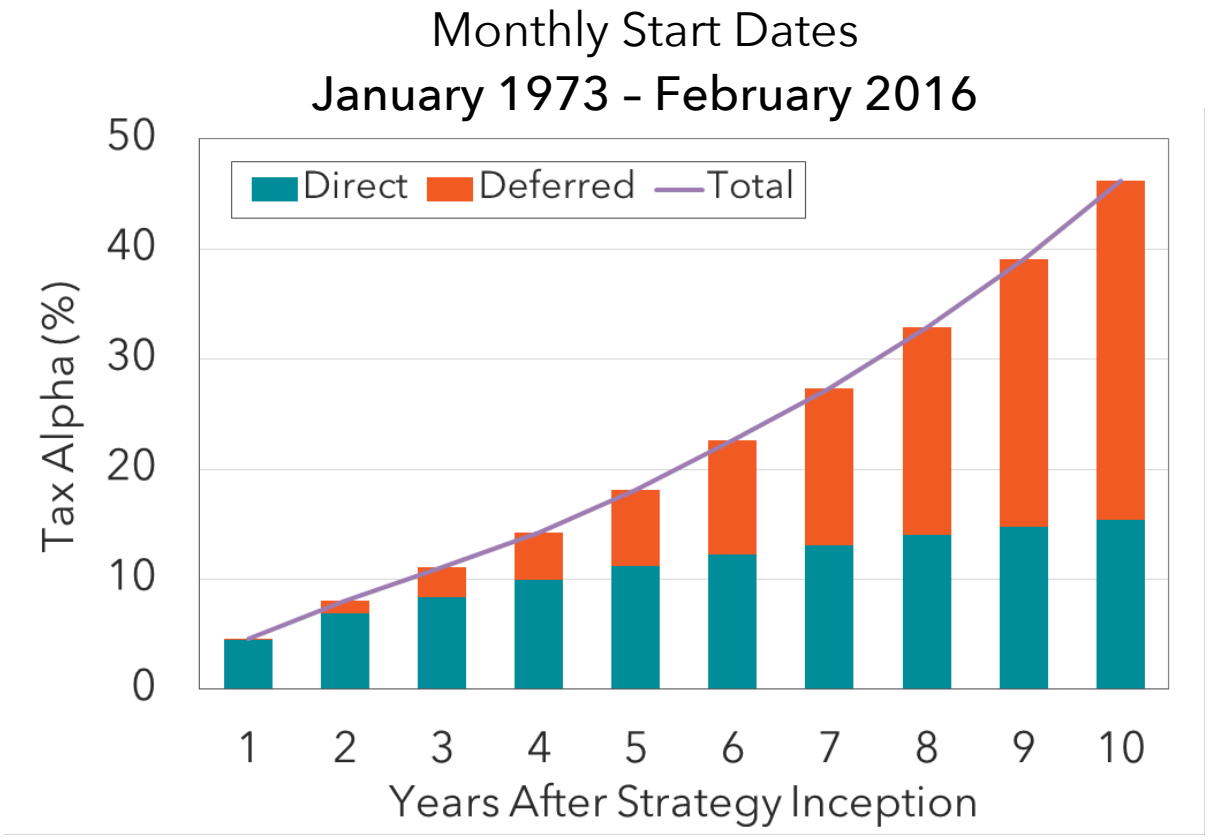
How Important are Direct vs. Deferred Benefits?

Tax-loss harvesting provides benefits through both immediate reduction in tax liability (direct) and the time value of postponing tax liability (deferred).

- ***Direct:*** *Accumulated tax savings when capital gains are offset with harvested losses*
- ***Deferred:*** *Reinvestment of tax savings**

* This includes the difference in return between the portfolio and its benchmark.

Average Direct and Deferred Components

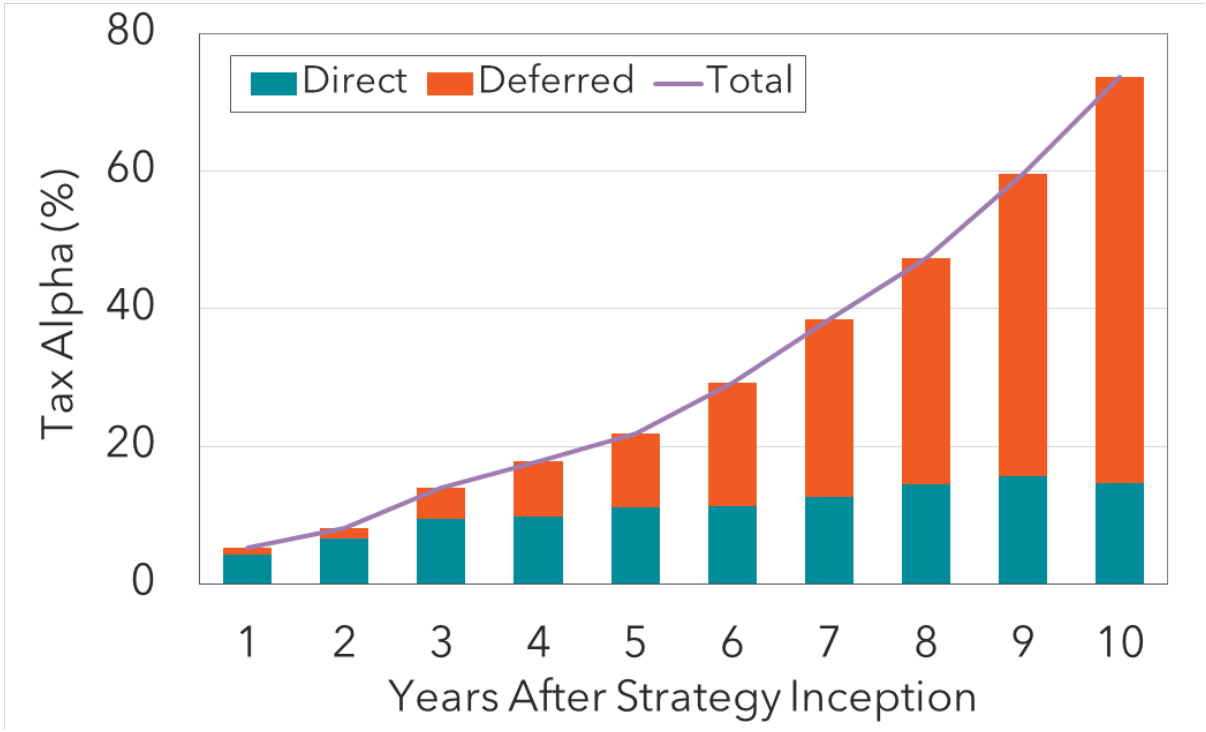


Estate/donation disposition

The average path illustrated in this slide may not be representative of individual experiences.

Direct and Deferred Benefits: Bull Market

January 1973 – February 2016



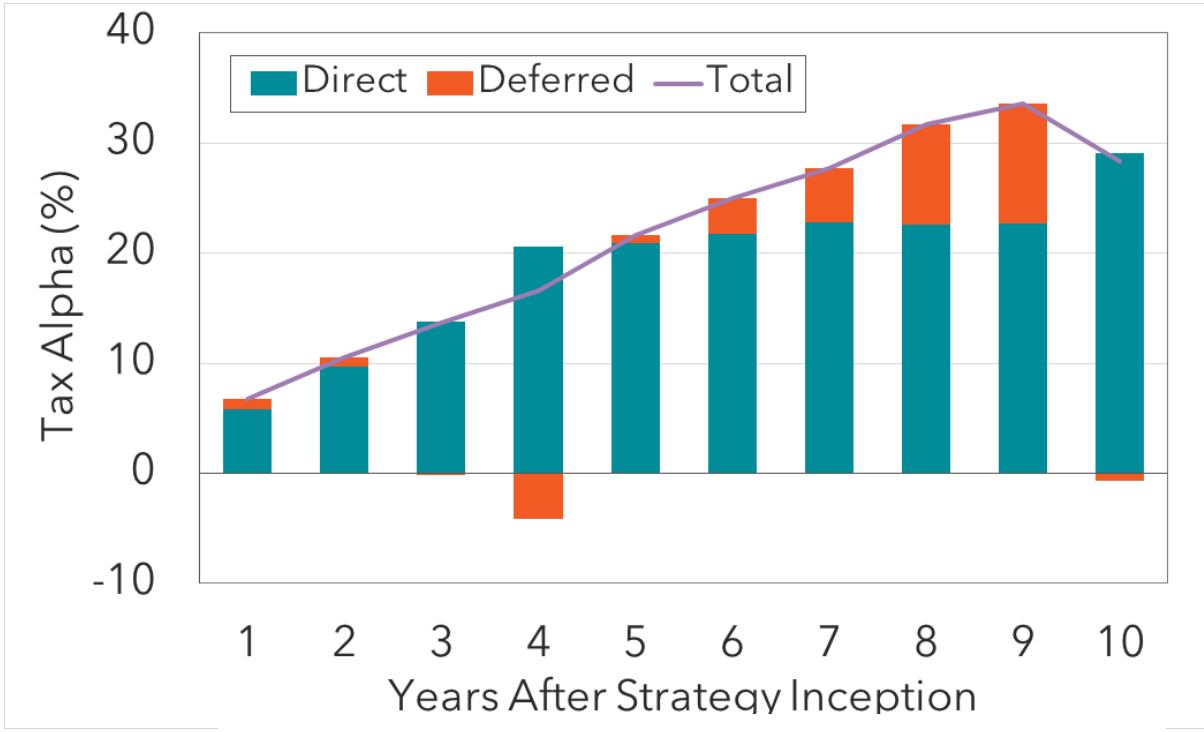
Inception: January 1980

Estate/donation disposition

The silhouette of this particular path bears strong resemblance to the average experience shown on the previous slide.

Direct and Deferred Benefits: Bear Market

January 1973 – February 2016



Inception: January 1980

Estate/donation disposition

This silhouette of this particular path differs materially from the average.

Summary

1 How does tax-loss harvesting work?

A tax-loss harvesting asset class allows investors to:

- more fully retain realized returns from tax-inefficient classes
- delay tax payments, or to avoid them entirely.

An abundance of losers makes U.S. equity a natural setting for tax-loss harvesting.

Optimal tax-loss harvesting is facilitated by factor models.

2 How effective has tax-loss harvesting been over time?

Tax Alpha

- Was uniformly positive at a 10-year horizon for the 408 strategies
- Was higher in bear markets

Forecast Tracking Error

- Was sensitive to market conditions
- Drifted by 0.28 basis points/ month on average, or 0.67% over 20 years

Tax Information Ratio

- Was uniformly positive at all horizons
- Had a median value of 0.88 at a 20-year horizon, which compares favorably with top quartile active managers

3 What is the relative importance of the direct vs. deferred benefits?

Tax-loss harvesting provides benefits through both immediate reduction in tax liability (direct) and the time value of postponing tax liability (deferred). Benefits vary depending on time horizon and market conditions.

	Conditions that Provide Greater Value	
	Time Horizon	Market Conditions
Direct	Earlier in life cycle	Turbulent, declining markets
Deferred	Later in life cycle	Calm, upward-trending markets

Executive Summary

Tax-loss harvesting allows investors to more fully retain realized gains from tax-inefficient classes by delaying or avoiding payments.

At a 10-year horizon, tax alpha was uniformly positive for the 408 strategies tested, and higher in bear markets.

The direct and deferred benefits vary depending upon time horizon and market conditions. Direct provides more value early and in bear markets. Deferred benefits are seen more later and in bull markets.

Investor experiences vary. However, despite the variation, tax-aware investing pays off for the taxable investor.

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The Russell 3000® Index is an equity benchmark for US stock performance. It is a capitalization-weighted index covering the largest 3,000 publicly-traded US stocks. The index represents approximately 98% of the total market capitalization of the US stock market.

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