August 2025

BlackRock®

Aperio Long/Short Strategies

Extension of Aperio's Active Tax Management using margin and shorting for potentially more tax alpha and/or less concentration risk

THIS DOCUMENT CONTAINS INFORMATION BASED ON HYPOTHETICAL PERFORMANCE DATA. PLEASE SEE "IMPORTANT NOTES FOR HYPOTHETICAL PERFORMANCE INFORMATION" CONCERNING THE LIMITATIONS OF HYPOTHETICAL INFORMATION.

Overview

A. Motivation: Three use cases

1) Seeking greater tax alpha for all-cash funded portfolios

130/30 200/100

2) Seeking rejuvenated tax alpha for an older/ossified account*

130/30 200/100

3) Seeking tax-efficient diversification of concentrated stocks and/or ETFs*

130/30 200/100

* Aperio offers the ability to integrate some ETFs into some accounts based on internal guidelines related to our risk models and appropriateness for an account's mandate. Aperio charges fees on all assets in an account, including ETFs, and because ETF providers also collect a fee, there is an additional layer of fees for ETF holdings. Aperio reviews potential ETF management on a case-by-case basis.

B. Short selling

C. Long/Short management at Aperio

For clients that integrate ETFs into an Aperio SMA, such clients will pay fees to both Aperio and the ETF provider when ETFs are managed in Aperio portfolios. Clients who direct Aperio to manage ETFs that are affiliated funds (e.g., BlackRock iShares ETFs) in an Aperio account portfolio may pay fees and expenses for these affiliated funds to an Aperio affiliate in addition to Aperio's management fee, which is based on a percentage of the Client's account value including the value of these funds held in such account. This can present a potential conflict of interest. Please refer to Aperio's Form ADV, Part 2A Brochure, Item 11: "Code of Ethics, Participation or Interest in Client Transactions, and Personal Trading" for more details.

Benefits and drawbacks of long/short* versus a long-only SMA

Benefits

- **Potentially achieve factor exposure on both the long and short sides.** Long/short allows for both positive factor exposure on the long side and negative factor exposure on the short side
- **Potentially higher level of loss harvesting.** Long/short strategies, with greater gross exposure than long-only, may potentially increase both the **amount** and the **longevity** of loss harvesting. Also, tax alpha may be more **consistent** across both up and down markets
- **Potentially rejuvenated loss harvesting.** For older or ossified portfolios, long/short may potentially rejuvenate loss harvesting
- **Potentially tax efficient systematic diversification of concentrated stock.** For concentrated stock(s), long/short may potentially reduce concentration risk tax-efficiently (shown later in this presentation)

*See "Important notes" for risks associated with short selling and trading on margin.

Drawbacks

- **Additional costs & fees.** Includes spread between margin and rebate rates, as well as long/short management fee premium
- **Leverage risk.** Use of leverage carries its own performance risk, as downside returns can be magnified
- **Added tax cost to liquidate.** Liquidating a long/short portfolio involves liquidating the short-side which is always taxed at short-term rates—and the portfolio is leveraged—and thus may be more expensive
- **Custodial limitation.** Aperio long/short accounts are currently available only at Fidelity and Charles Schwab

Suitable clients

A long/short strategy can be suitable for clients with consistent gains or clients seeking greater and/or more consistent loss harvesting.

Long/short can also be suitable for clients with concentrated stock(s).

Long/short may not be suitable for clients with only long-term gains and plan to liquidate or clients averse to the long/short complexity.

What is Long/Short

Explanation of Long/Short using 130/30 as an example

A tax-managed 130/30 long/short portfolio is simply an extension of a traditional tax-managed long-only portfolio where the "long-only constraint" has been relaxed.

A long-only portfolio is 100% long and 0% short, whereas a 130/30 portfolio uses leverage to increase long exposure to 130% and uses a short exposure to 30%.

Thus, for every $1.00 invested, the 130/30 strategy provides $1.60 of gross exposure.

Note: Throughout this presentation, we use **130/30** and **200/100** leverage.

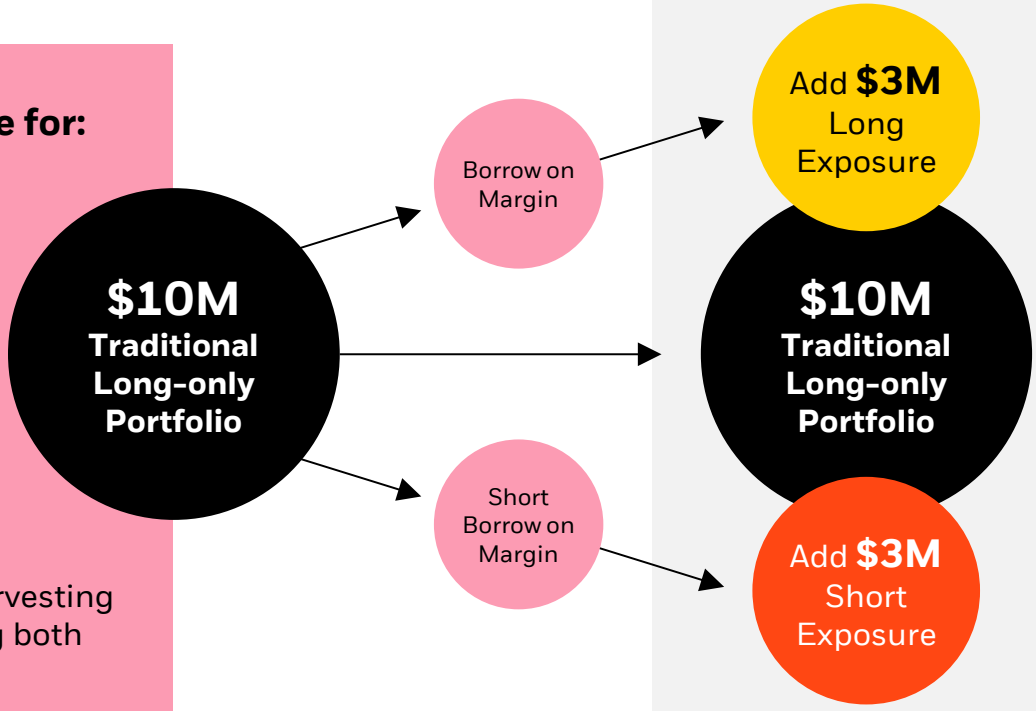
Using different actual leverage, such as **140/40** would generate different back-test results. See Appendix for additional reading.

Long/Short Strategy Investment Objective for:

1. **All-cash funded portfolios**
2. **Ossified portfolio rejuvenation**

Long/Short Active Tax Management seeks to provide exposure to US or global stocks and to provide a greater-than-benchmark exposure to Quality and Value factors using margin and shorting while improving both pre-tax and after-tax returns.

Additionally, this strategy seeks to increase loss harvesting and provide more consistent loss harvesting during both up and down markets versus a long-only strategy.



For illustrative purposes only.

In this presentation we highlight two different levels of leverage:

- **130/30**
- **200/100**

- Aperio's **130/30** long/short strategy is subject to Regulation T* ("Reg T"), which essentially limits leverage to 150/50

- Aperio's **200/100** long/short strategy is not subject to Reg T, but does require extra steps to set up:

  - For leverage amounts greater than Reg T, the term for this is "**portfolio margin**"

  - For these portfolio margin accounts, application paperwork is needed for the end client, the financial advisor's firm, and Aperio—and all must be approved by Fidelity (Aperio has been approved by Fidelity for portfolio margin)

*Federal Reserve Board Regulation T is 12 CFR §220 – Code of Federal Regulations, Title 12, Chapter II, Subchapter A, Part 220. Regulation T governs the extension of credit by securities brokers and dealers in the United States. Its best-known function is the control of margin requirements for stocks bought on margin. (https://en.wikipedia.org/wiki/Regulation_T)

Aperio's long/short customization capabilities

Leverage*

Reg T

- **130/30**
- **140/40**

Portfolio Margin

- **200/100 (uses stronger factor tilts)**

*Reach out to Aperio for customized leverage—limitations may exist

Benchmarks

- S&P 500
- Russell 1000
- Russell 3000
- MSCI ACWI
- MSCI World
- Blended benchmarks**

For global long/short:

- **For non-US exposure, we can only hold ADRs — we cannot hold foreign ordinaries in long/short**
- **We only short-sell US securities**

Factor tilts***

Long/short research available

- **Aperio Quality Value**
- **Aperio Multi-Factor**

***Reach out to Aperio for customizing factor tilts—limitations may exist

Aperio long-only factor tilt strategies listed in the Appendix

Funding Source

- Cash
- Stocks
- ETFs

Restrictions

- Tickers
- GICS industries and sub-industries
- Values-Aligned Investing (VAI) Menu restrictions

**Blended benchmarks can be US or Global and must include at least 30% in either the S&P 500 or Russell 1000. Blend indexes must be market-cap weighted indexes (style and specialty indexes not allowed)

For clients that integrate ETFs into an Aperio SMA, such clients will pay fees to both Aperio and the ETF provider when ETFs are managed in Aperio portfolios. Clients who direct Aperio to manage ETFs that are affiliated funds (e.g., BlackRock iShares ETFs) in an Aperio account portfolio may pay fees and expenses for these affiliated funds to an Aperio affiliate in addition to Aperio's management fee, which is based on a percentage of the Client's account value including the value of these funds held in such account. This can present a potential conflict of interest. Please refer to Aperio's Form ADV, Part 2A Brochure, Item 11: "Code of Ethics, Participation or Interest in Client Transactions, and Personal Trading" for more details.

Factor tilts: additional portfolio construction considerations

Long/short signal

With long/short optimization, we believe a signal such as a factor tilt may be necessary for optimal all-cash funded or ossified portfolios.

Factor tilts can improve pre-tax active returns, especially with long/short where the long-only constraint is removed.

Long/short factor strategies can reduce both forecast tracking error* and unintended factor exposures versus analogous long-only factor strategies.

200/100 factor tilts

For 200/100 (portfolio margin), we double the size of our factor tilts versus the long-only and 130/30 factor strategy.

For example, we use “Quality Value 2x” and “Multi-Factor 2x” for 200/100.

Factor Strategy	Factor Groups in the Factor Strategy	Forecast tracking error*		
		Long-Only	130/30	200/100
Aperio Quality Value	Quality, Value	1.2%	0.9%	
Aperio Quality Value 2x				2.3%
Aperio Multi-Factor	Quality, Value, Small Size, Price Momentum	1.5%	1.4%	
Aperio Multi-Factor 2x				3.0%

*Forecast tracking error for an all-cash funded sample portfolio as of 1/31/2025. Forecast tracking error is a point-in-time risk measure not intended to provide assurance as to performance/limit on losses**.** Forecast tracking error can and has increased for all-cash funded portfolios when loss harvesting commences. See Back-test H in Appendix for more information. **See “Important notes” for details.** Sample portfolios relied on MSCI’s Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See “Important notes” for information regarding the optimization process.**

130/30 Use case #1

Compared to traditional long-only loss-harvesting, the increased gross exposure of **130/30** may provide **additional loss-harvesting opportunities** both on the long and short side, as well as in **both up and down markets**, which may lead to **more consistent tax alpha**.

Back-test A:
All-cash funded 130/30 versus long-only portfolios

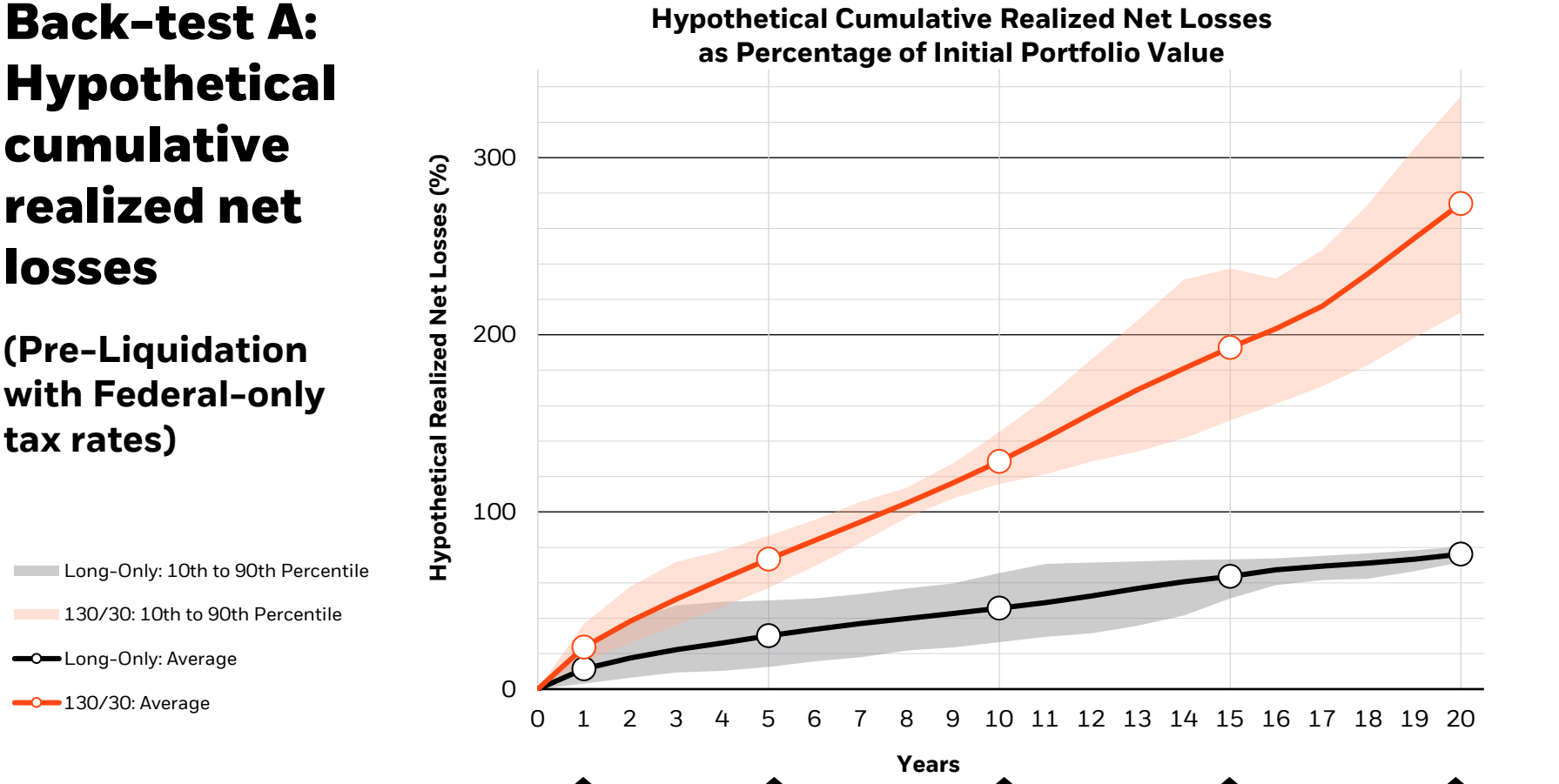
Back-test assumptions & settings:

- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **June 30, 1995, to January 31, 2025**, with hypothetical portfolios of $10M cash launched quarterly with monthly rebalancing
- The 130/30 portfolios used leverage of 130/30 and the **Aperio Quality Value** factor tilt, while the long-only portfolios did not use a factor tilt.
- **Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.42% for 130/30 portfolios, and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- For all after-tax hypothetical portfolio returns, the highest federal tax rates are used (40.8% short term and 23.8% long term)
- Two hypothetical investor types are shown: (1) those with short-term (ST) and long-term (LT) gains; and (2) those with only LT gains. For both, we assume they have sufficient gains to offset all losses harvested
- **We show 10-year results based on 79 runs and 20-year results based on 39 runs**

See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Back-test A: Hypothetical cumulative realized net losses

(Pre-Liquidation with Federal-only tax rates)



Averages	1 year	5 years	10 years	15 years	20 years
130/30	24%	73%	129%	193%	274%
Long-Only	11%	30%	46%	64%	76%

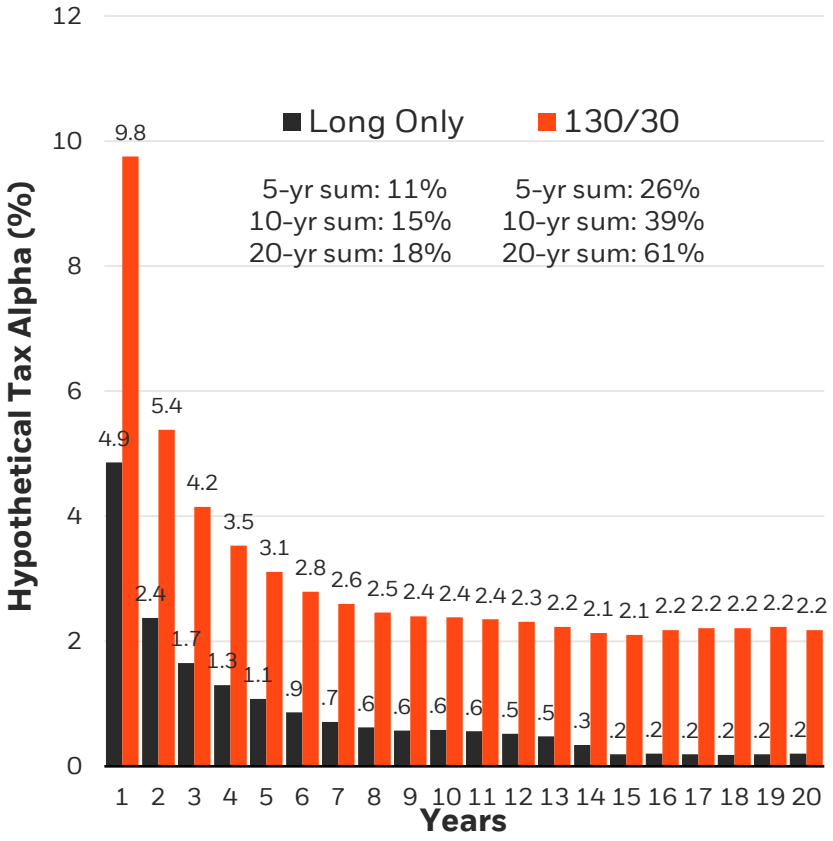
This page contains hypothetical realized loss data that is based on backtested/ hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model**. See "Important notes" for information regarding the optimization process and the risks associated with short selling and trading on margin.**

Source: Internal data and MSCI.

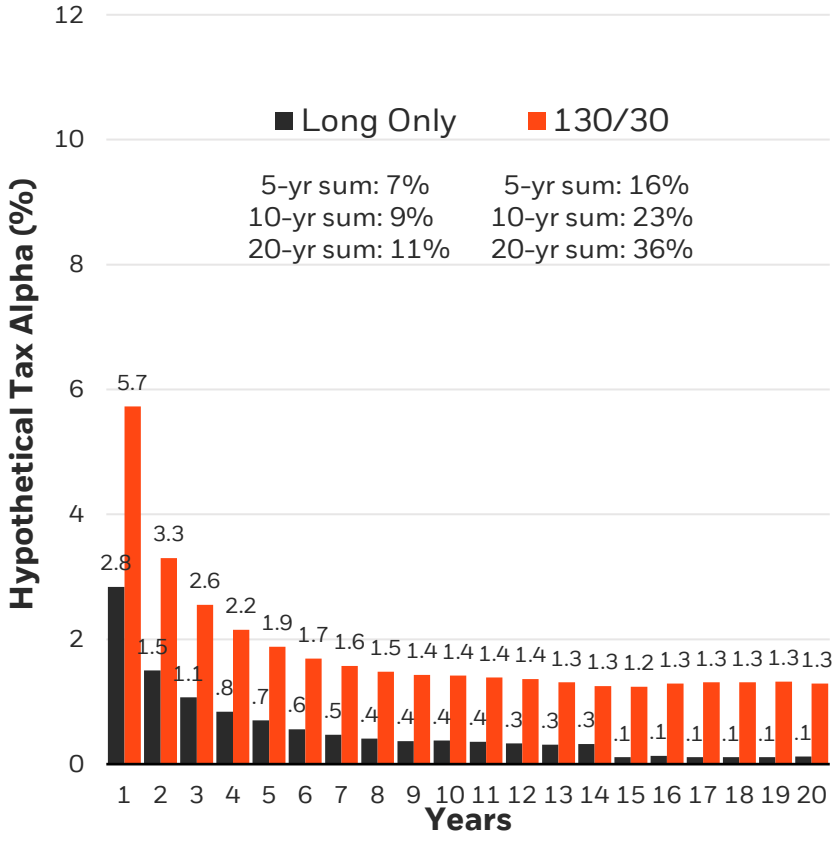
Back-test A:

Average hypothetical tax alpha by year (Pre-Liquidation & Federal-only tax rates)

Hypothetical Investors with ST & LT Gains



Hypothetical Investors with only LT Gains



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Source: Internal data and MSCI.

Back-test A:

Average 10-year annualized hypothetical net-of-fee after-tax active returns

- For all but one of the eight investor situations in the back-test, the back-test showed that the long/short strategy significantly improved the hypothetical after-tax results versus the long-only strategy.
- However, for the one investor situation in the back-test (where hypothetical investors only had long-term gains and will be liquidating), the back-test results showed that the 130/30 strategy did not meaningfully improve upon the long-only strategy.

Hypothetical Investor with ST & LT Gains

Disposition	Long-Only	130/30	Difference
Pre-Liquidation	1.52%	4.13%	+2.61%
Estate (Close Shorts)	1.52%	3.50%	+1.98%
Convert to Long-Only (No Leverage)	1.52%	3.24%	+1.72%
Post-Liquidation	0.78%	1.94%	+1.16%

Hypothetical Investors with only LT Gains

Disposition	Long-Only	130/30	Difference
Pre-Liquidation	0.85%	2.38%	+1.53%
Estate (Close Shorts)	0.85%	1.76%	+0.91%
Convert to Long-Only (No Leverage)	0.85%	1.50%	+0.65%
Post-Liquidation	0.11%	0.23%	+0.12%

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Source: Internal data and MSCI.

Back-test A:

Decomposition of hypothetical annualized net-of-fee after-tax active return (Pre-Liquidation, Federal-only tax rates, Investors with ST & LT Gains)

Hypothetical Average 10-year:	Long-Only	130/30	Difference
Pre-tax Active Return Gross of Fees and Costs	**-0.01%**	**0.53%**	**0.54%**
Transaction Costs	-0.03%	-0.10%	-0.07%
Leverage Cost (Margin Interest minus Rebate Rate)	—	-0.24%	-0.24%
Additional Hard to Borrow Cost	—	-0.01%	-0.01%
Management Fees	-0.22%	-0.42%	-0.20%
Subtotal: Costs & Fees	**-0.25%**	**-0.77%**	**-0.52%**
Tax Alpha	**1.78%**	**4.37%**	**2.59%**
After-Tax Active Return Net of Fees & Costs	**1.52%**	**4.13%**	**2.61%**

The Quality Value factor tilt in the Long/Short back-test had a positive impact on the hypothetical pre-tax returns.

These costs and fees are **52 bps** greater with long/short than with long-only.

Fees and costs will not vary with tax rates, disposition, or investor gains profile.

Tax alpha will vary with tax rates, disposition, and investor gains profile as shown on earlier pages.

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Source: Internal data and MSCI.

Additional details on leverage cost

(margin interest minus rebate rate)

Margin Cost

The portion of the long-side that is bought on margin carries a margin cost.

This margin cost is often quoted as an overnight borrowing rate plus a margin spread.

Shorting Cost

The portion of short-side carries a shorting cost related to the rebate rate.

This rebate rate is often quoted as an overnight borrowing rate minus a short spread.

Margin & Shorting Combined Costs

- The margin spread plus the short spread equals the total spread, which is a cost that investors should understand
- The total spread cost is (long margin %) times (margin spread) plus (short %) times (short spread)

Examples

For illustrative purposes only.

Consider a hypothetical 130/30 strategy

- Margin spread = 22 bps
- Short spread = 58 bps (total spread is 80 bps)
- Long margin = 30%
- Short = 30%
- Total cost = 30% x 22 bps + 30% x 58 bps = 30% x 80 bps = 24 bps

Next, consider a hypothetical 140/40 strategy

- Margin spread = 22 bps
- Short spread = 58 bps (total spread is 80 bps)
- Long margin = 40%
- Short = 40%
- Total cost = 40% x 22 bps + 40% x 58 bps = 40% x 80 bps = 32 bps

130/30 Use case #2

Compared to a traditional long-only ossified portfolio, the increased gross exposure of 130/30 increases the portfolio's cost basis and may provide **rejuvenated loss-harvesting opportunities** both on the **long and short side**, as well as in **both up and down markets**.

Back-test B:
Ossified long/short portfolios versus long-only portfolios

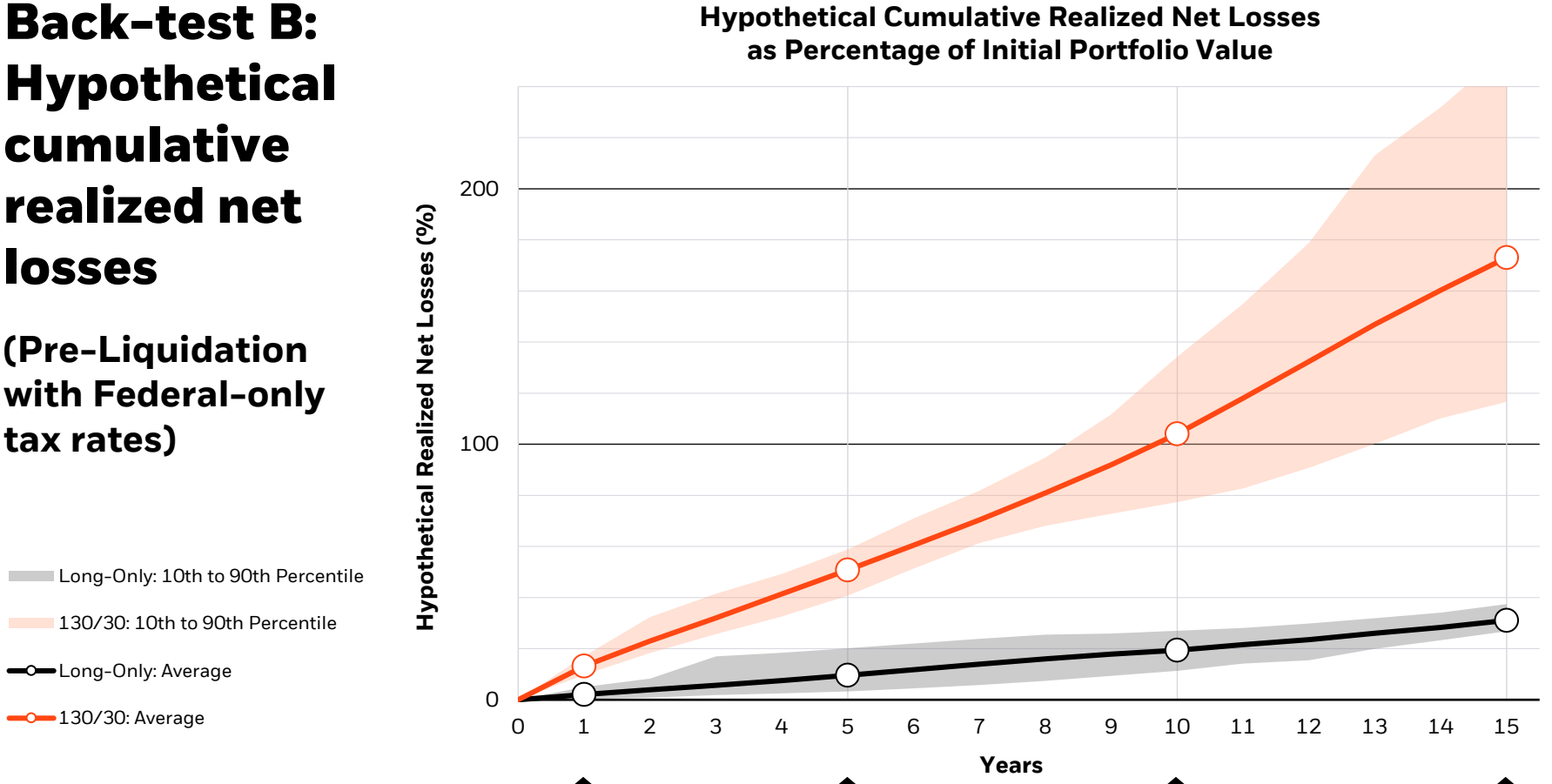
Back-test assumptions & settings:

- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **June 30, 1995, to January 31, 2025**, with hypothetical portfolios of $10M cash launched quarterly with monthly rebalancing
- The long/short portfolios used no leverage and no factor tilt for the first 5 years, and then used leverage of 130/30 and the **Aperio Quality Value** factor tilt. The long-only portfolios did not use a factor tilt. The first 5 years are excluded from the results as a proxy for "ossified" accounts
- **Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.42% for long/short and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- Highest federal tax rates are used (40.8% short term and 23.8% long term)
- Two hypothetical investor types are shown: (1) those with short-term (ST) and long-term (LT) gains; and (2) those with only LT gains. For both, we assume they have sufficient gains to offset all losses harvested
- **We show 10-year results based on 59 runs and 15-year results based on 39 runs**

See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Back-test B: Hypothetical cumulative realized net losses

(Pre-Liquidation with Federal-only tax rates)



Averages	1 year	5 years	10 years	15 years
130/30	13%	51%	104%	173%
Long-Only	2%	10%	19%	31%

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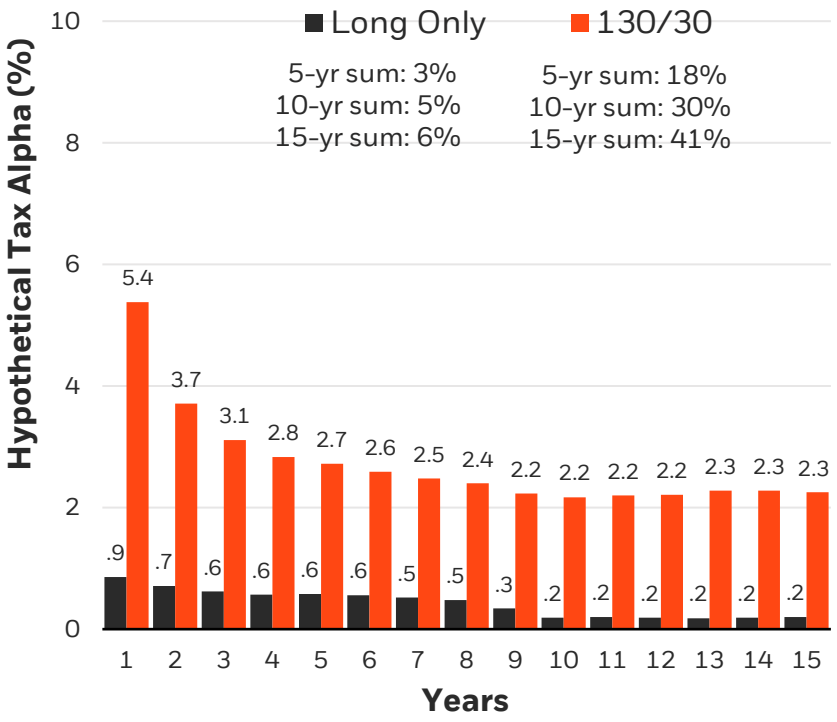
Source: Internal data and MSCI.

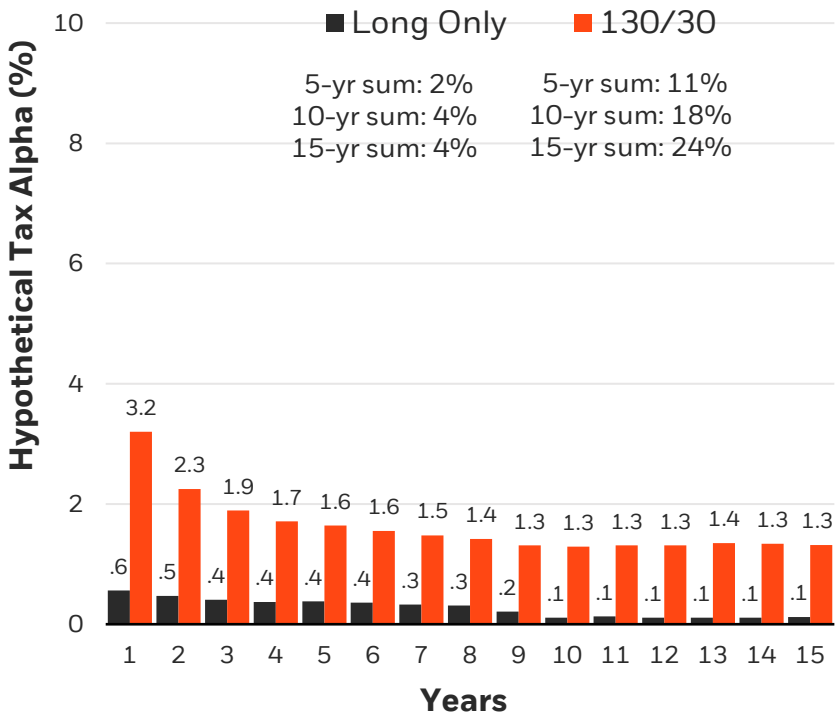
Back-test B:

Average hypothetical tax alpha by year (Pre-Liquidation & Federal-only tax rates) for ossified accounts

Hypothetical Investors with ST & LT Gains



Hypothetical Investors with only LT Gains



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Source: Internal data and MSCI.

Back-test B:

Average 10-year annualized hypothetical after-tax net-of-fee active returns for ossified accounts

- For all but one of the investor situations in the back-test, the back-test showed that the long/short strategy significantly improved the hypothetical after-tax results versus the long-only strategy.
- However, for one of the investor situations in the back-test (where hypothetical investors only had long-term gains who will be liquidating), the back-test results showed that the long/short strategy did not meaningfully improve upon the long-only strategy.

Hypothetical Investor with ST & LT Gains

Disposition	Long-Only	130/30	Difference
Pre-Liquidation	0.51%	2.92%	+2.41%
Estate (Close Shorts)	0.51%	2.39%	+1.88%
Convert to Long-Only (No Leverage)	0.51%	2.08%	+1.57%
Post-Liquidation	0.23%	1.33%	+1.10%

Hypothetical Investors with only LT Gains

Disposition	Long-Only	130/30	Difference
Pre-Liquidation	0.26%	1.60%	+1.34%
Estate (Close Shorts)	0.26%	1.07%	+0.81%
Convert to Long-Only (No Leverage)	0.26%	0.77%	+0.51%
Post-Liquidation	-0.02%	0.04%	+0.06%

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Source: Internal data and MSCI.

200/100 Use case #1

Compared to traditional long-only loss-harvesting, the increased gross exposure of **200/100** may provide **additional loss-harvesting opportunities** both on the long and short side, as well as in **both up and down markets**, which may lead to **more consistent tax alpha**.

Back-test C:
All-cash funded 200/100 versus long-only portfolios

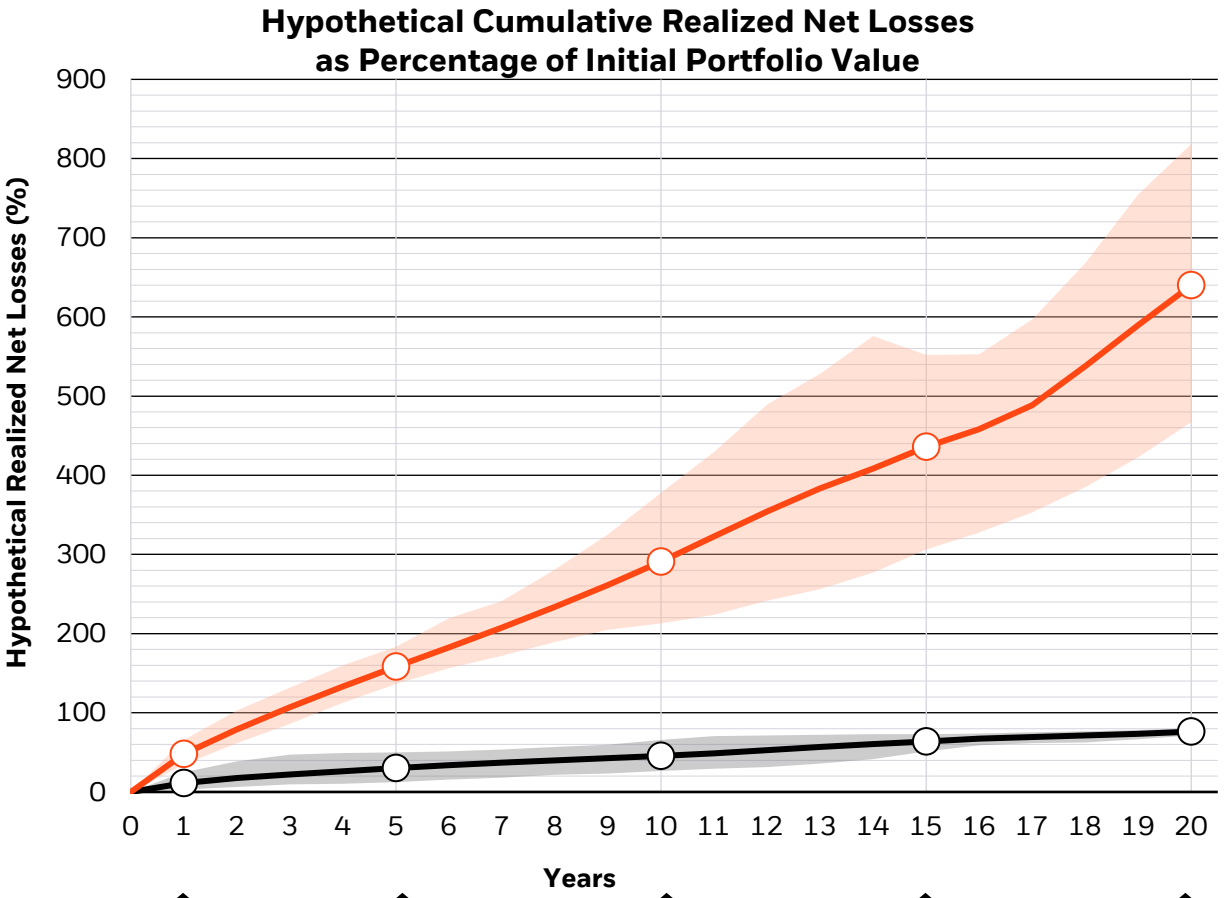
Back-test assumptions & settings:

- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **June 30, 1995, to January 31, 2025**, with hypothetical portfolios of $10M cash launched quarterly with monthly rebalancing
- The 200/100 portfolios used leverage of 200/100 and the **Aperio Quality Value 2x** factor tilt, while the long-only portfolios did not use a factor tilt.
- **Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.62% for 200/100 portfolios, and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- For all after-tax hypothetical portfolio returns, the highest federal tax rates are used (40.8% short term and 23.8% long term)
- Two hypothetical investor types are shown: (1) those with short-term (ST) and long-term (LT) gains; and (2) those with only LT gains. For both, we assume they have sufficient gains to offset all losses harvested
- **We show 10-year results based on 79 runs and 20-year results based on 39 runs**

See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Back-test C: Hypothetical cumulative realized net losses

(Pre-Liquidation with Federal-only tax rates)



Averages	1 year	5 years	10 years	15 years	20 years
200/100	48%	158%	291%	436%	640%
Long-Only	11%	30%	46%	64%	76%

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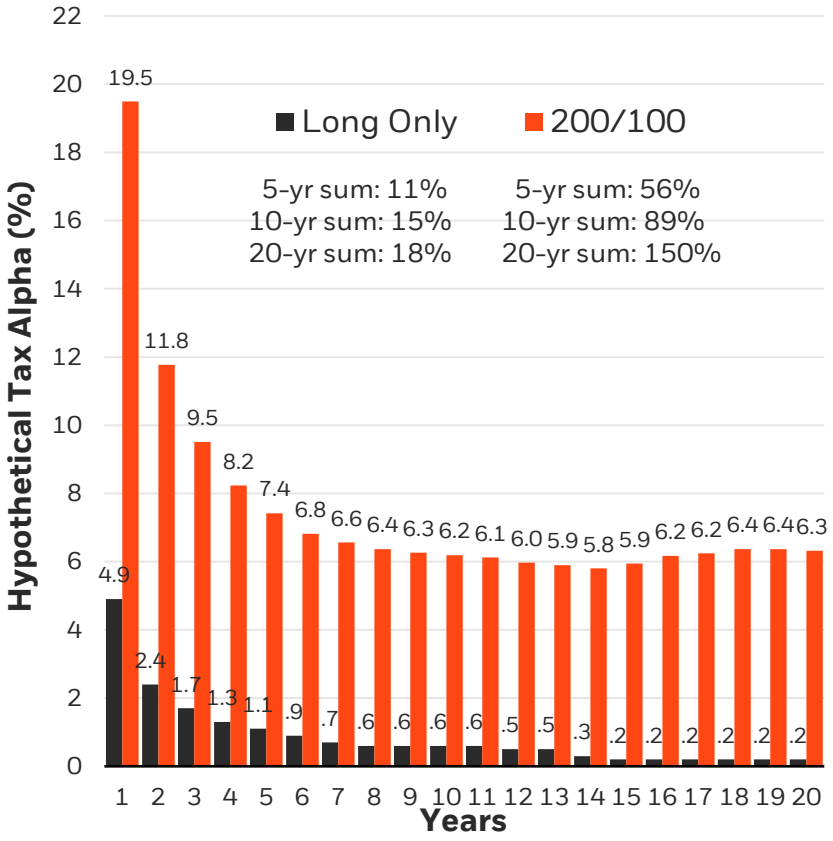
Source: Internal data and MSCI.

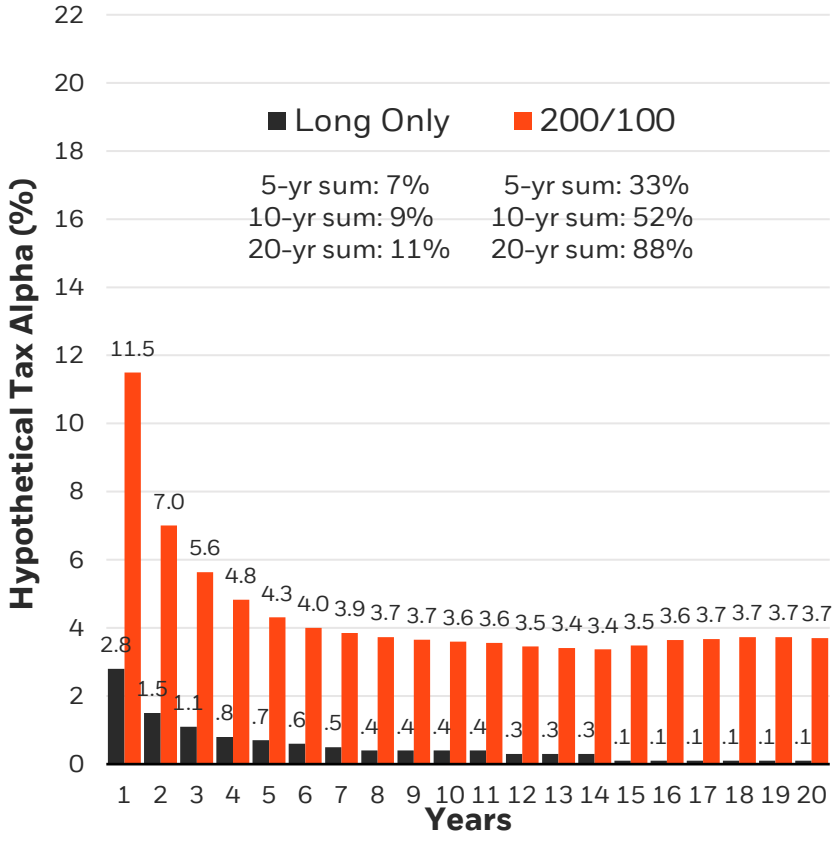
Back-test C:

Average hypothetical tax alpha by year (Pre-Liquidation & Federal-only tax rates)

Hypothetical Investors with ST & LT Gains



Hypothetical Investors with only LT Gains



This page contains net returns and other data that are based on back-tested/hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.42% for long/short and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

Back-test C:

Average 10-year annualized hypothetical net-of-fee after-tax active returns

- For all but one of the eight investor situations in the back-test, the back-test showed that the long/short strategy significantly improved the hypothetical after-tax results versus the long-only strategy.
- However, for the one investor situation in the back-test (where hypothetical investors only had long-term gains and will be liquidating), the back-test results showed that the 200/100 strategy did not meaningfully improve upon the long-only strategy.

Hypothetical Investor with ST & LT Gains

Disposition	Long-Only	200/100	Difference
Pre-Liquidation	1.52%	9.07%	+7.55%
Estate (Close Shorts)	1.52%	7.05%	+5.53%
Convert to Long-Only (No Leverage)	1.52%	5.51%	+3.99%
Post-Liquidation	0.78%	3.11%	+2.33%

Hypothetical Investors with only LT Gains

Disposition	Long-Only	200/100	Difference
Pre-Liquidation	0.85%	4.87%	+4.02%
Estate (Close Shorts)	0.85%	2.92%	+2.07%
Convert to Long-Only (No Leverage)	0.85%	1.43%	+0.58%
Post-Liquidation	0.11%	-0.84%	-0.95%

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Source: Internal data and MSCI.

Back-test C:

Decomposition of hypothetical annualized net-of-fee after-tax active return (Pre-Liquidation, Federal-only tax rates, Investors with ST & LT Gains)

Hypothetical Average 10-year:	Long-Only	200/100	Difference
Pre-tax Active Return Gross of Fees and Costs	**-0.01%**	**0.78%**	**0.79%**
Transaction Costs	-0.03%	-0.23%	-0.07%
Leverage Cost (Margin Interest minus Rebate Rate)	—	-0.80%	-0.80%
Additional Hard to Borrow Cost	—	-0.03%	-0.01%
Management Fees	-0.22%	-0.62%	-0.20%
Subtotal: Costs & Fees	**-0.25%**	**-1.68%**	**-1.43%**
Tax Alpha	**1.78%**	**9.97%**	**8.19%**
After-Tax Active Return Net of Fees & Costs	**1.52%**	**9.07%**	**7.55%**

The Quality Value 2x factor tilt in the Long/Short back-test had a positive impact on the hypothetical pre-tax returns.

These costs and fees are **143 bps** greater with long/short than with long-only.

Fees and costs will not vary with tax rates, disposition, or investor gains profile.

Tax alpha will vary with tax rates, disposition, and investor gains profile as shown on earlier pages.

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Source: Internal data and MSCI.

200/100 Use case #2

Compared to a traditional long-only ossified portfolio, the increased gross exposure of 200/100 increases the portfolio's cost basis and may provide **rejuvenated loss-harvesting opportunities** both on the **long and short side**, as well as in **both up and down markets**.

Back-test D:
Ossified long/short portfolios versus long-only portfolios

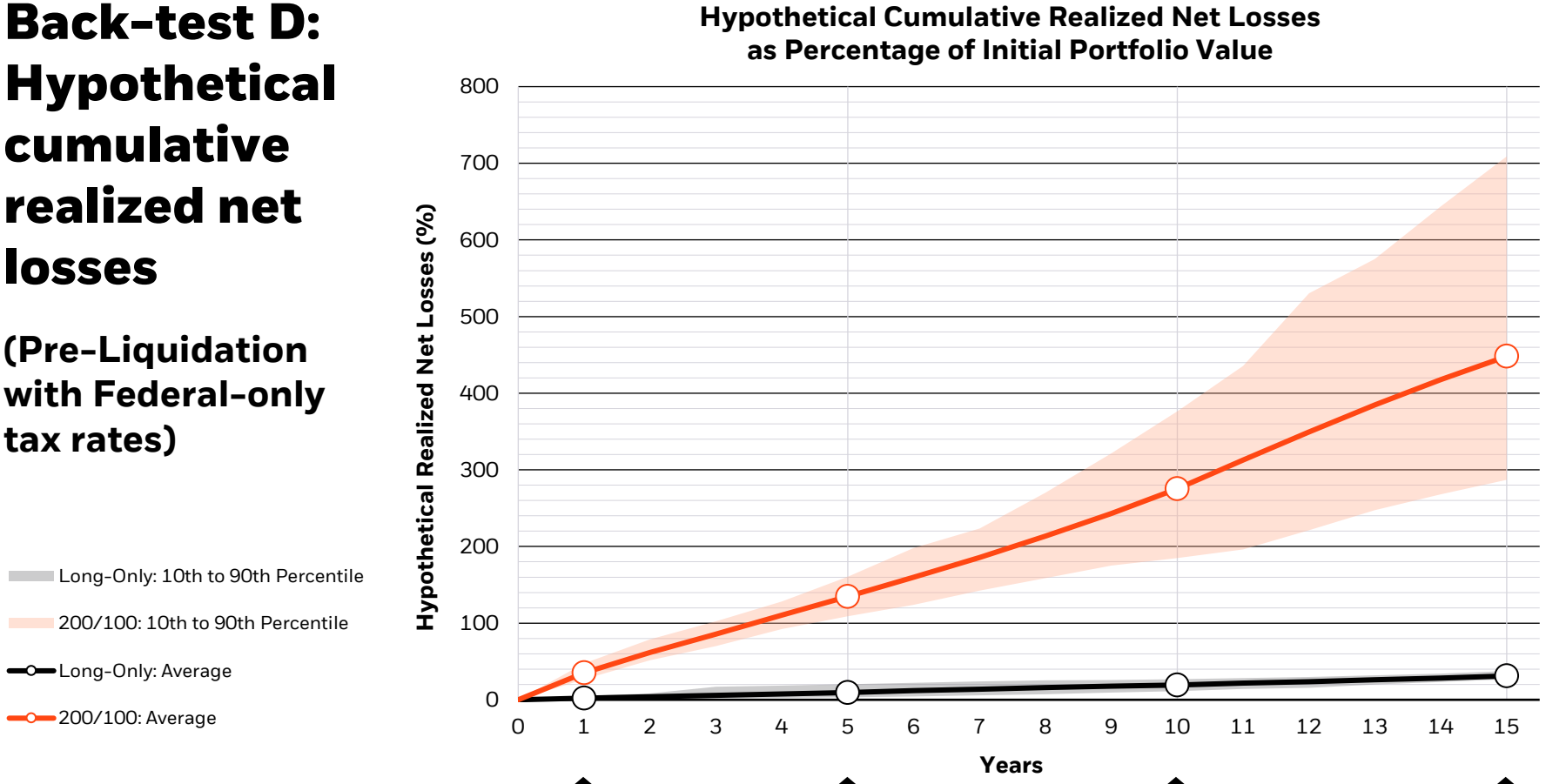
Back-test assumptions & settings:

- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **June 30, 1995, to January 31, 2025**, with hypothetical portfolios of $10M cash launched quarterly with monthly rebalancing
- The long/short portfolios used no leverage and no factor tilt for the first 5 years, and then used leverage of 200/100 and the **Aperio Quality Value 2x** factor tilt. The long-only portfolios did not use a factor tilt. The first 5 years are excluded from the results as a proxy for "ossified" accounts
- **Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.62% for long/short and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- Highest federal tax rates are used (40.8% short term and 23.8% long term)
- Two hypothetical investor types are shown: (1) those with short-term (ST) and long-term (LT) gains; and (2) those with only LT gains. For both, we assume they have sufficient gains to offset all losses harvested
- **We show 10-year results based on 59 runs and 15-year results based on 39 runs**

See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Back-test D: Hypothetical cumulative realized net losses

(Pre-Liquidation with Federal-only tax rates)



Averages	1 year	5 years	10 years	15 years
200/100	35%	135%	275%	448%
Long-Only	2%	10%	19%	31%

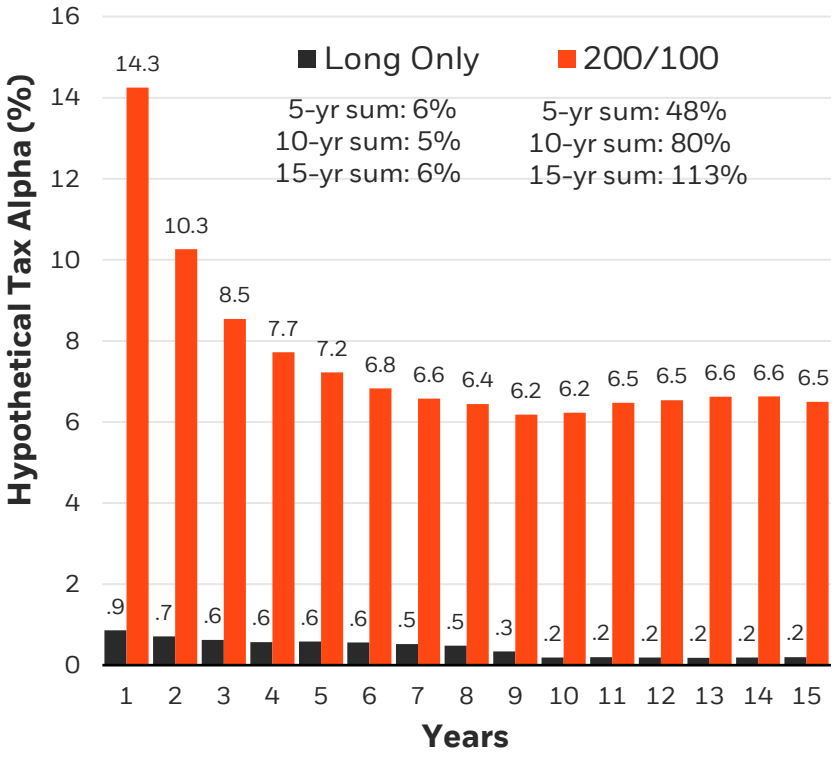
This page contains hypothetical realized loss data that is based on backtested/ hypothetical information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

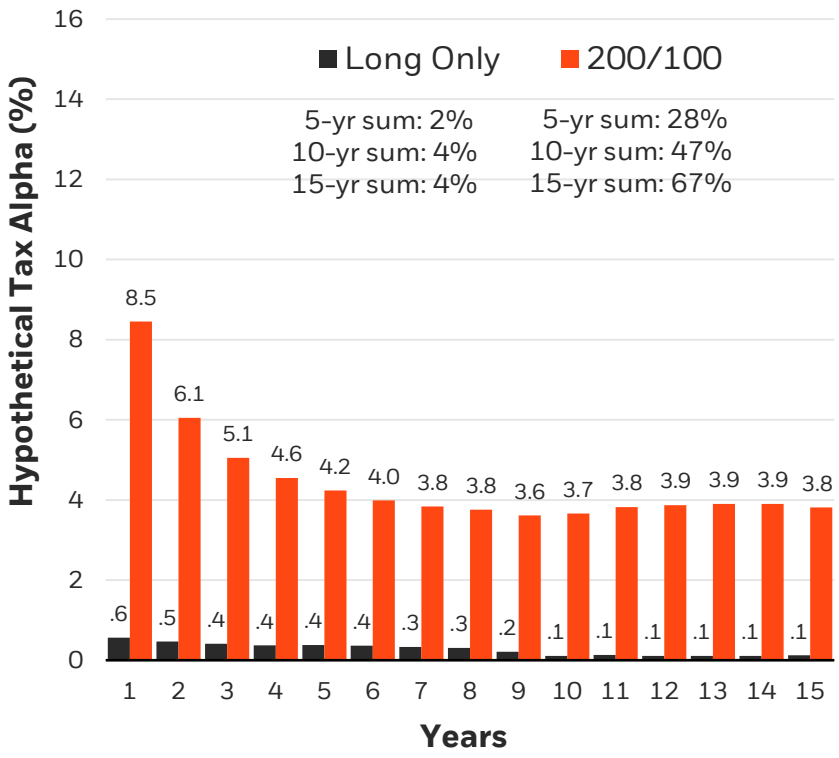
Back-test D:

Average hypothetical tax alpha by year (Pre-Liquidation & Federal-only tax rates) for ossified accounts

Hypothetical Investors with ST & LT Gains



Hypothetical Investors with only LT Gains



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Source: Internal data and MSCI.

Back-test D:

Average 10-year annualized hypothetical after-tax net-of-fee active returns for ossified accounts

- For all but one of the investor situations in the back-test, the back-test showed that the long/short strategy significantly improved the hypothetical after-tax results versus the long-only strategy.
- However, for one of the investor situations in the back-test (where hypothetical investors only had long-term gains who will be liquidating), the back-test results showed that the long/short strategy did not meaningfully improve upon the long-only strategy.

Hypothetical Investor with ST & LT Gains

Disposition	Long-Only	200/100	Difference
Pre-Liquidation	0.51%	8.09%	+7.58%
Estate (Close Shorts)	0.51%	6.42%	+5.91%
Convert to Long-Only (No Leverage)	0.51%	4.81%	+4.30%
Post-Liquidation	0.23%	3.07%	+2.84%

Hypothetical Investors with only LT Gains

Disposition	Long-Only	200/100	Difference
Pre-Liquidation	0.26%	4.34%	+4.08%
Estate (Close Shorts)	0.26%	2.73%	+2.47%
Convert to Long-Only (No Leverage)	0.26%	1.17%	+0.91%
Post-Liquidation	-0.02%	-0.46%	-0.44%

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Source: Internal data and MSCI.

Use case #3

The increased gross exposure of long/short may provide sufficient loss-harvesting to **tax efficiently reduce the concentrated stock exposure** over a relatively short time.

Back-test E:
Concentrated stocks in 130/30 long/short portfolios

Back-test assumptions & settings:

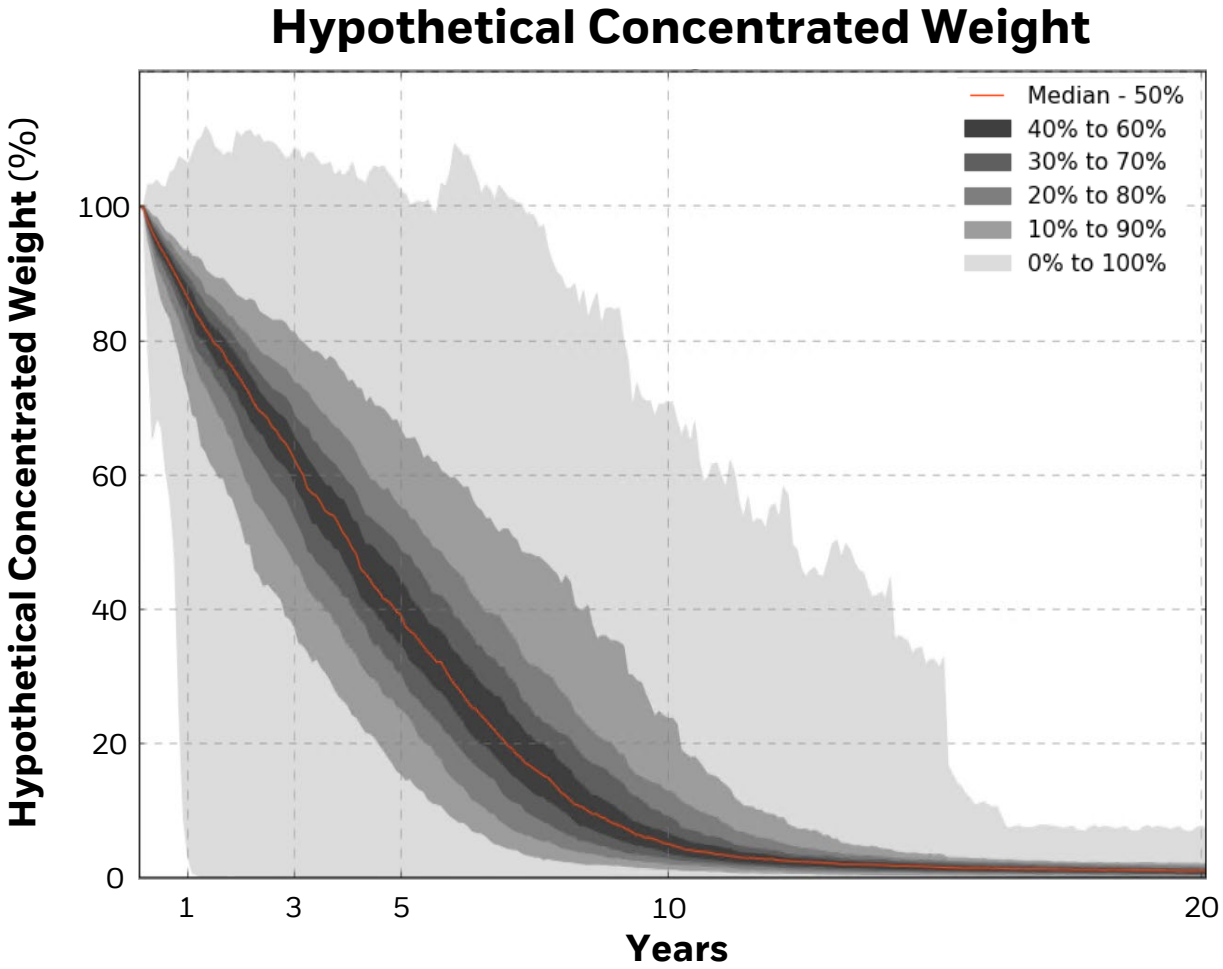
- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **December 29, 1995, to January 31, 2025**, with hypothetical portfolios of $10M single stock launched annually with monthly rebalancing. For each launch date, each of the largest 20 stocks by market cap were used to start a back-test run and cost basis for each stock was assumed to be $0
- The long/short portfolios used leverage of **130/30** and no factor tilt
- **Hypothetical back-test portfolio returns deduct annual management fees of 0.42% and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share; returns include the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- Highest federal tax rates are used (40.8% short term and 23.8% long term), no state tax rates were used.
- We assumed 50% Reg T margin requirement, corresponding to a max allowable leverage of 150/50, above which a margin call will be triggered.
- **We show 20-year results based on 180 runs**

See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Back-test E:

Gain-neutral (when possible)* reduction of concentrated stock with cost basis of $0

- Median back-test result reduced concentration to less than 40% at 5 years, and less than 20% at 7 years
- 90% of back-test results reduced concentration to 20% or less within 10 years



* Note: Per our back-test assumptions on Reg T, if leverage ever exceeds 150/50, it must be de-levered back to 150/50 within 5 days. While this event was rare in our back-test, it can happen if a concentrated stock declines quicky and severely, which could force a trade that is not gain-neutral.

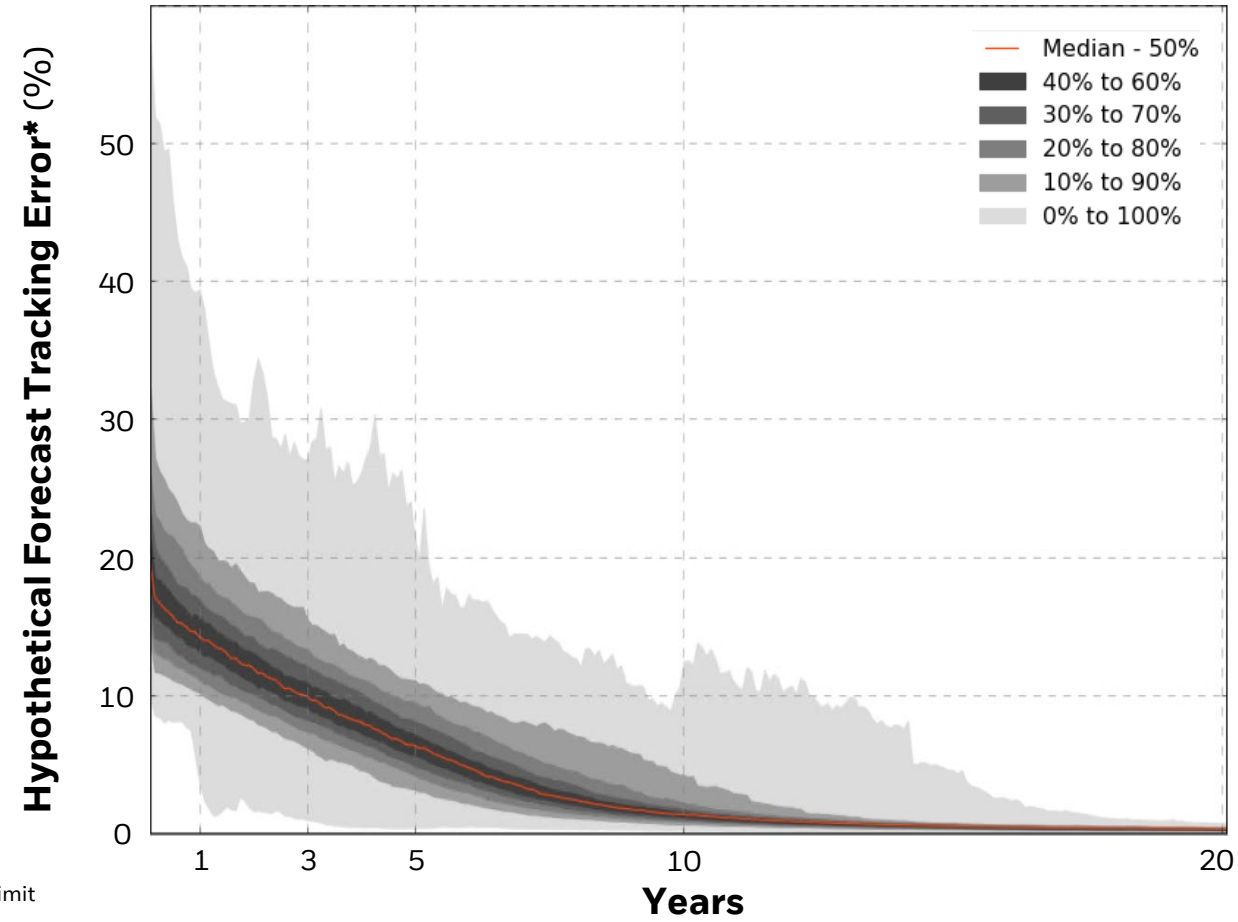
This page contains hypothetical concentrated weight data that is based on backtested/hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

Back-test E

Median back-test result reduced forecast tracking error to 6.1% at 5 years, and less than 3.1% at 7 years

Hypothetical Forecast Tracking Error*



* Forecast tracking error is a point-in-time risk measure not intended to provide assurance as to performance/limit on losses. **See "Important notes" for details.**

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Source: Internal data and MSCI.

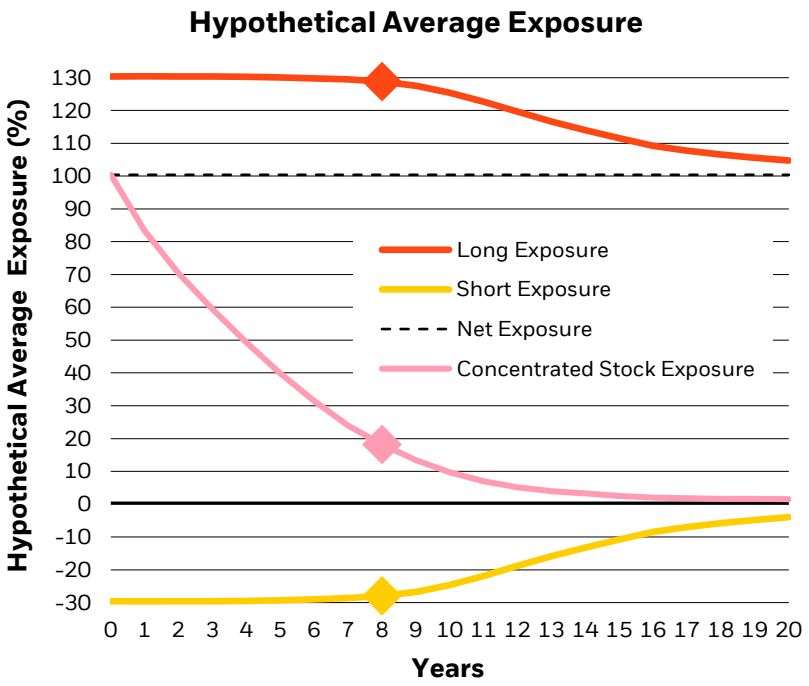
Back-test E

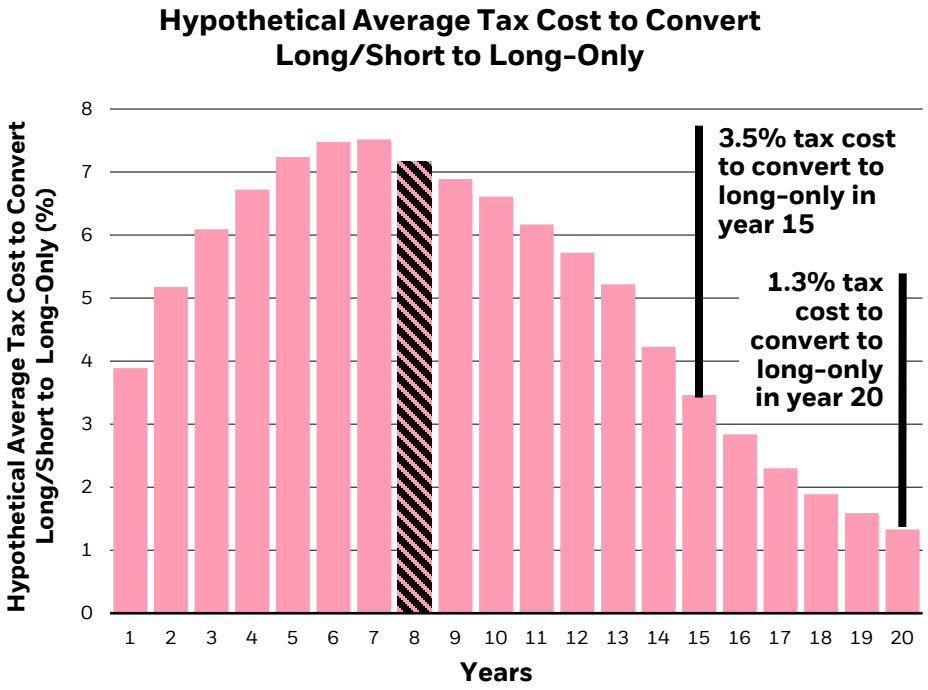
We observe 2 phases in this back-test:

Phase 1: Until roughly year 8, hypothetical concentrated stock exposure declines by over 80%, while hypothetical leverage remains steady at roughly 130/30;

Phase 2: After roughly year 8, hypothetical leverage starts to decline — roughly 110/10 at year 15 and roughly 104/4 at year 20

For investors looking to convert their long/short portfolio back to a long-only portfolio, the back-test conversion tax cost declines during this second phase





This page contains concentrated stock exposure and other data that are based on back-tested/hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

Back-test F:
Concentrated stocks in 200/100 long/short portfolios

Back-test assumptions & settings:

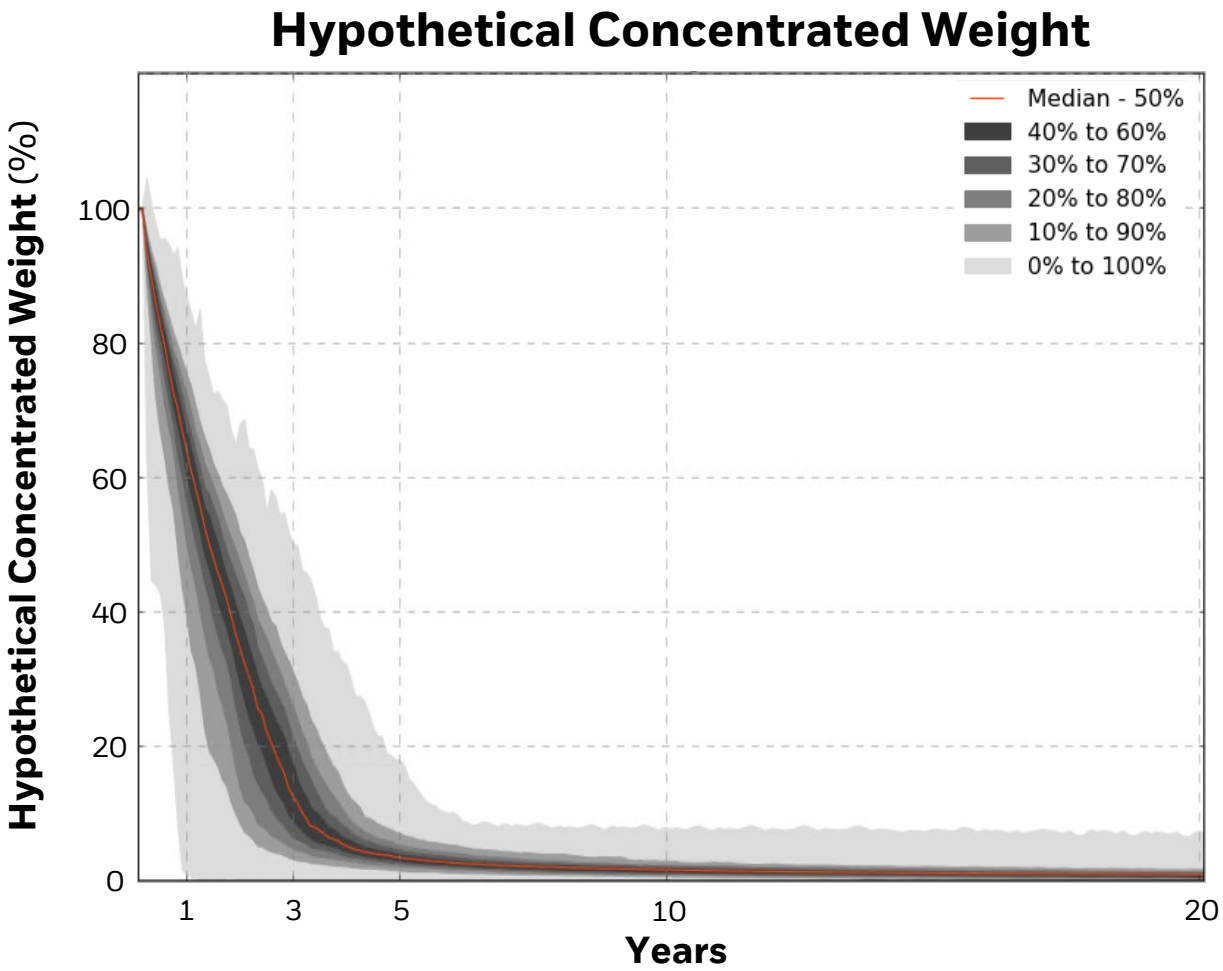
- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **December 29, 1995, to January 31, 2025**, with hypothetical portfolios of $10M single stock launched annually with monthly rebalancing. For each launch date, each of the largest 20 stocks by market cap were used to start a back-test run and cost basis for each stock was assumed to be $0
- The long/short portfolios used leverage of **200/100** and no factor tilt
- **Back-test hypothetical portfolio returns are net of management fees assumed to be 0.62% for long/short and are net of transaction costs estimated at 4 bps per and 0.2 cents per share and includes the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- Highest federal tax rates are used (40.8% short term and 23.8% long term), no state tax rates were used.
- We did not apply any Reg T margin requirement for this portfolio margin back-test
- **We show 20-year results based on 180 runs**

See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Back-test F:

Gain-neutral reduction of concentrated stock with cost basis of $0

- Median back-test result reduced concentration to less than 60% at 1 year end, and less than 12% at 3 years
- 90% of back-test results reduced concentration to 30% or less within 3 years



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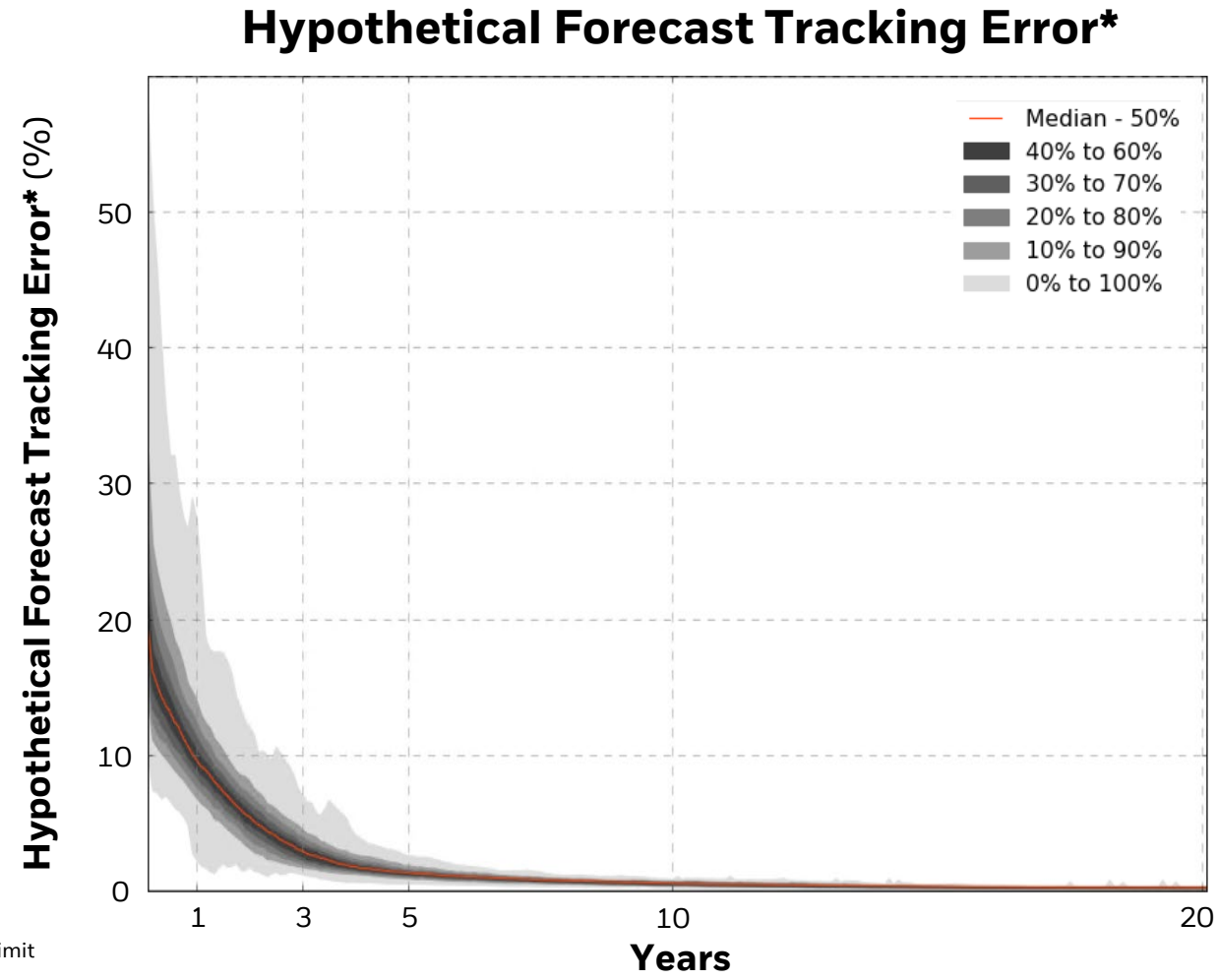
Source: Internal data and MSCI.

Back-test F

Median back-test result reduced forecast tracking error to 9.2% at 1 year end, and less than 2.8% at 3 years



* Forecast tracking error is a point-in-time risk measure not intended to provide assurance as to performance/limit on losses. **See "Important notes" for details.**

This page contains hypothetical concentrated weight data that is based on backtested/hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

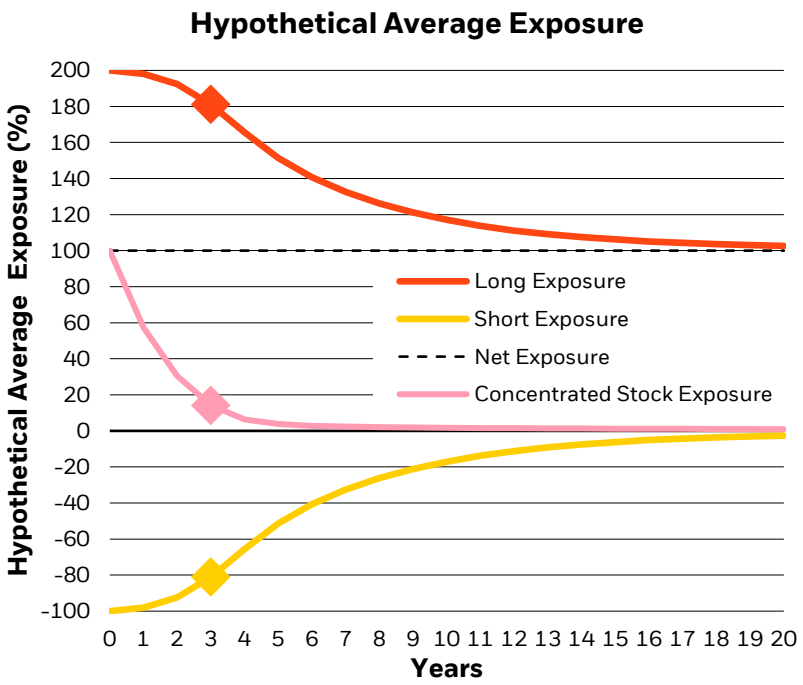
Back-test F

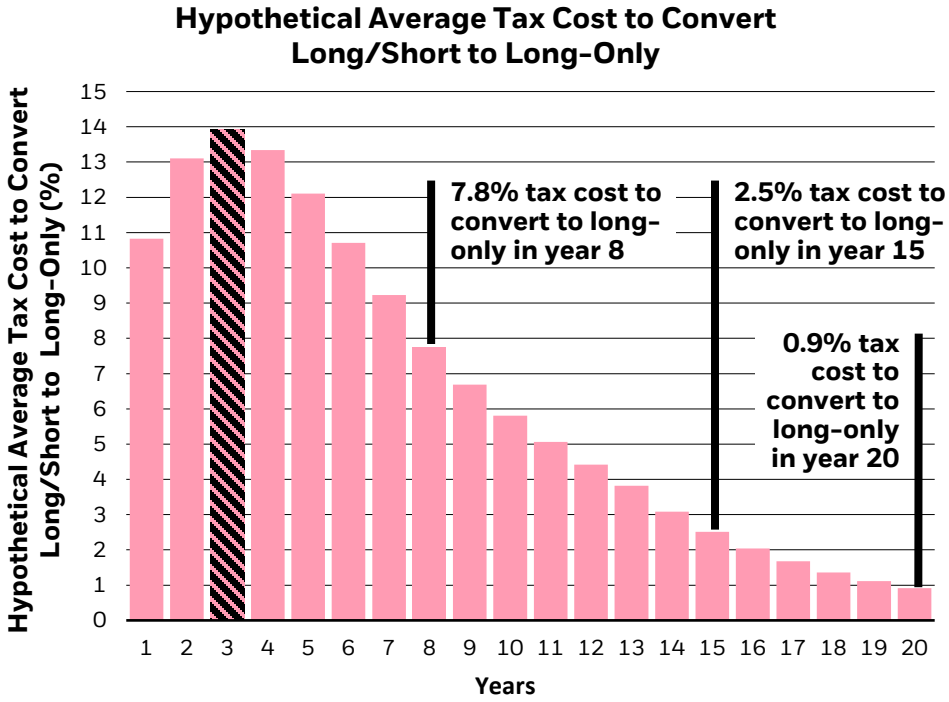
We observe 2 phases in this back-test:

Phase 1: Until roughly year 3, hypothetical concentrated stock exposure declines by over 85%, while hypothetical leverage declined to around 180/80;

Phase 2: After roughly year 3, hypothetical leverage starts to decline more rapidly — roughly 126/6 at year 8, 106/6 at year 15, and 103/3 at year 20

For investors looking to convert their long/short portfolio back to a long-only portfolio, the back-test conversion tax cost declines during this second phase





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Source: Internal data and MSCI.

Short selling

Mechanics of Short Selling in Long/Short Portfolios at Aperio

Locating and selling

- An investor determines which stock shares they wish to "short sell"
- This investor requests a broker to "locate" these shares (from shareholders)
- If the broker successfully locates these shares, the broker "lends" these shares to the investor
- The investor sells these shares via the broker

Rebate rate

- The sales proceeds remain with the broker as collateral
- The broker pays the investor interest on the collateral – this is called the "rebate rate", and for "General Collateral" stocks, this is often quoted as borrowing rate minus a premium
- "Hard to Borrow" stocks carry a higher premium, which can be greater than the borrowing rate, creating a case where the investor is paying the broker

Closing the short position

To close the short position, the investor buys shares in the market, and returns these shares to the broker

See "Important notes" for risk associated with short selling and trading on margin.

Important details on short selling

- In the US tax code, realized gains and losses from short sales are always **characterized as short-term**
- Short positions with unrealized gains, unlike long positions with unrealized gains, **cannot be donated** away
- Whereas long positions can receive a step-up in basis at death, **short positions receive no change in basis**
- Investors who own both a long position and a short position in the same security at the same time are "**shorting against the box**", which invokes a different portion of the US tax code, potentially reducing value of the losses. Also cross-account wash-sale rules are made more complex with long/short versus long-only. Note that Aperio avoids shorting against the box for all client portfolios managed by Aperio.
- Stocks that are "**hard to borrow**" may have lower rebate rates from the broker, and can actually be negative. Note that Aperio avoids stocks that are hard to borrow
- Brokers may change the **terms of their rebates rates**

Long/Short Investing involves additional risks and considerations

- Long/short market impact costs are likely to be higher versus long-only due to higher turnover
- For clients who anticipate the liquidation of their accounts or conversion to a long-only strategy, the timing of the liquidation or conversion may be more complicated due to the higher likelihood of additional unrealized short-side ST gains in the portfolio. (Note that conversion of a long-short strategy to a long-only strategy is a potential exit strategy for a concentrated stock diversification program)
- Investors may wish to accelerate the liquidation of short-side lots with gains
- Pre-tax long/short returns are likely to differ from the corresponding long-only returns. In our research, long/short can have a negative impact on pre-tax performance. Pre-tax long/short returns can be impacted by:
  - Long/short factor tilts (e.g., Quality Value, Multi-Factor)
  - Different risk factor profile due to factor tilts
  - Different idiosyncratic risk
  - Margin and shorting costs

See “Important notes” for risk associated with short selling and trading on margin.

Long/Short management at Aperio

Requirements

Long/Short may only be beneficial for clients comfortable with the risk of leverage and the complexity of short selling who seek to increase their tax alpha and/or decrease concentration risk

Plus:

1

Long/Short is currently limited to accounts at these **custodians**:

- Fidelity
- Charles Schwab

2

Long/Short at Aperio requires a factor tilt for all-cash funded and ossified portfolios (but not for concentrated stock portfolios)

3

Aperio may choose to further limit its customization options for long/short portfolios

For example, we currently limit benchmarks to S&P 500, Russell 1000, MSCI ACWI, MSCI World, and some global blends

4

Client must understand that the long/short liquidation disposition may be far more expensive than with long-only liquidation due to the leverage

How Aperio manages risks on the short side

Process subject to change.

During portfolio optimization, we constrain on the short side:

- Constraining short positions in size
- Constraining short-side sector weights
- Constraining short sell universe to primarily General Collateral (“GC”) stocks
- Constraining short sells to avoid “shorting against the box”

Between portfolio optimizations, we monitor many metrics, including:

- Decrease in rebate rates
- Short position weights
- Leverage drift and equitization
- Wash sale status and accumulation of unrealized losses

We describe our short sales as “boring” stocks, mostly GC midcap names which may have lower volatility and beta than the benchmark, and are generally not household names

Additional considerations when using long/short to diversify concentrated stock risk

- Due to custodian-specific margin requirement variability for different categories of stocks (e.g., megacap versus smallcap), not all concentrated stocks **may be sufficiently leverageable** to achieve 130/30 or even 120/20 or 110/10 per Reg T—please reach out to Aperio for further information on specific stocks*
- The **risk for a margin call** is higher when long/short is used for concentrated stock diversification due to risk of stock price decline; any margin calls will require Aperio to reduce leverage and may involve realizing gains*
- A **basket** of multiple concentrated stocks may partially or fully alleviate some of the issues above

*For "portfolio margin" accounts, such as 200/100, Reg T does not apply

Appendix

Aperio Beta-1 factor strategies

Aperio Factor Strategy	Sample client thesis	Characteristics
Quality Value*	The quality of a company's balance sheet and earnings should lead to better long-term stock performance.	Aperio combines traditional quality factors with traditional value factors.
Multi-Factor*	A portfolio of cheaper stocks, smaller stocks, momentum stocks, profitable stocks, and higher-quality investments should outperform for reasons listed on this page.	Aperio combines value, momentum, small size, profitability, and investment quality factors.
Value Tilt	Cheaper stocks should outperform expensive stocks over time as investors overpay for exciting stocks.	Aperio uses a combination of earnings yield (E/P) and book-to-price (B/P) to produce a diversified exposure to multiple value factors.
Small Size + Value Tilt	Smaller stocks should outperform larger-cap stocks, possibly because they are riskier and investors are rewarded for that risk.	Size is measured by a company's market cap. Small size may not be effective outside the US.
Size, Value + Profitability Tilt	A portfolio of cheaper stocks, smaller stocks, and profitable stocks, should outperform for reasons listed on this page.	Aperio combines value, small size, profitability, and investment quality factors.
Value + Momentum Tilt	Stocks that have outperformed the market recently ("momentum" stocks) should continue to outperform the market.	Momentum reflects the performance of a stock from 12 months ago until one month ago (avoiding the one-month "reversal" factor).
Dividend Yield Tilt	For investors looking for higher yield, the dividend yield tilt may achieve this.	Aperio used dividend yield.
Growth Tilt	Companies that can grow their earnings and/or sales more rapidly than the market should see a corresponding rise in stock price.	Aperio combines growth, momentum, profitability, and earnings quality.

***Long/short research available for these factor strategies**

Back-test G:
All-cash funded portfolio of various leverage to understand how tax alpha can diminish with higher leverage based on disposition

Back-test assumptions & settings:

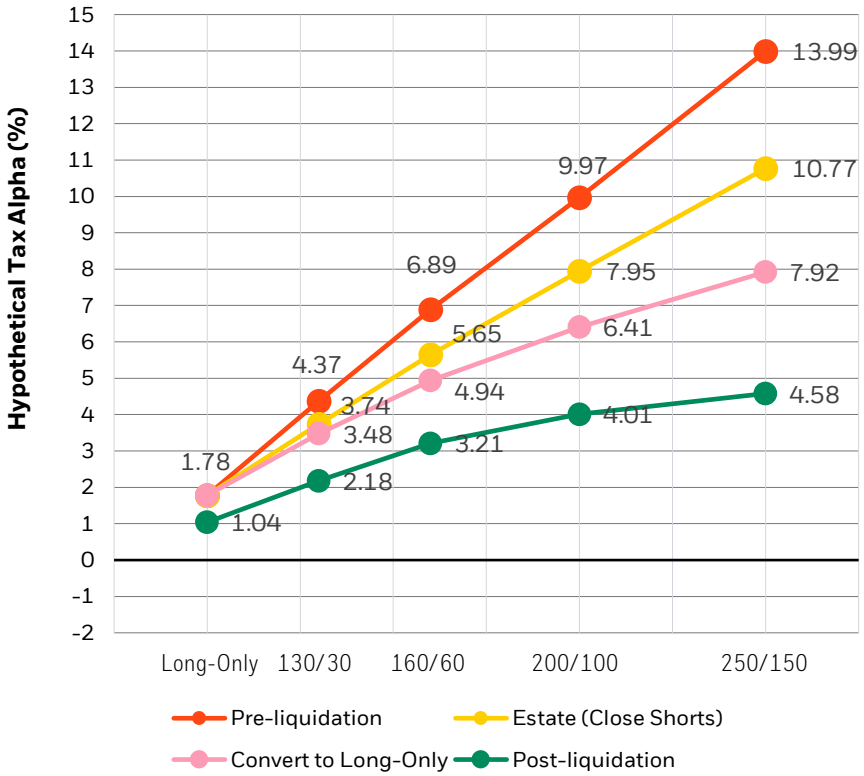
- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **June 30, 1995, to January 31, 2025**, with hypothetical portfolios of $10M cash launched quarterly with monthly rebalancing
- Portfolio used leverage of 130/30, 150/50, 200/100, 250/150 and the **Aperio Quality Value** factor tilt, while the long-only portfolios did not use a factor tilt. **(Note that Aperio does not currently offer all of these leverages.)**
- **Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.42% for leveraged portfolios, and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- For all after-tax hypothetical portfolio returns, the highest federal tax rates are used (40.8% short term and 23.8% long term)
- Two hypothetical investor types are shown: (1) those with short-term (ST) and long-term (LT) gains; and (2) those with only LT gains. For both, we assume they have sufficient gains to offset all losses harvested
- **We show 10-year results based on 79 runs and 20-year results based on 39 runs**

See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

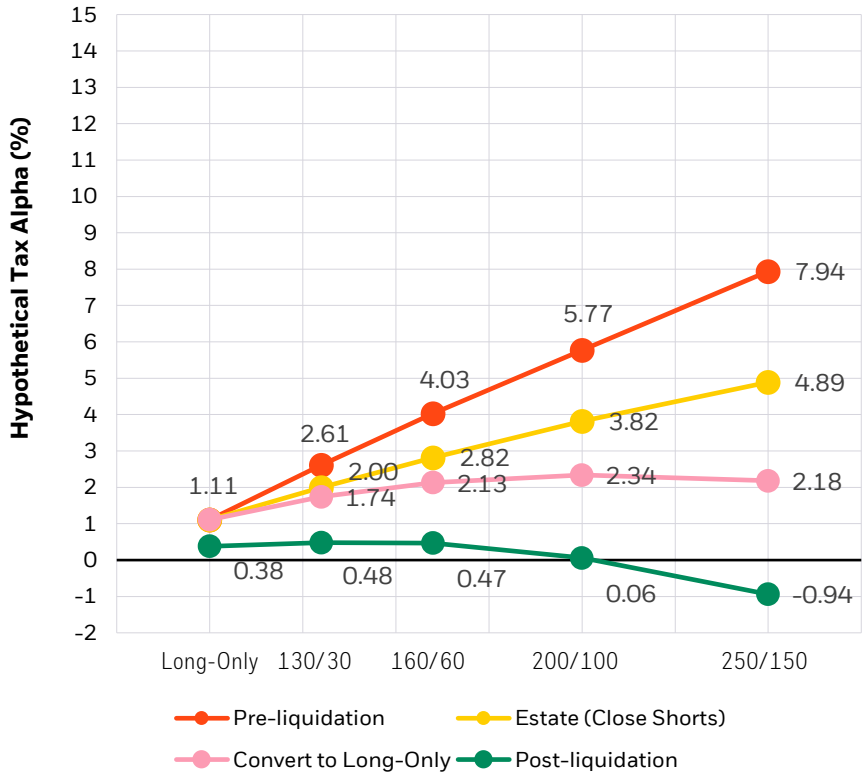
Back-test G (Quality Value & different leverage):
Average 10-year annualized hypothetical tax alpha

In pre-liquidation, tax alpha increased with leverage, but post-liquidation, these returns began to decrease with higher leverage.

Hypothetical Investor with ST & LT Gains



Hypothetical Investor with only LT Gains



This page contains net returns and other data that are based on back-tested/hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.42% for long/short and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

Back-test H:
All-cash funded portfolio of Quality Value or Multi-Factor with 130/30 or 200/100

Back-test assumptions & settings:

- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **June 30, 1995, to January 31, 2025**, with hypothetical portfolios of $10M cash launched quarterly with monthly rebalancing
- Portfolio used leverage of 130/30 and the Aperio Quality Value factor tilt, 130/30 with the Aperio Multi-Factor tilt, 200/100 with the Aperio Quality Value 2x factor tilt, 200/100 with the Aperio Multi-Factor tilt, while the long-only portfolios did not use a factor tilt.
- **Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only, 0.42%, for 130/30 portfolios, and 0.62% for 200/100 portfolio, and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- For all after-tax hypothetical portfolio returns, the highest federal tax rates are used (40.8% short term and 23.8% long term)
- One hypothetical investor type is shown: (1) those with short-term (ST) and long-term (LT) gains. We assume they have sufficient gains to offset all losses harvested
- **We show 10-year results based on 79 runs and 20-year results based on 39 runs**

See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Back-test H:

Decomposition of hypothetical annualized net-of-fee after-tax active return

(Pre-Liquidation, Federal-only tax rates, Investors with ST & LT Gains)

Hypothetical Average 10-year:	Long-Only	130/30 Quality Value	130/30 Multi-Factor	200/100 Quality Value 2x	200/100 Multi-Factor 2x
Pre-tax Active Return Gross of Fees and Costs	**-0.01%**	**0.53%**	**1.34%**	**0.78%**	**2.35%**
Transaction Costs	-0.03%	-0.10%	-0.10%	-0.23%	-0.23%
Leverage Cost (Margin Interest minus Rebate Rate)	—	-0.24%	-0.24%	-0.80%	-0.80%
Additional Hard to Borrow Cost	—	-0.01%	-0.01%	-0.03%	-0.03%
Management Fees	-0.22%	-0.42%	-0.42%	-0.62%	-0.62%
Subtotal: Costs & Fees	**-0.25%**	**-0.77%**	**-0.77%**	**-1.68%**	**-1.68%**
Tax Alpha	**1.78%**	**4.37%**	**4.28%**	**9.97%**	**9.27%**
After-Tax Active Return Net of Fees & Costs	**1.52%**	**4.13%**	**4.85%**	**9.07%**	**9.94%**

This page contains net returns and other data that are based on back-tested/hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.42% for long/short and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

Back-test H:
Forecast Tracking Error* & Realized Tracking Error

Hypothetical 10-year Average:	Long-Only	130/30 Quality Value	130/30 Multi-Factor	200/100 Quality Value 2x	200/100 Multi-Factor 2x
Forecast Tracking Error*	0.57%	1.22%	1.73%	2.43%	3.25%

Hypothetical Average 10-year Annualized:	Long-Only	130/30 Quality Value	130/30 Multi-Factor	200/100 Quality Value 2x	200/100 Multi-Factor 2x
Realized Tracking Error	0.54%	1.33%	1.83%	2.78%	3.58%

*Forecast tracking error is a point-in-time risk measure not intended to provide assurance as to performance/limit on losses.

See "Important notes" for details. This page contains forecast tracking error and realized tracking error other data that are based on back-tested/hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Hypothetical back-test portfolio returns deduct annual management fees of 0.22% for long-only and 0.42% for long/short and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

Back-test I:
All-cash funded portfolio of 200/100 Quality Value for 3 years then gain neutrally reduce leverage

Back-test assumptions & settings:

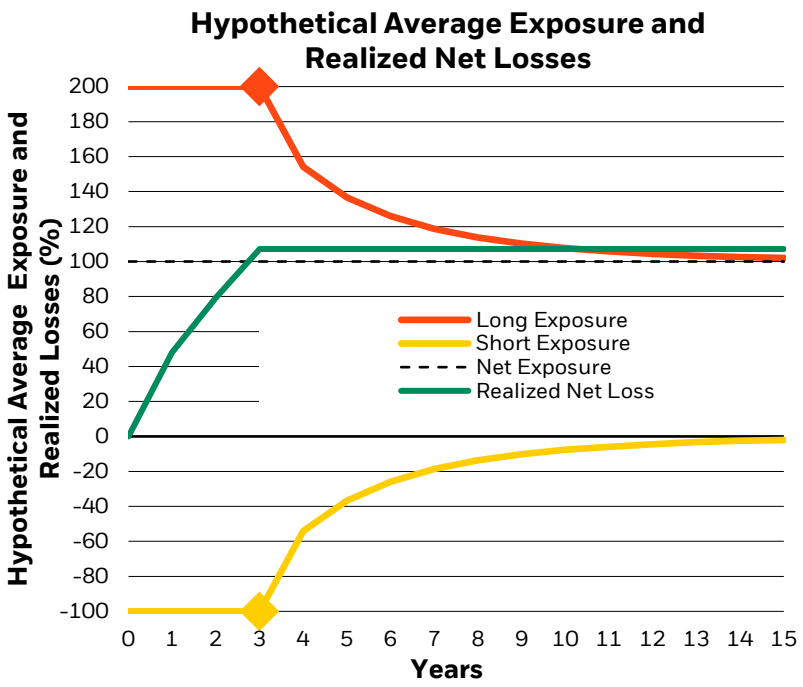
- Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to evaluate the performance of hypothetical portfolios; ATBAT uses historical data to perform optimization and calculate portfolio metrics
- Back-test period is **June 30, 1995, to January 31, 2025**, with hypothetical portfolios of $10M cash launched quarterly with monthly rebalancing
- Portfolio used leverage of 200/100 and the **Aperio Quality Value 2x** factor tilt.
- Portfolios are run for 3 years accumulating losses for a hypothetical capital gains event; then new losses are used to gain neutrally reduce levereage.
- **Hypothetical back-test portfolio returns deduct annual management fees of 0.62% for 200/100 portfolio, and are net of transaction costs estimated at 4 bps per all transactions and 0.2 cents per share for long/short transactions; returns include the reinvestment of dividends, interest, and other income received**
- Benchmark is S&P 500®
- For all after-tax hypothetical portfolio returns, the highest federal tax rates are used (40.8% short term and 23.8% long term)
- One hypothetical investor type is shown: (1) those with short-term (ST) and long-term (LT) gains. We assume they have sufficient gains to offset all losses harvested
- **We show 10-year results based on 79 runs and 20-year results based on 39 runs**

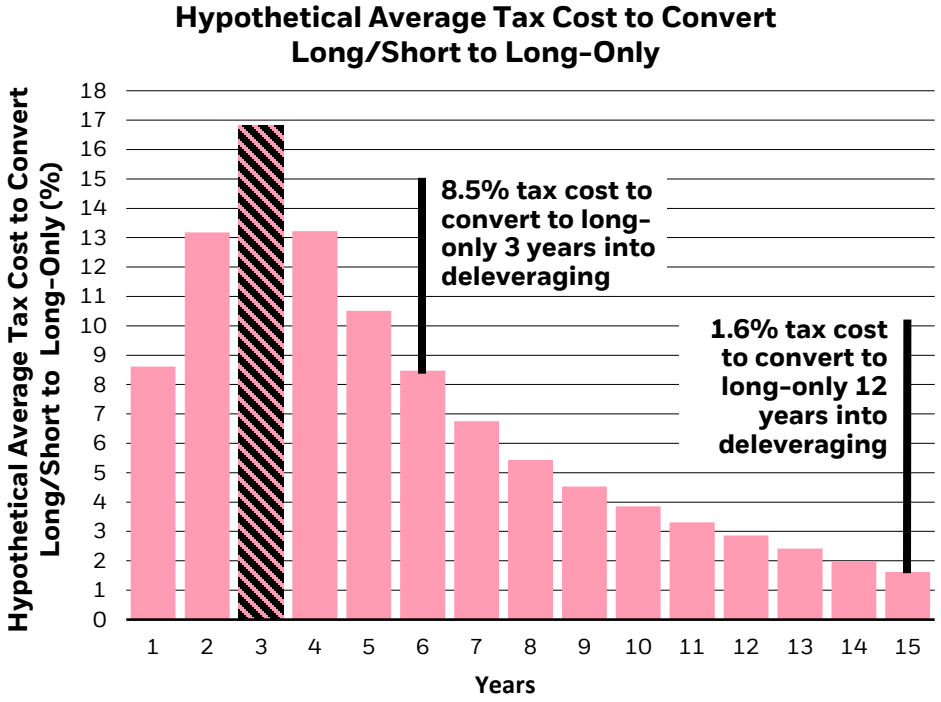
See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Back-test I:
Deleveraging a 200/100 strategy after 3 years of loss harvesting

- **Cumulative realized net losses of 107% after 3 years**
- Leverage down to 154/54 after 1 year of deleveraging (year 4 overall)
- Leverage down to 126/26 after 3 years of deleveraging (year 6 overall)
- Leverage down to 102/2 after 12 years of unwinding (year 15 overall)

For investors looking to convert their long/short portfolio back to a long-only portfolio, the back-test conversion tax cost declines over time





This page contains concentrated stock exposure and other data that are based on back-tested/hypothetical net performance information. See "Important notes for hypothetical performance information" for limitations of back-tested information and an explanation of Aperio's After-Tax Back-Testing Analysis Tool. Rebalances relied on MSCI's Barra US Total Market Equity Model for Long-Term Investors (USSLOWL) risk model. **See "Important notes" for information regarding the optimization process.**

Source: Internal data and MSCI.

After-tax active return & tax alpha

After-tax active return measures the portfolio return versus the benchmark on an after-tax basis.

Tax alpha measures the benefit from tax-loss harvesting.

* Tax alpha is defined as the after-tax active return minus the pre-tax active return. Tax alpha is a measure of the value added through active tax management. A positive number indicates a potential tax savings (from realized capital losses), while a negative number indicates a potential tax drag (from realized capital gains). Tax Alpha is mathematically identical to the portfolio tax benefit plus the benchmark tax drag. Also, if the pre-tax portfolio return is the same as the pre-tax benchmark return, then tax alpha and after-tax active return are mathematically the same.

For illustrative purposes only.

Additional reading

- Clarke, Roger G., de Silva, Harindra, and Steven Thorley. “Portfolio Constraints and the Fundamental Law of Active Management.” Financial Analysts Journal, September/October 2002, pp. 48-66.
- Clarke, Roger G., de Silva, Harindra, and Steven Sapra. “Toward More Information Efficient Portfolios,” The Journal of Portfolio Management, Fall 2004, pp. 54-63.
- Clarke, Roger G., de Silva, Harindra, Sapra, Steven, and Steven Thorley. “Long/Short Extensions: How Much is Enough?” SSRN Working Paper. July 2007.

Important notes

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Investing involves risk, including possible loss of principal. Asset allocation and diversification may not protect against market risk, loss of principal, or volatility of returns. There is no guarantee that any investment strategy discussed herein will work under all market conditions. Many factors affect performance, including changes in market conditions and interest rates, as well as other economic, political, or financial developments.

You should not assume that investment decisions we make in the future will be profitable or will equal the investment performance of the past. 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.

Any tax information provided herein is for illustrative purposes only and does not constitute the provision of tax advice by Aperio. Due to the complexity of tax law, not every single taxpayer will face the situations described herein exactly as presented, i.e., the examples 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.

Tax alpha is defined as the after-tax active return minus the pre-tax active return. Tax alpha is a measure of the value added through active tax management. A positive number indicates a potential tax savings (from realized capital losses), while a negative number indicates a potential tax drag (from realized capital gains). Tax Alpha is mathematically identical to the portfolio tax benefit plus the benchmark tax drag. Also, if the pre-tax portfolio return is the same as the pre-tax benchmark return, then tax alpha and after-tax active return are mathematically the same. Aperio's tax-loss harvesting strategy seeks to generate positive tax alpha while providing market-like pre-tax returns.

Short Sales
In a short sale, a portfolio sells securities it does not own. To accomplish this, the portfolio borrows the securities at a fee from the custodian (the lender). The position is "closed" by "returning" the security (buying a replacement security on the lender's behalf). This "return" obligation to replace the borrowed securities does not typically have a specified "maturity" date and the lender generally may require replacement of the securities whenever it chooses. A short sale theoretically involves the risk of unlimited loss: The price at which a portfolio must buy "replacement" securities could increase without limit. A portfolio may experience losses on short positions that are not offset by gains on long positions.

Possibility of Margin Calls or Liquidations
Borrowings are usually from securities brokers and dealers and are typically secured by a portfolio's securities and other assets. Under certain circumstances, such a broker or dealer may demand an increase in the collateral that secures a portfolio's obligations, and if a portfolio is unable to provide additional collateral, the broker or dealer could close either long and/or short positions held in a portfolio's account to satisfy a portfolio's obligations. Closing positions in that manner could have extremely adverse consequences, including initiating closing transactions at disadvantageous times and prices and the acceleration of tax consequences.

Optimizer
The optimization process Aperio uses in tax-loss harvesting and generating sample portfolios relies upon optimization software developed by MSCI. The software utilizes a mathematical objective function that seeks to minimize the combination of active risk (i.e., forecast tracking error) and, when applicable, the tax liability on realized gains, while also meeting the conditions presented by a series of simultaneous equations, the values of which are, in part, populated by data based upon the securities being analyzed. With respect to measuring potential equity risk in the process of tax-loss harvesting and portfolio analysis, Aperio also uses and relies upon MSCI Barra risk models. You should note that such use and reliance of the MSCI Barra risk models in the optimization and equity risk analysis presents model risk, which is defined as the potential for adverse consequences from decisions based on incorrect or misused model outputs and reports. Model risk can lead to financial loss.

Important notes

The mathematical calculation and quantification exercise underlying any model generally involves application of theory, choice of sample design and numerical routines, selection of inputs and estimation, and implementation in information systems. Errors can occur at any point from design through implementation. In addition, shortcuts, simplifications, or approximations used to manage complicated problems could compromise the integrity and reliability of outputs from those calculations. Finally, the quality of model outputs depends on the quality of input data and assumptions, and errors in inputs or incorrect assumptions will lead to inaccurate outputs. The model may be used incorrectly or inappropriately. Even a fundamentally sound model producing accurate outputs consistent with the design objective of the model may exhibit high model risk if it is misapplied or misused. Models by their nature are simplifications of reality, and real-world events may prove those simplifications inappropriate.

Forecast Tracking Error
Forecast tracking error is not intended to provide assurance as to performance/limit on losses. Forecast tracking error is a measure of how closely a portfolio is projected to track its benchmark. By definition, realized tracking error is the standard deviation of the differences between gross-of-fee portfolio returns and benchmark returns. The calculation is based on portfolio holdings, benchmark holdings, and a risk model (which takes into account the volatility and correlation of the risk factors in the market place) as of a specific date. For different dates, the portfolio and benchmark holdings, and the risk model will differ. Therefore, the measure on one date could significantly differ from a measure on another date.

Benchmarks & Indexes
Any indexes referenced herein are used under license by Aperio. Indexes represent unmanaged groups of securities. Investing directly in an index is not possible. Reference to an index does not imply that the portfolio would achieve returns, volatility, or other results similar to that index. Further, an index's composition may not reflect the manner in which a client portfolio is constructed in relation to expected or achieved returns, investment holdings, portfolio guidelines, restrictions, sectors, correlations, concentrations, volatility, or tracking error targets, all of which are subject to change over time. Any index referenced would necessarily be materially different in strategy and volatility from the client account.

The Russell 1000® Index is an equity benchmark for US stock performance. It is a capitalization-weighted index covering the largest 1,000 publicly traded US stocks. 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. FTSE Russell is a trading name of certain of the LSE Group company. The Russell 1000 Index and the Russell 3000 Index referenced herein are trademarks of the relevant LSE Group company and is used by any other LSE Group company under license. All rights in the FTSE Russell indexes or data vest in the relevant LSE Group company, which owns the index or the data. Neither LSE Group nor its licensors accept any liability for any errors or omissions in the indexes or data and no party may rely on any indexes or data contained in this communication. No further distribution of data from the LSE Group is permitted without the relevant LSE Group company's express written consent. The LSE Group does not promote, sponsor, or endorse the content of this report.

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The MSCI ACWI® Index is an equity benchmark for global stock performance. It is a capitalization-weighted index covering large and midsize companies. The index includes approximately 2,900 stocks from 23 developed-market countries and 24 emerging-market countries.

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Important notes for hypothetical performance information

The Aperio account strategies reflected in this document contain hypothetical information, including point-in-time modeling and back-testing and other statistical analysis generated by Aperio. The hypothetical data used in this report do not reflect actual investments or trades. Modeling and back-tested information is provided for informational and discussion purposes only and should not be considered a recommendation to buy or sell any securities, or as investment advice. It is provided solely for discussion and illustrative purposes to provide a general example of the potential implementation of the strategy.

The assumptions and projections displayed are estimates, hypothetical in nature, and meant to serve solely as a guideline. They should not be considered an indication of actual performance.

Hypothetical, back-tested performance, including data based on that information, has many inherent limitations. (1) It is designed with the benefit of hindsight, based on historical data, and does not reflect the impact that certain economic and market factors might have had on the decision-making process. No hypothetical, back-tested or simulated performance can completely account for the impact of financial risk in actual performance. (2) It does not reflect actual client asset trading and cannot, for example, accurately account for the ability to withstand losses. (3) The information is based, in part, on hypothetical assumptions made for modeling purposes that may not be realized in the actual management of indices or accounts. (4) Back-testing of performance differs from actual account performance, because the investment strategy may be adjusted over time. (5) The hypothetical information contained in these back-tests also does not take into account the possibility of partial order fills, which would affect the outcome of the trading positions and performance over time. (6) With regard to market events, like the market correction in 2008, for example, it is impossible to predict whether Aperio would have altered its models or overridden its models in light of market performance or expectations. (7) Likewise, the model is used to back-test in its current format, without taking into effect any possible model modifications that might have been made to it, as our algorithms and models are constantly reviewed and updated.

In constructing and implementing our models, Aperio has not taken into account the investment objectives, financial situation, or particular needs of any individual investor. They are simulations and have not been verified by an independent third party. Model portfolio information presented, including, but not limited to, objectives, allocations, and portfolio characteristics, is intended to provide a general example of the potential implementation of the strategy. No representation is being made that any client account will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently sharp differences between hypothetical performance results and the actual results subsequently achieved by any particular trading program.

Aperio used its After-Tax Back-Testing Analysis Tool (ATBAT) to build the hypothetical portfolios discussed herein. ATBAT uses historical returns to perform taxable optimizations and calculate tax alpha, as well as other after-tax portfolio metrics. The model utilizes a mathematical objective function that seeks to minimize the combination of active risk (i.e., tracking error), while also meeting the conditions presented by a series of simultaneous equations, the values of which are, in part, populated by data based upon the securities being analyzed. The generic output of ATBAT is gross of management fees charged by Aperio. These fees vary across time and by client. ATBAT attempts to mitigate period independence by launching a fixed horizon strategy at staggered start dates. By default, dividends are assumed to be reinvested into the hypothetical portfolios. Trading costs are estimated using a transaction cost model. By default, starting portfolio size is set to $10 million. The ATBAT back-testing system, as with all back-testing systems, is inherently limited in its ability to reflect actual results regarding performance and other quantitative information that may have been, or will be, achieved by any given portfolio.

The optimization process Aperio uses in tax-loss harvesting and generating sample portfolios relies upon optimization software developed by MSCI. The software utilizes a mathematical objective function that seeks to minimize the combination of active risk (i.e., forecast tracking error) and, when applicable, the tax liability on realized gains, while also meeting the conditions presented by a series of simultaneous equations, the values of which are, in part, populated by data based upon the securities being analyzed. With respect to measuring potential equity risk in the process of tax-loss harvesting and portfolio analysis, Aperio also uses and relies upon MSCI Barra risk models. You should note that such use and reliance of the MSCI Barra risk models in the optimization and equity risk analysis presents model risk, which is defined as the potential for adverse consequences from decisions based on incorrect or misused model outputs and reports. Model risk can lead to financial loss.

Important notes for hypothetical performance information

The mathematical calculation and quantification exercise underlying any model generally involves application of theory, choice of sample design and numerical routines, selection of inputs and estimation, and implementation in information systems. Errors can occur at any point from design through implementation. In addition, shortcuts, simplifications, or approximations used to manage complicated problems could compromise the integrity and reliability of outputs from those calculations. Finally, the quality of model outputs depends on the quality of input data and assumptions, and errors in inputs or incorrect assumptions will lead to inaccurate outputs. The model may be used incorrectly or inappropriately. Even a fundamentally sound model producing accurate outputs consistent with the design objective of the model may exhibit high model risk if it is misapplied or misused. Models by their nature are simplifications of reality, and real-world events may prove those simplifications inappropriate.

Aperio, like all investment advisors, has an incentive to present returns that reflect positively on Aperio's investment strategies. While Aperio seeks to apply back-tests objectively and consistently, Aperio may be unsuccessful in removing all instances and forms of bias from the construction and implementation of the hypothetical portfolios.

There is no guarantee that any client results actually achieved will align with the modeled results demonstrated or output by the back-testing systems. Back-testing may have fundamental errors and may produce inaccurate outputs when viewed against its design objective and intended business uses. The mathematical calculation and quantification exercise underlying the models embedded in Aperio's back-testing systems, for example, generally involves the application of theory, choice of sample design and numerical routines, selection of inputs and estimation, and implementation in information systems. Errors may have occurred and can occur at any point from design through implementation. In addition, shortcuts, simplifications, or approximations used to manage complicated problems could compromise the integrity and reliability of outputs from those calculations. Finally, the quality of the outputs from back-testing depends on the quality of input data and assumptions, and errors in inputs or incorrect assumptions, will lead to inaccurate outputs. Even assuming that the back-testing systems are a fundamentally sound tool, producing accurate outputs consistent with its design objective may still exhibit high risk if it is misapplied or misused. Such modeling tools, by their nature, are simplifications of reality, and real-world events may prove those simplifications inappropriate.