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Tax-Managed Factor Strategies

This presentation is based on Aperio's
Tax-Managed Factor Strategies research paper.

For Professional Investor Use Only

Factor Investing for Taxable Investors

- Tax-managed factor investing seeks to balance three objectives:
    1. Maintain factor exposures (factor alpha)
    2. Maximize the value of losses (tax alpha)
    3. Minimize risk (forecast tracking error or total risk)
- Turnover required to maintain factor exposures can erode tax alpha
- Can investors still enjoy the benefits of loss harvesting while attempting to capture factor premiums?

Aperio Factor Strategies

Beta-1 Strategies

- Value Tilt
- Small Size + Value Tilt
- Value + Momentum Tilt
- Multi-Factor

Beta-1 strategies are typically used by investors seeking to outperform a benchmark by tilting toward factors while maintaining reasonable levels of tracking error.

Lower-Risk Strategies

- Quality
- Quality Light
- Min Vol + Value

Lower-risk strategies are typically used by investors seeking to reduce total portfolio volatility while outperforming on a risk-adjusted basis. They fit the description of "forgoing some market upside in exchange for some downside protection." They are more than "tilts"—the low beta exposure drives up tracking error.

Methodology

- Launch simulated index-tracking and factor-tilted strategies each quarter between June 1995 and March 2018* (52 historical back-tests per strategy)
- Rebalance monthly; round-trip trading costs of 12 bps
- Use highest 2018 federal tax rates (40.8% and 23.8%)**
- Analyze US and global portfolios at different horizons and dispositions (estate/donation vs. liquidation)***
  - We focus on US portfolios at a 10-year horizon in the estate/donation disposition
  - Other scenarios are available on request

*Many of the historical back-tests ran through one or both of the volatile periods between 2000 and 2010, during which loss harvesting was especially effective.

**We are effectively asking the question, "How would a loss-harvesting strategy have performed had the federal tax rates of January 2018 prevailed throughout history?"

***For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Decomposition of After-Tax Active Return

- **After-Tax Active Return:** the difference between portfolio and benchmark returns after tax

- **Factor Alpha:** active return due to factors, ignoring taxes
- **Tax Alpha:** active return due to loss harvesting
- **Pre-Tax Residual:** the difference between a tax-managed strategy and its otherwise equivalent tax-indifferent counterpart

Decomposition of After-Tax Active Return

10-Year Estate/Donation

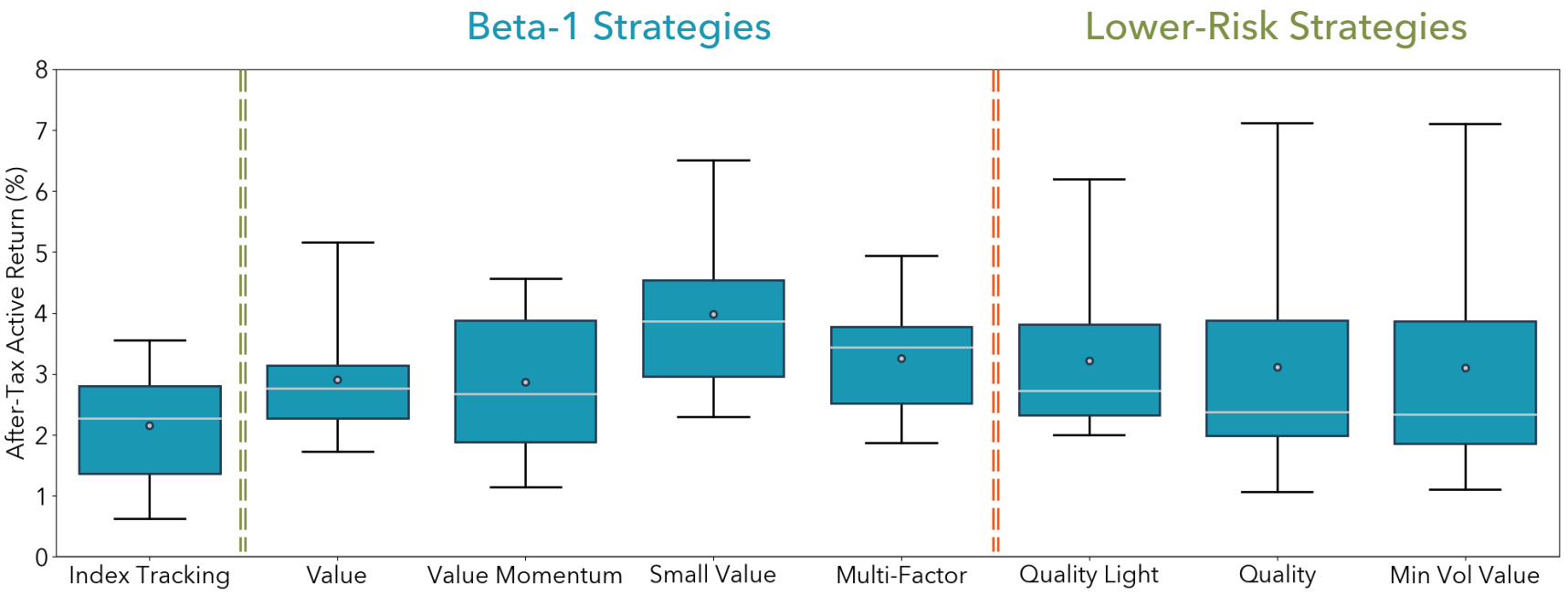
Tax alpha (green bars) tends to diminish with beta as we move from left to right in the chart.

Source: Aperio Group, LLC. See Appendix for actual data.

After-Tax Active Return

US 10-Year Estate/Donation

Median after-tax active return was uniformly positive, but lower-volatility strategies had a greater dispersion of outcomes in our historical back-tests.



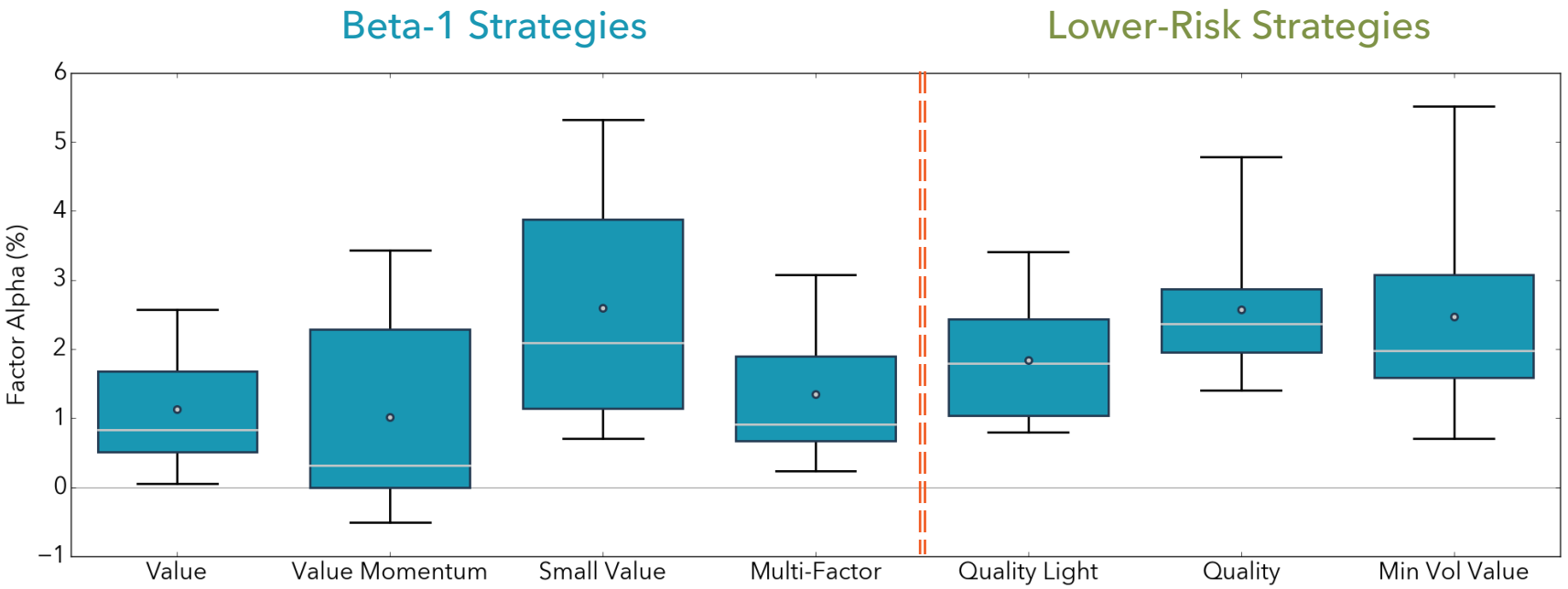
Portfolio	Index Tracking	Value	Value Momentum	Small Value	Multi-Factor	Quality Light	Quality	Min Vol Value
Median	2.27	2.76	2.68	3.87	3.44	2.73	2.37	2.34

Source: Aperio Group, LLC. Ten-year estate/donation after-tax active return for a tax-managed indexing strategy and six factor tilts in the US market. June 1995–March 2018. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Factor Alpha

US 10-Year Estate/Donation

Factor alpha isolates the component of after-tax active return attributable only to factors in our historical back-tests.



Portfolio	Value	Value Momentum	Small Value	Multi-Factor	Quality Light	Quality	Min Vol Value
Median	0.84	0.32	2.09	0.91	1.80	2.37	1.98

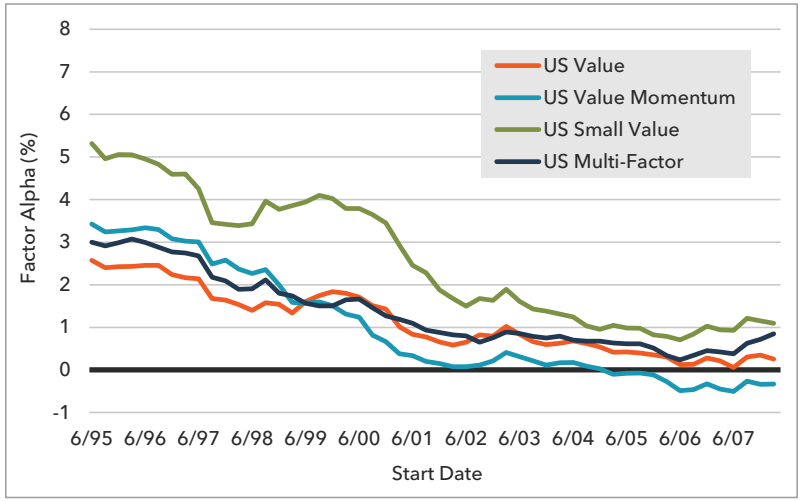
Source: Aperio Group, LLC. Ten-year estate/donation factor alpha for six factor tilts in the US market. June 1995–March 2018. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Trends in Factor Alpha

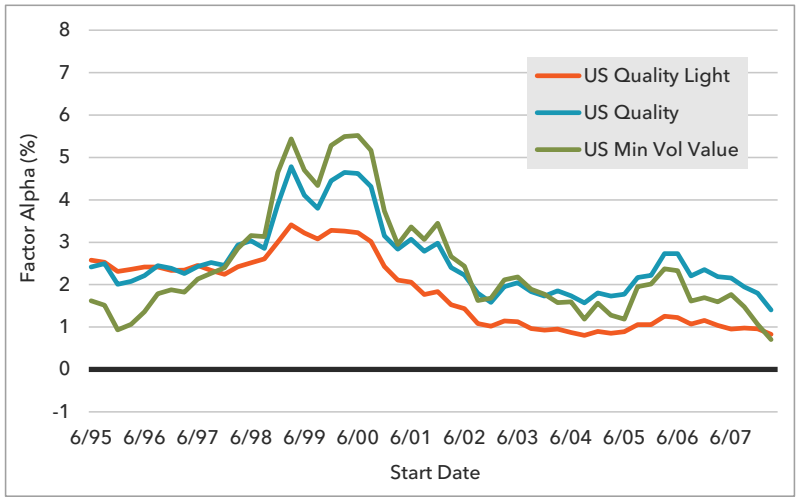
US 10-Year Estate/Donation

While 10-year median factor alpha for US strategies was positive in our historical back-tests, it generally declined over time for beta-1 strategies.

Beta-1 Strategies



Lower-Risk Strategies



We observed the same trend in global portfolios (see Appendix).

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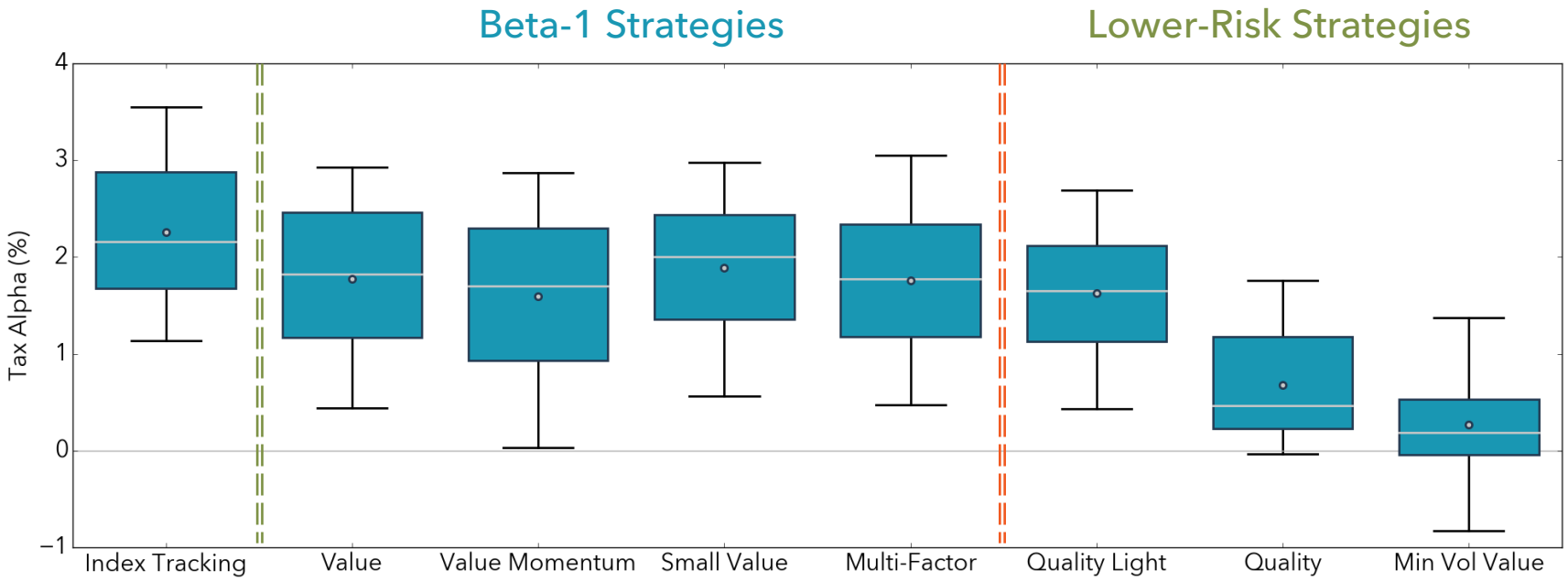
Source: Aperio Group, LLC. Rolling 10-year estate/donation factor alpha for six factor tilts in the US market. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Tax Alpha

US 10-Year Estate/Donation

Lower-risk strategies delivered significantly less tax alpha than beta-1 strategies in our historical back-tests.



Portfolio	Index Tracking	Value	Value Momentum	Small Value	Multi-Factor	Quality Light	Quality	Min Vol Value
Median	2.16	1.82	1.70	2.00	1.77	1.65	0.46	0.19

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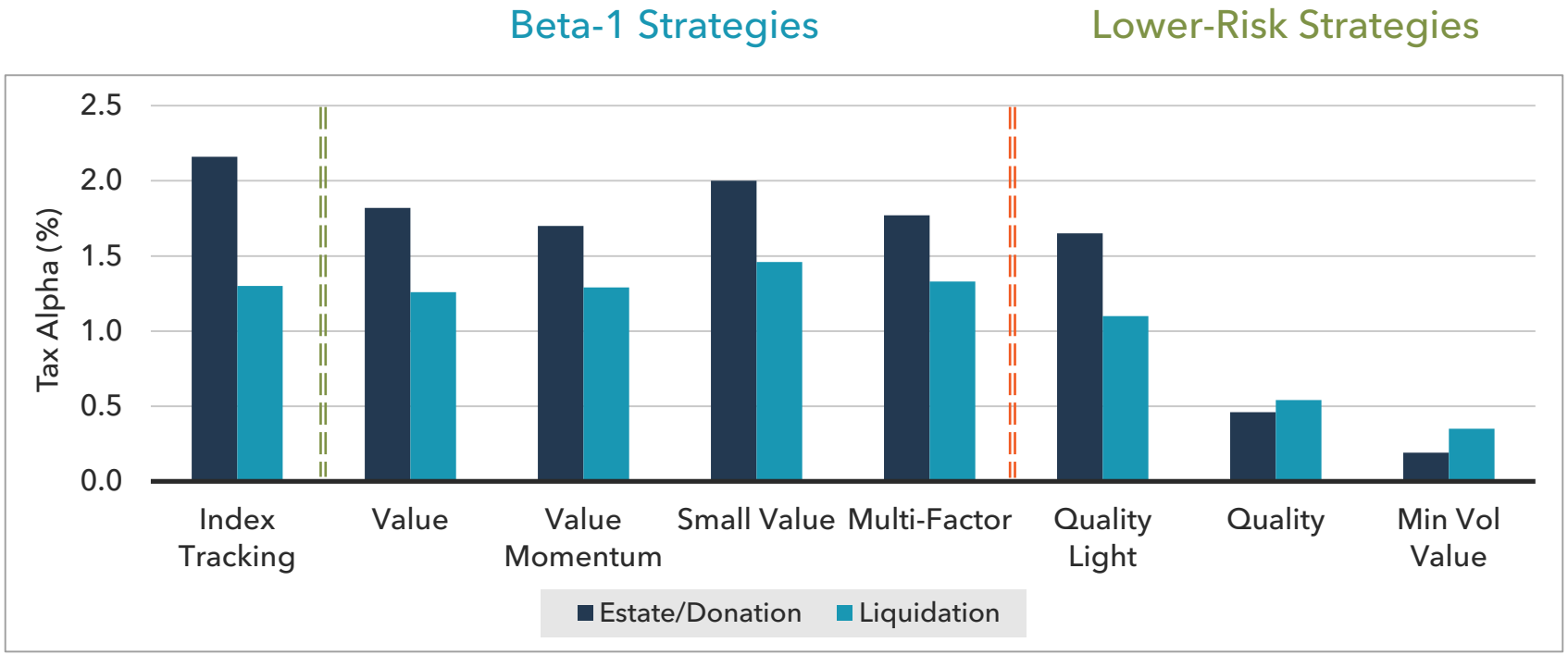
Source: Aperio Group, LLC. Ten-year estate/donation tax alpha for a tax-managed indexing strategy and six factor tilts in the US market. June 1995–March 2018. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Estate/Donation vs. Liquidation Tax Alpha

Under liquidation, where taxes are merely deferred, tax alpha tended to be lower in our historical back-tests for beta-1 strategies.



Source: Aperio Group, LLC. Median tax alpha for a 10-year tax-managed indexing strategy and six factor tilts in the US market. June 1995–March 2018. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Hurdle Rate

To break even, lower tax alpha in a factor strategy must be compensated with factor alpha.

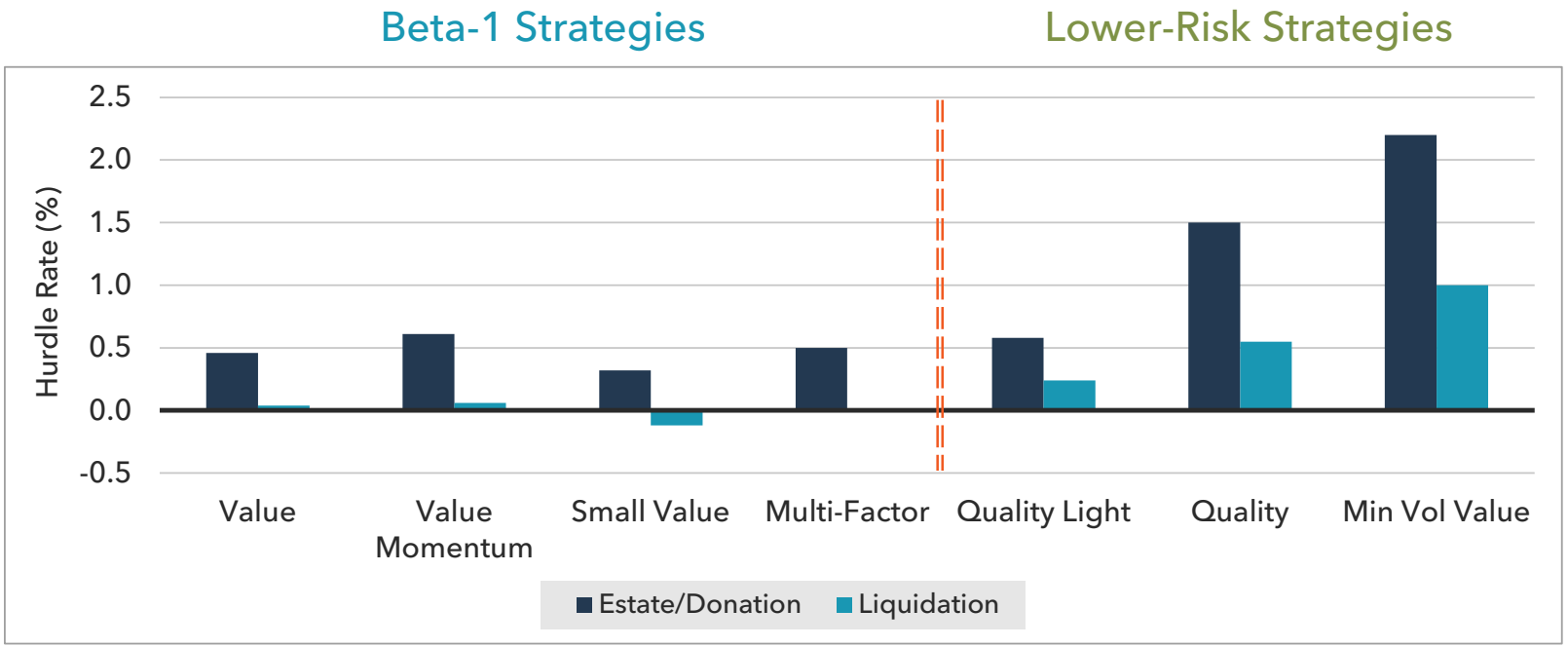
Hurdle Rate = Base Tax Alpha – Factor Strategy Tax Alpha

Hurdle Rate

US 10-Year

Median hurdle rates were lower for beta-1 strategies than for lower-risk strategies in our historical back-tests.

In order for a tilt to be a rational choice for a taxable investor, its factor alpha must exceed its hurdle rate.



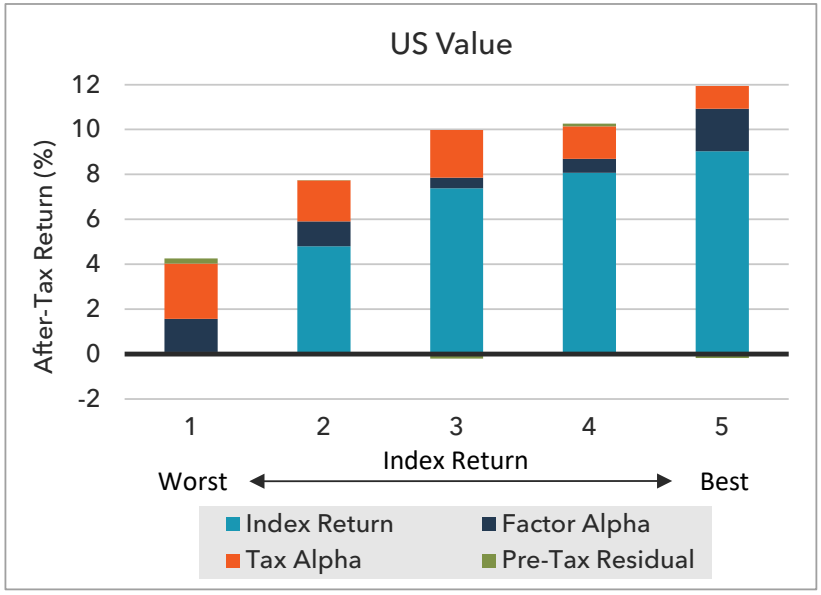
Portfolio	Value	Value Momentum	Small Value	Multi-Factor	Quality Light	Quality	Min Vol Value
Estate/Donation	0.46	0.61	0.32	0.50	0.58	1.50	2.20
Liquidation	0.04	0.06	-0.12	-0.01	0.24	0.55	1.00

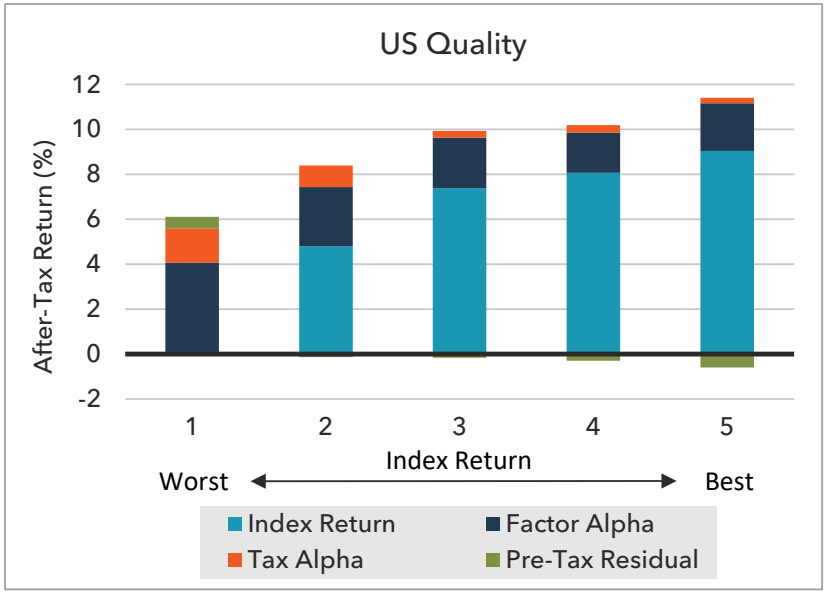
Source: Aperio Group, LLC. Median 10-year hurdle rates for six factor tilts in the US market. June 1995–March 2018. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Sensitivity to Index Return

US 10-Year Estate/Donation

In our historical back-tests, loss harvesting was most effective in turbulent, declining markets when Quality factor alpha was strongest. Value factor alpha had no apparent relationship to index returns.

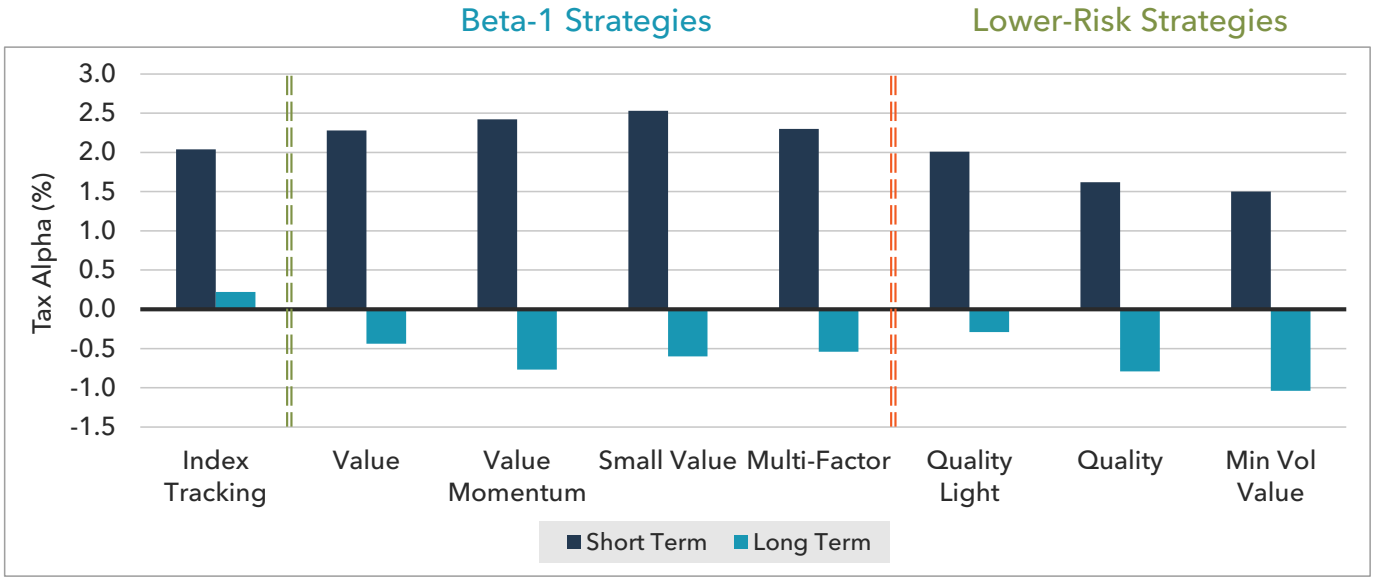




Source: Aperio Group, LLC. Ten-year index return, factor alpha, tax alpha, and pre-tax residual of tax-managed factor tilts in the estate/donation disposition averaged over quintiles by index return, June 1995–March 2018. Left panel: US Value. Right panel: US Quality. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Implicit Tax Arbitrage

- Maintaining factor tilts requires turnover, which raises the cost basis of the portfolio and facilitates the harvesting of short-term losses.
- The full benefits of loss harvesting can be enjoyed only by investors with ample short-term gains to offset.



Portfolio	Index Tracking	Value	Value Momentum	Small Value	Multi-Factor	Quality Light	Quality	Min Vol Value
Short Term	2.04	2.28	2.42	2.53	2.30	2.01	1.62	1.50
Long Term	0.22	-0.44	-0.77	-0.60	-0.54	-0.29	-0.79	-1.04

Incremental Risk Due to Loss Harvesting

- Loss harvesting increases risk, but by how much?

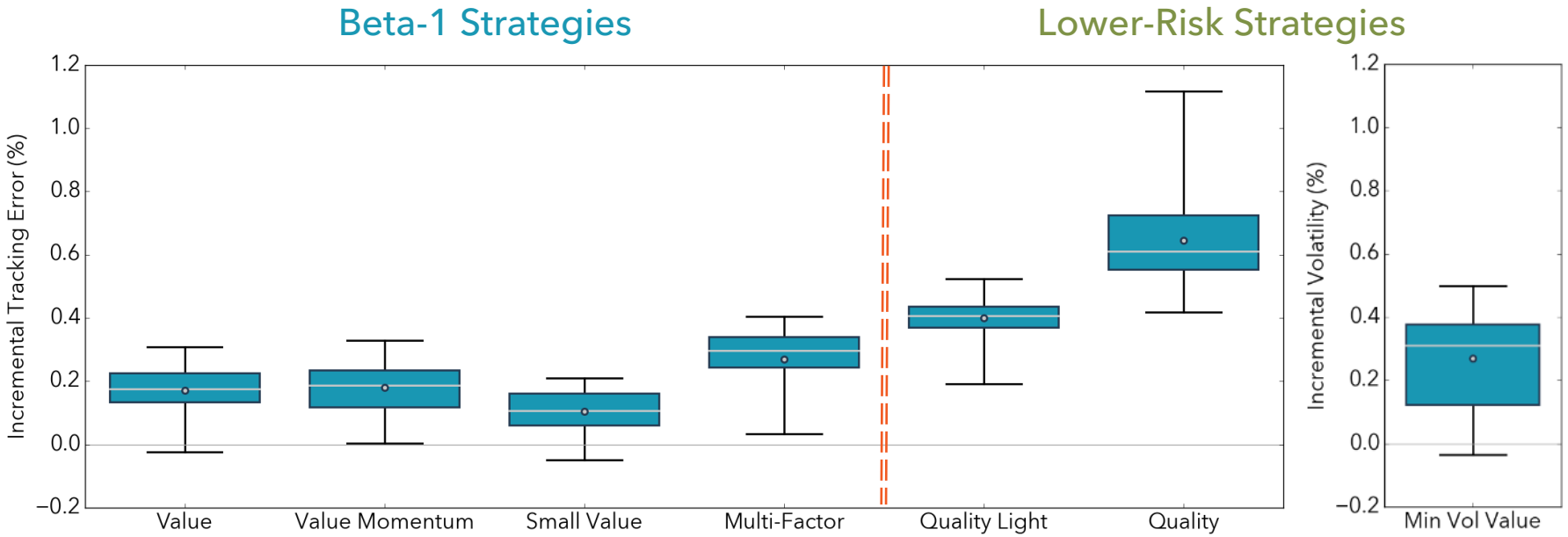
Incremental Risk = Tax-Managed Risk − Tax-Indifferent Risk

- Incremental risk is the increase in the width of the distribution of relative returns due to loss harvesting

Incremental Risk

US 10-Year

The incremental risk from loss harvesting was generally lower for beta-1 strategies in our historical back-tests.



Portfolio	Value	Value Momentum	Small Value	Multi-Factor	Quality Light	Quality
Median	0.18	0.19	0.11	0.30	0.41	0.61

Min Vol Value
0.31

Source: Aperio Group, LLC. Difference in realized risk (tracking error or volatility) between tax-managed and tax-indifferent factor tilts at a 10-year horizon in the US market. June 1995–March 2018. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Summary

- Aperio's tax-managed factor strategies captured both factor alpha and tax alpha in our historical back-tests
- Index-tracking strategies typically had the highest tax alpha under estate/donation but not under liquidation in our historical back-tests
- In our historical back-tests, tax alpha was higher in beta-1 strategies than in lower-risk strategies and in turbulent markets than in calm markets
- Incremental risk due to loss harvesting was typically not more than 0.61% in our historical back-tests

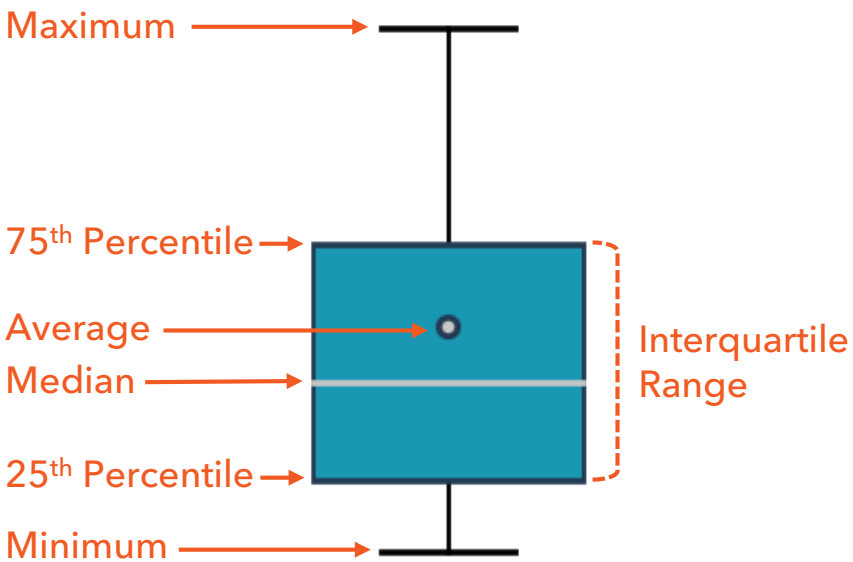
Limitations of This Study

- The results reflect the period over which the study was run. The future may be different from the past
- The construction of the tax-indifferent tilt affects the results
- The Min Vol Value portfolios in this study have betas of ~0.5
- The strategies in our historical study are robotic, while live strategies may reflect real-time judgment
- The benchmark is not taxed in the estate/donation disposition
- Tax-loss harvesting strategies may have higher fees than straightforward indexing strategies, 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

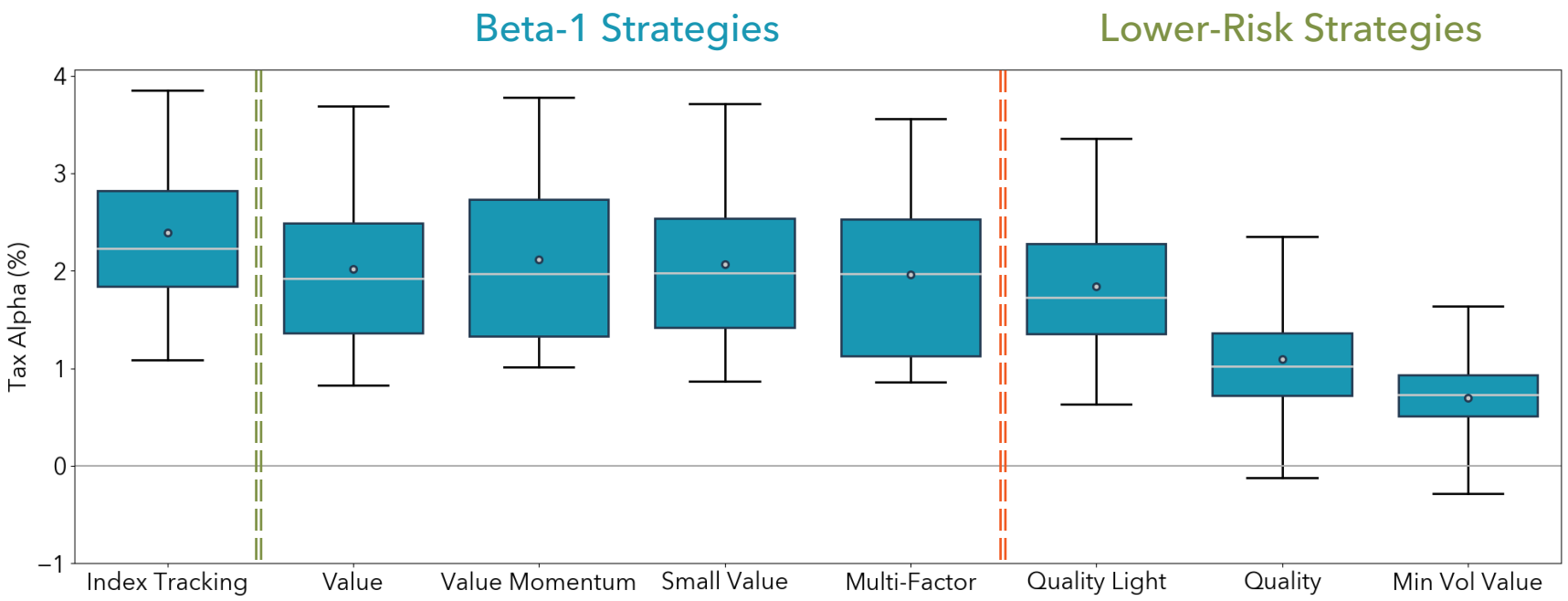
Appendix

Guide to Box Plots

A box plot shows a range of observed or simulated outcomes and provides a broader perspective than a simple average or median.



Results: Tax Alpha (Global)

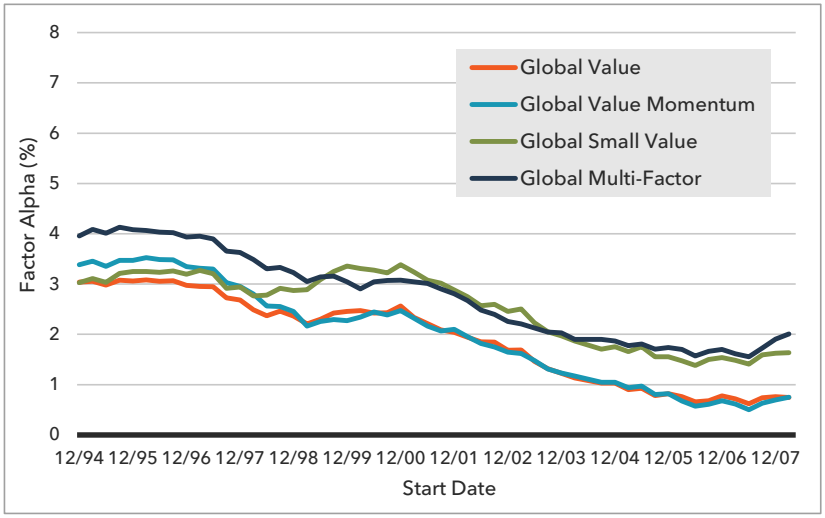


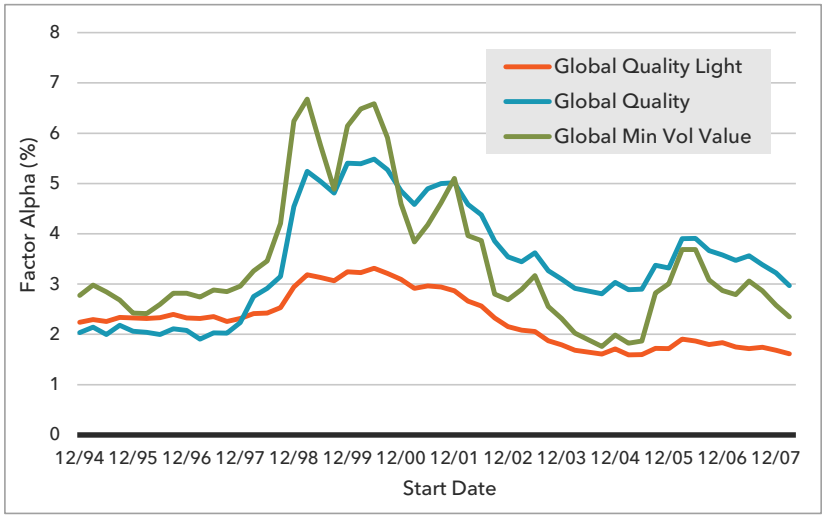
Portfolio	Index Tracking	Value	Value Momentum	Small Value	Multi-Factor	Quality Light	Quality	Min Vol Value
Median	2.23	1.92	1.97	1.98	1.97	1.72	1.02	0.73

Source: Aperio Group, LLC. Ten-year estate/donation tax alpha for a tax-managed indexing strategy and six factor tilts in the global market. June 1995–March 2018. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Trends in Factor Alpha

Global portfolios experienced the same decline in factor alpha we observed in US portfolios.



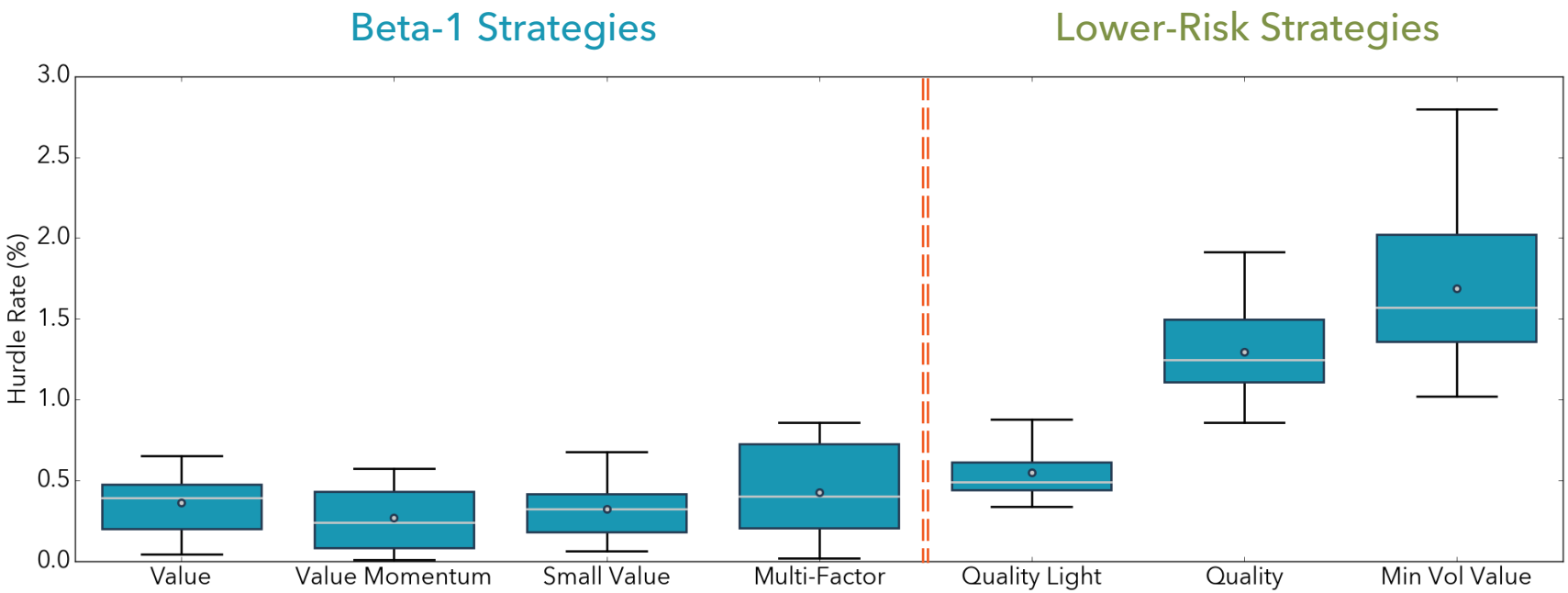


Source: Aperio Group, LLC. Rolling 10-year estate/donation factor alpha for six factor tilts in the global market. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Hurdle Rate

US 10-Year Estate/Donation

In order for a tilt to be a rational choice for a taxable investor, its factor alpha must exceed its hurdle rate.



Portfolio	Value	Value Momentum	Small Value	Multi-Factor	Quality Light	Quality	Min Vol Value
Median	0.39	0.24	0.32	0.41	0.49	1.25	1.57

Source: Aperio Group, LLC. Ten-year estate/donation hurdle rates for six tax-managed factor tilts in the US market. June 1995–March 2018. For more information, see Aperio's paper "Tax-Managed Factor Strategies."

Strategy Benchmarks/Universes

Menu of Factor Tilts

	US	Global
	Universe & Performance Benchmark	Universe & Performance Benchmark
Index Tracking	R1000	MSCI ACWI
Value	R1000	
Value Momentum	R1000	
Small Value	R3000	
Multi-Factor	R1000	
Quality Light	R1000	
Quality	R1000	
Min Vol Value	R1000	

Decomposition of After-Tax Active Return

10-Year Estate/Donation

	Index Tracking		Value		Value Momentum		Small Value		Multi-Factor		Quality Light		Quality		Min Vol Value	
	US	Global	US	Global	US	Global	US	Global	US	Global	US	Global	US	Global	US	Global
Factor Alpha	0.00	0.00	1.13	1.93	1.01	2.01	2.60	2.54	1.35	2.78	1.84	2.31	2.58	3.47	2.47	3.48
Tax Alpha	2.26	2.39	1.77	2.02	1.59	2.12	1.89	2.07	1.75	1.96	1.63	1.84	0.68	1.09	0.27	0.70
Pre-Tax Residual	-0.10	0.00	0.00	0.06	0.27	-0.02	-0.51	-0.12	0.15	0.07	-0.25	0.25	-0.14	0.68	0.37	0.25

Disclosure

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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.

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Strategy returns do not reflect payment of any sales charges or fees an investor may pay to purchase the securities underlying the strategies. The imposition of these fees and charges would cause the performance of the strategies to be different than the performance presented. The information may contain back-tested data. Back-tested performance is not actual performance but is hypothetical. There are frequently material differences between back-tested performance results and actual results subsequently achieved by any investment strategy.

Disclosure *(continued)*

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 index represents approximately 90% of the total market capitalization of the US stock market.

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.

The MSCI ACWI is an equity benchmark for global stock performance. It is a capitalization-weighted index covering large and midsize companies. The index includes approximately 2,800 stocks from 23 developed-market countries and 24 emerging-market countries.

You cannot invest directly in an index.

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