How to buck the Trend?

The Effect of Valuations and Costs on Smart Beta Strategies

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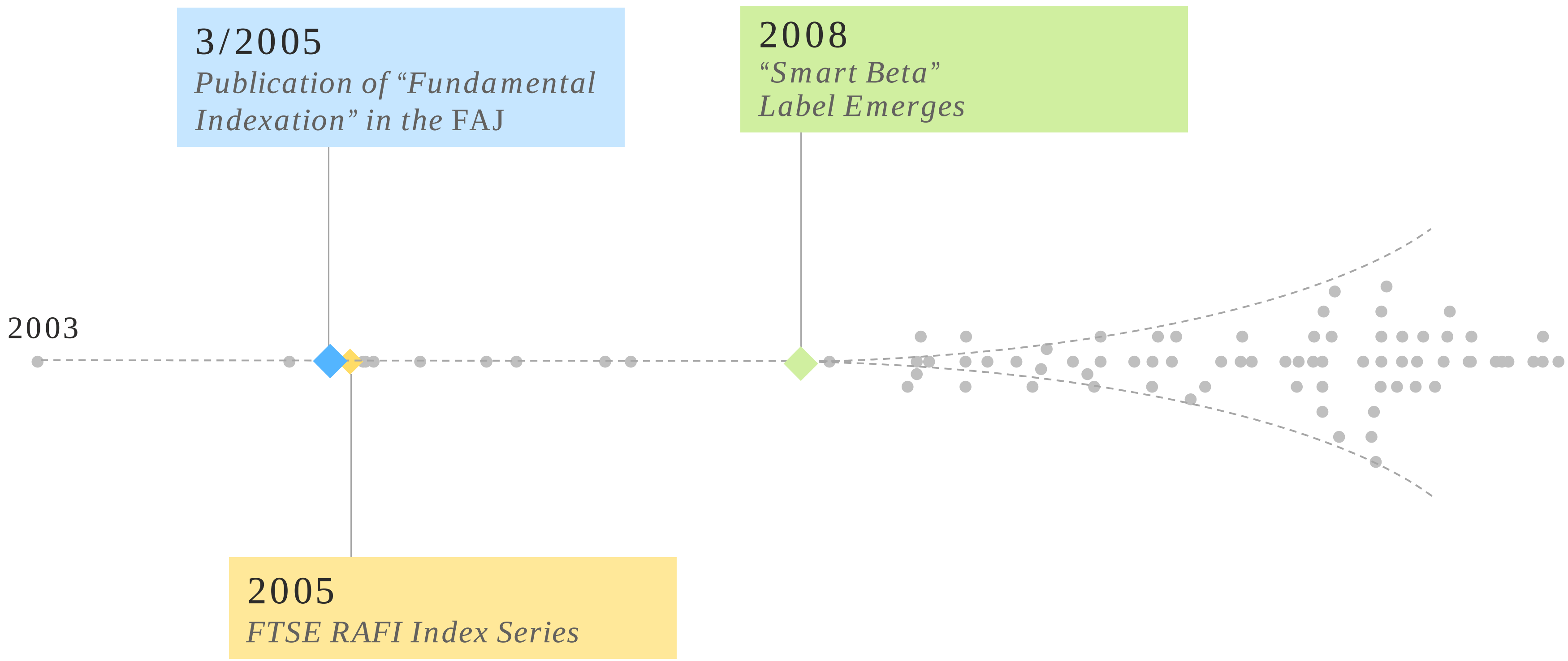
What is Smart Beta?

Delivering well understood sources of excess returns through simple, transparent, low cost indices

- Smart Beta strategies combine the benefits of:
  - **Active management;** The opportunity for outperformance
  - **Passive management;** Transparent, rules-based, low cost

The Proliferation of Smart Beta Index Strategies



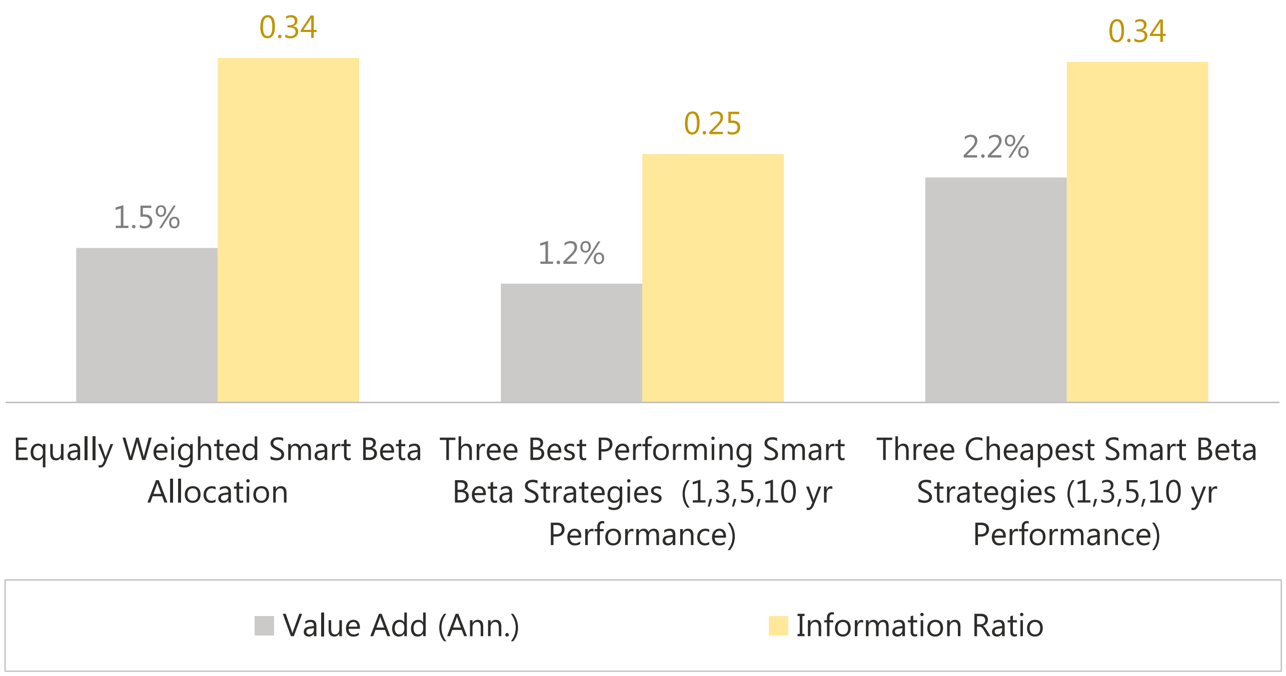
- *Each dot represents a "family" of smart beta index strategies which could have dozens of underlying indices, (geography, size, etc.)*
  - *For example, there are over 100 indices associated with the RAFI Fundamental Index[1]*

[1]Includes FTSE RAFI, Russell RAFI, and RAFI Indices, LLC strategies.

Note: Chart represents smart beta index strategies launched since 2003.

Trend Chasing Is Costly

Performance Characteristics of Trend Chasing and Contrarian Allocations, Smart Beta Strategies, United States (Jan 1977–Aug 2016)



Source: Research Affiliates, LLC, using CRSP/Compustat and Worldscope/Datastream data. For more information, please see "Timing 'Smart Beta' Strategies? Of Course! Buy Low, Sell High!" Arnott, Beck, Kalesnik, September 2016.

A Sensible Framework for Choosing Smart Beta Strategies

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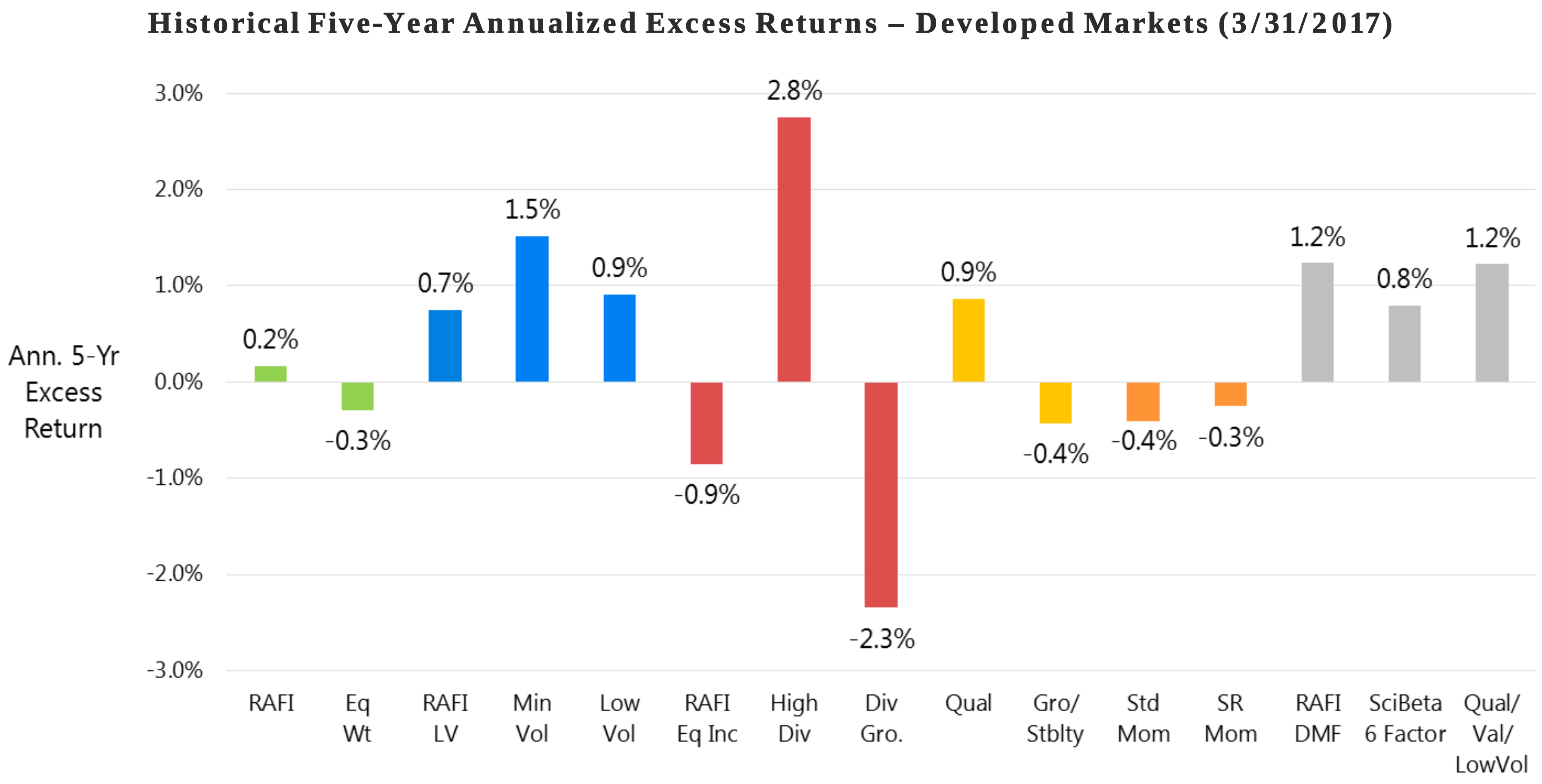
Factors to Consider When Choosing Smart Beta

- Past performance is not important… future performance is
- When determining expected returns:
  - Valuation matters
  - Cost matters—both management fees, transaction costs and including implicit trading costs!

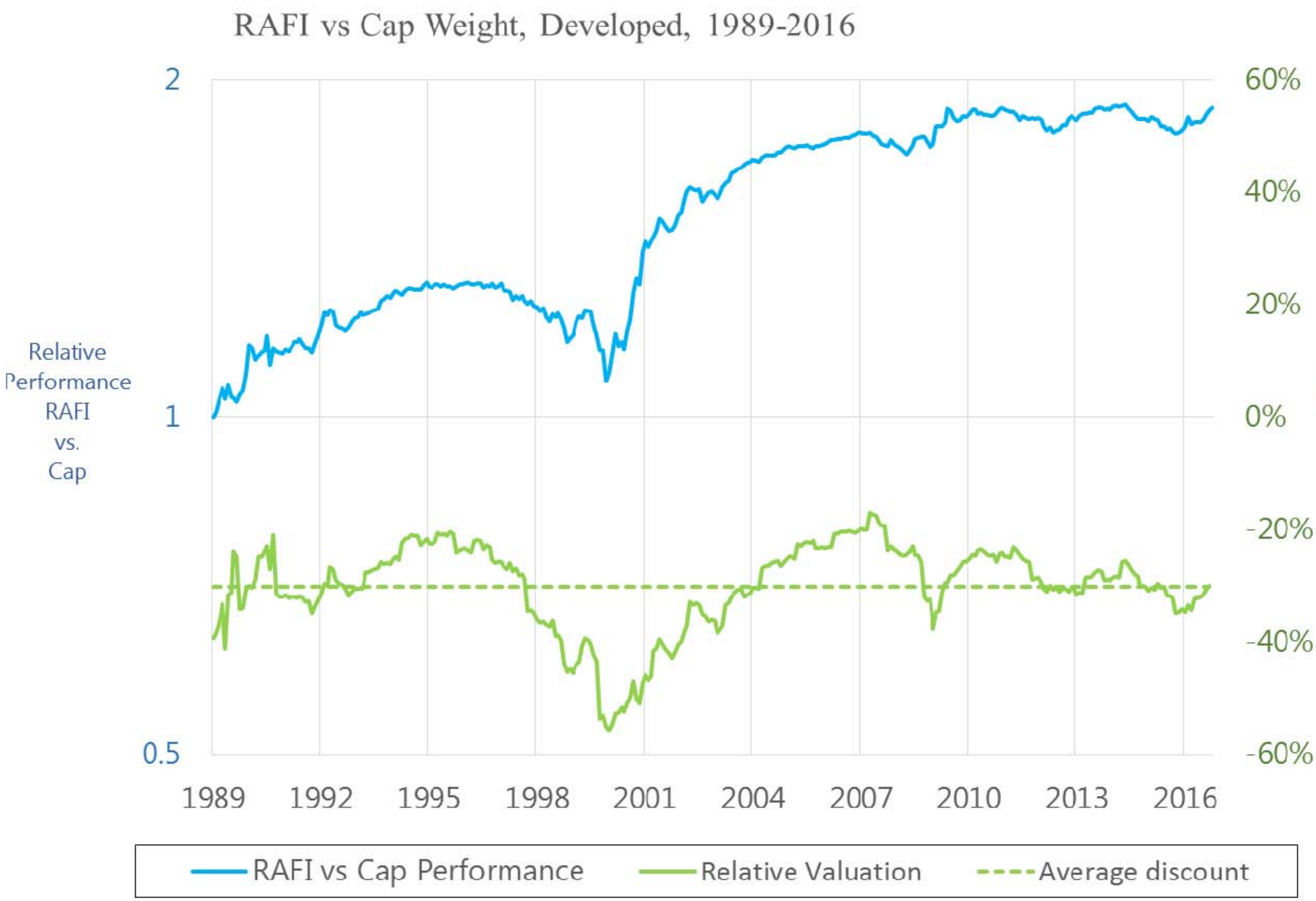
Past Returns of Various Smart Beta Strategies



Source: Research Affiliates, LLC, based on data from Worldscope/Datastream. Strategy returns and characteristics are simulated. Please see strategy descriptions at the end of this presentation.

Valuations

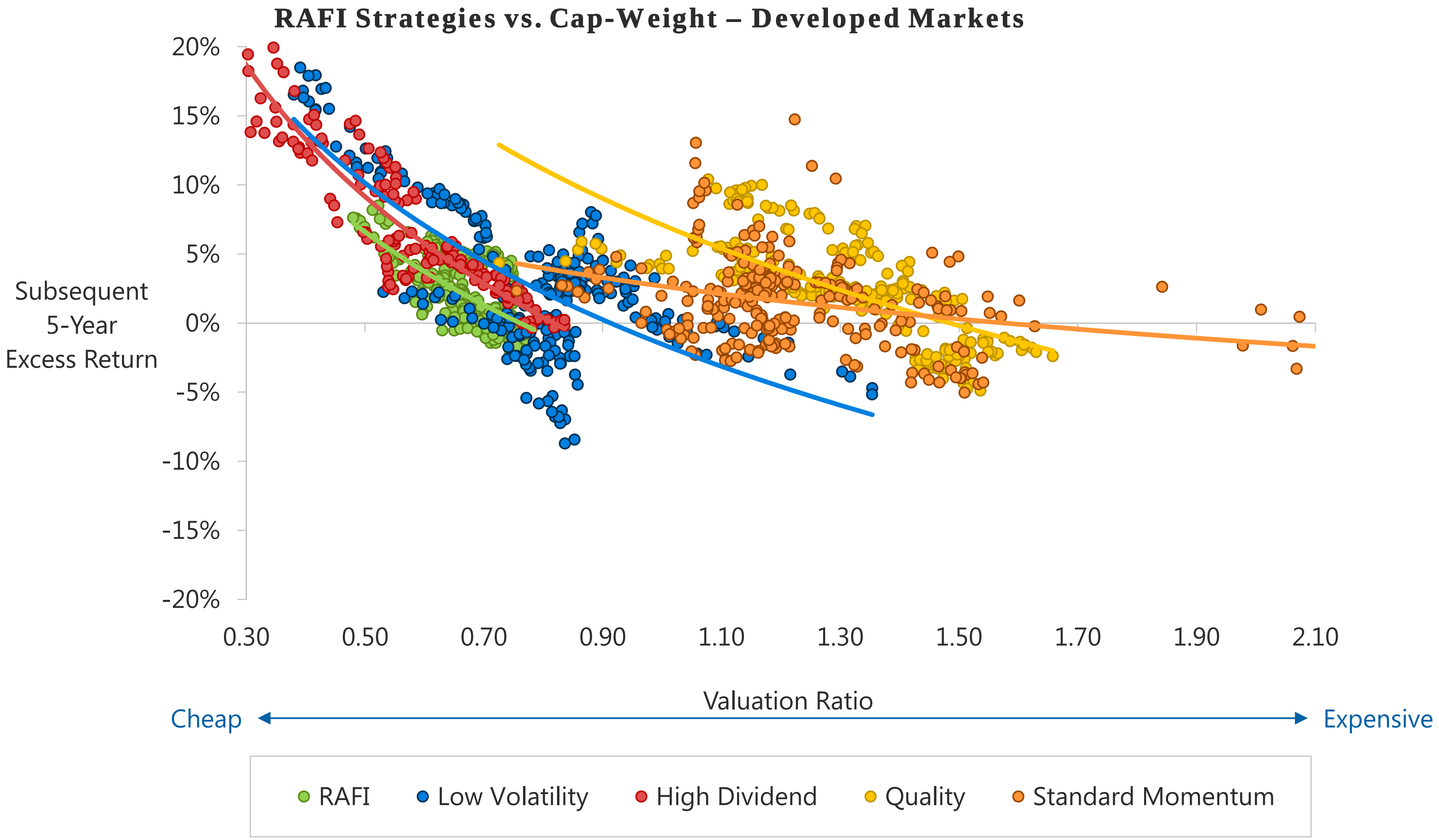
The Importance of Valuations



*Based on a blend of four valuation metrics: Price/Book, Price/5yrSales, Price/5yrEarnings, Price/5yrDividends.

Source: Research Affiliates, LLC, using data from CRSP and Compustat.

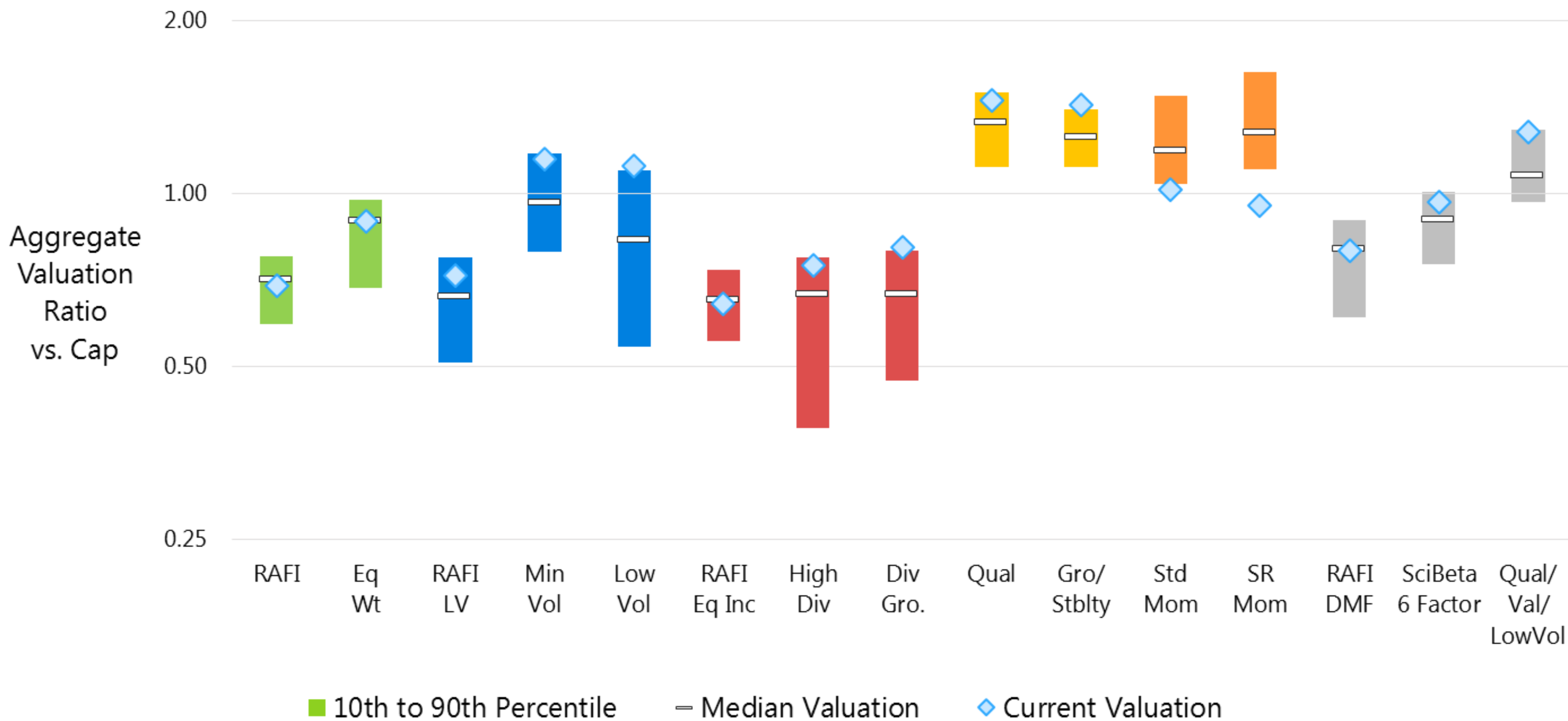
Valuations Are Predictive of Future Returns



Source: Research Affiliates, LLC, using data from CRSP and Compustat. Please see disclosures at the end of this presentation for strategy descriptions. Valuation ratio is calculated as the average of the following four ratios for each respective strategy vs. cap weight: P/B, P/5Yr. Sales, P/5Yr. Earnings, P/5Yr. Dividends. All strategies are for the period 4/1989–9/2011 except for High Dividend which is for the period 4/1998–9/2011.

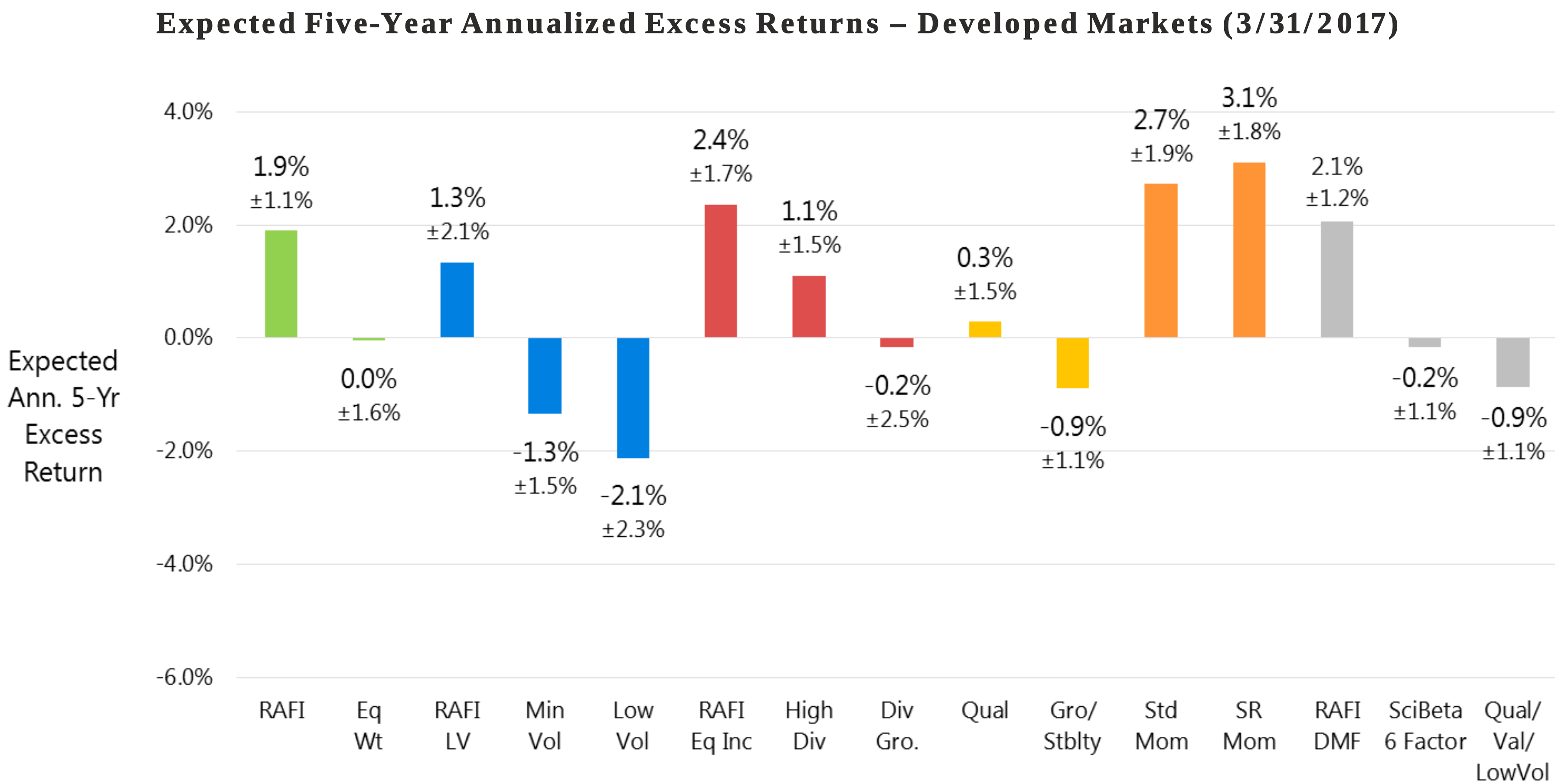
Where Are We Today?

Current vs. Historical Valuations – Developed Markets (3/31/2017)



Source: Research Affiliates, LLC, based on data from Worldscope/Datastream. Strategy returns and characteristics are simulated. Please see strategy descriptions at the end of presentation. Valuation ratio is calculated as the average of the following four ratios for each respective strategy vs. cap weight: P/B, P/5Yr. Sales, P/5Yr. Earnings, P/5Yr. Dividends. Historical valuations for the period 7/1/1989–present.

What Should You Expect Going Forward?



Source: Research Affiliates, LLC, based on data from Worldscope/Datastream. Strategy returns and characteristics are simulated. Please see strategy descriptions at the end of this presentation. Expected returns calculated using an equation of the form $Return5yr = \alpha + \beta \times z(\ln(valuation\ ratio)) + \epsilon$. α, structural alpha, is excess returns less the component of returns that comes from changing valuations. Valuation ratio is calculated as the average of the following four ratios for each respective strategy vs. cap weight: P/B, P/5Yr. Sales, P/5Yr. Earnings, P/5Yr. Dividends. The z-score of the log of valuation is used to calculate expected returns. Calculation of coefficients uses data from 7/1/1989-latest available. Bands for expected returns are calculated as the 75th and 25th percentile estimates (50% confidence interval).

Implicit Market Impact Costs

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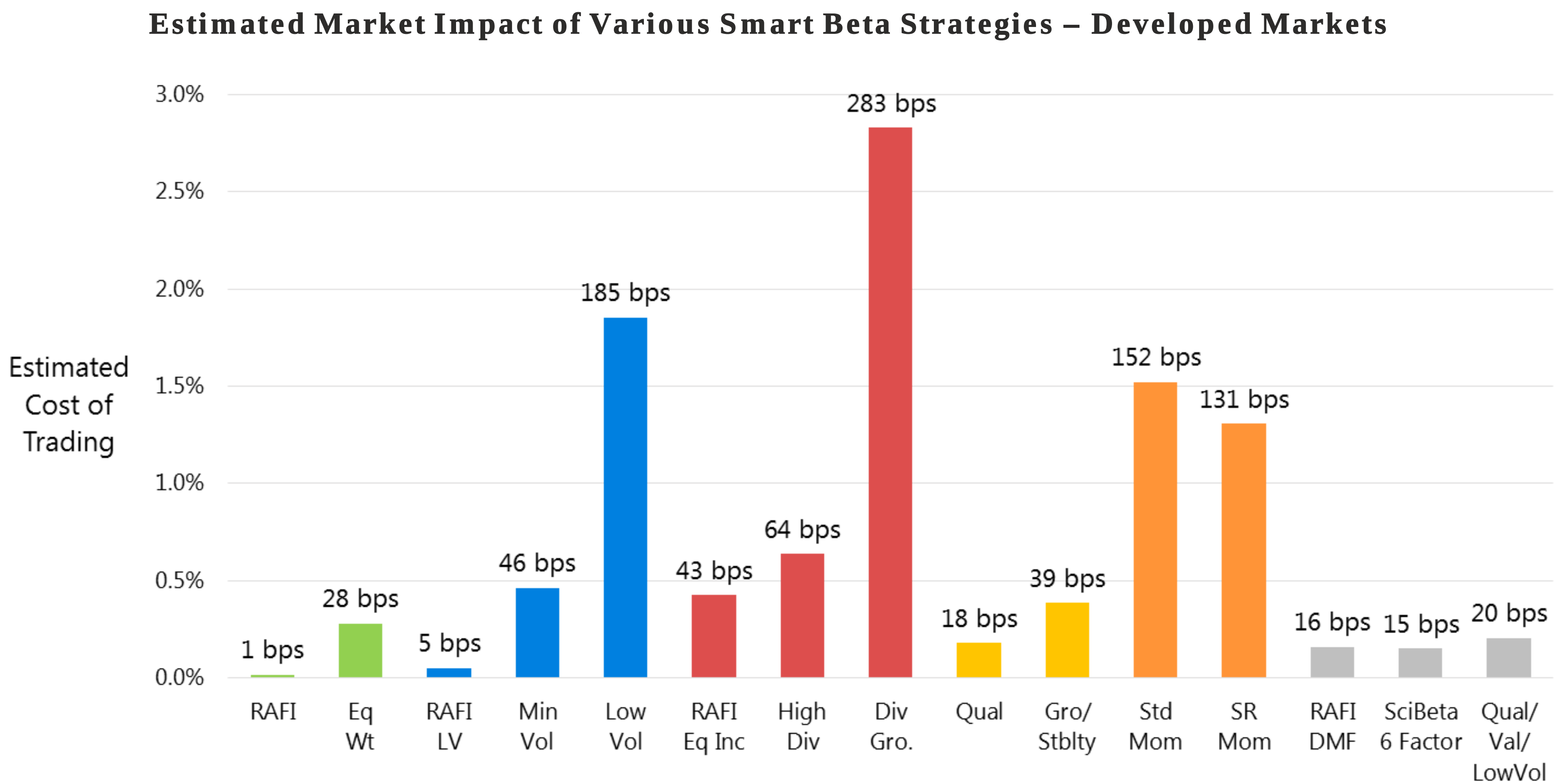
Not All Smart Beta Strategies Are Created Equal

» Apply *constant* haircut to backtests? **NO!**

Holding Low Liquidity Stocks?	Concentrated Weights on Illiquid Companies?	High Turnover Rate
↓	↓	↓
Difficult to Get In/Out	Big Trades (relative to firm size) at Rebalancing	Trading More

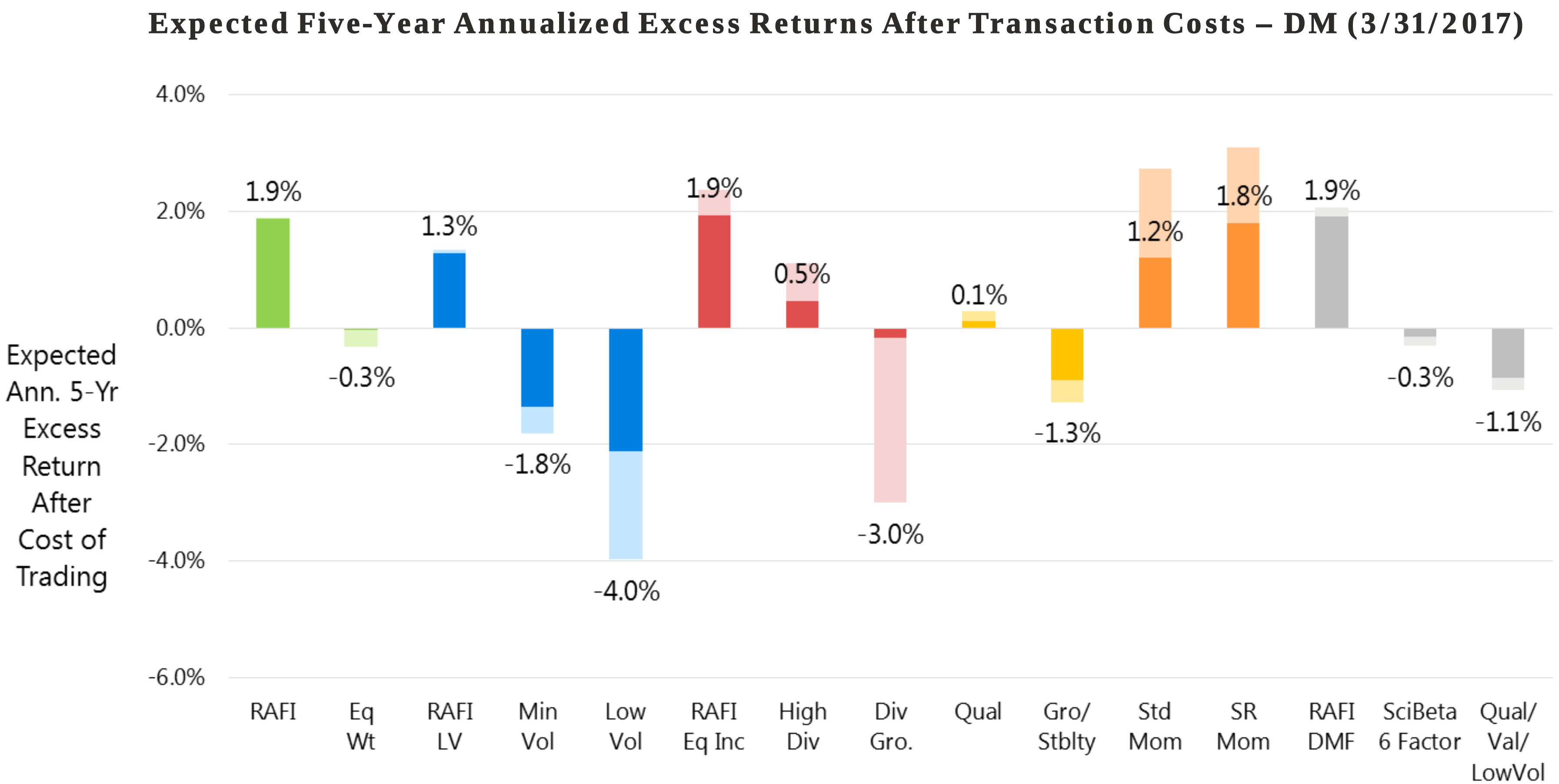
Higher Cost!!

Transaction Costs for Smart Beta Strategies



Source: Research Affiliates, LLC, based on data from Worldscope/Datastream. Strategy returns and characteristics are simulated. Please see strategy descriptions at the end of this presentation. Transaction costs are estimates as of 3/2017, based on AUM of $10B for each strategy. Transaction costs calculated based on cost model presented in “The Market Impact of Index Rebalancing” by Mike Aked and Max Moroz, November 2013.

What Should You Expect Going Forward After Costs?



Source: Research Affiliates, LLC, based on data from Worldscope/Datastream. Strategy returns and characteristics are simulated. Please see strategy descriptions at the end of this presentation. Expected returns calculated using a regression of the form *Return5yr* $= \alpha + \beta \times \ln(\text{valuation ratio}) + \epsilon$. Valuation ratio is calculated as the average of the following four ratios for each respective strategy vs. cap weight: P/B, P/5Yr. Sales, P/5Yr. Earnings, P/5Yr. Dividends. Historical valuations and subsequent five-year returns are for the period 7/1989–latest available. Transaction costs are estimates as of 3/2017, based on AUM of $10B for each strategy. Transaction costs calculated based on cost model presented in “The Market Impact of Index Rebalancing” by Mike Aked and Max Moroz, November 2013.

Conclusion

» **Trend chasing abounds:** Beware of the flashy backtest! Chasing past performance often leads to poor investor outcomes.

» **Be Mindful of Valuations:** Current valuations have shown to be a good predictor of future long-term performance.

» **Costs Matter:** Pay attention to both explicit and implicit costs of a strategy.

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Strategy Descriptions

- **RAFI:** Uses the RAFI Fundamental Index methodology as implemented by RAFI Indices, LLC to select and weight companies by four fundamental measures of company size; adjusted sales, cash flow, dividends + buybacks, and book value. Rebalanced annually using a quarterly staggered approach.
- **Equal Weight (Eq Wt):** Uses the S&P 500 Equal Weight methodology to select the top stocks by market cap, equally weight them, and rebalance quarterly.
- **RAFI Low Volatility (RAFI LV):** Uses the FTSE RAFI Low Volatility methodology to select companies according to four fundamental measures of company size: sales, cash flow, dividends, and book value. Stocks are screened for low valuation and low beta and weighted by fundamental weights. Rebalanced annually using a quarterly staggered approach.
- **Minimum Volatility (Min Vol):** Uses the MSCI Minimum Volatility methodology to employ a constrained optimization on the Large+Mid universe to minimize volatility. Constraints include minimum and maximum constituent, country weights, sector weights, and turnover. The optimization is re-computed semi-annually.
- **Low Volatility (Low Vol):** Uses the S&P Low Volatility methodology to select the 100 lowest volatility stocks (200 for Developed and Emerging) from the top cap-weighted index, where volatility is defined as the standard deviation of daily returns over the prior year. Stocks are weighted by 1/volatility and rebalanced quarterly.
- **RAFI Equity Income (RAFI Eq Inc):** Uses the FTSE RAFI Equity Income methodology to select the top 50% of stocks by dividend yield, screen out the bottom quintiles by growth (return on assets), distress (debt coverage ratio), and conservative accounting (net operating assets). Stocks are weighted by the product of RAFI weight and yield and are rebalanced annually.
- **High Dividend (High Div):** Uses the Dow Jones Select Dividend methodology to select 100 stocks by dividend yield from the All Cap universe, after screens for dividend growth and dividend coverage. Stocks are weighted by indicated dividend yield and rebalanced annually.
- **Dividend Growth (Div Gro):** Uses the S&P High Yield Dividend Aristocrats methodology to select all stocks from the top 1500 by market cap that had stable or increasing dividends every year for the last 20 years. The stocks are weighted by indicated dividend yield, and the portfolio is rebalanced quarterly. For Emerging, The S&P Dividend Opportunities methodology is used to select the top 100 stocks by risk adjusted yield. The index is rebalanced semi-annually.
- **Quality (Qual):** Uses the MSCI Quality methodology to select companies from the Large+Mid universe based on a quality score. Quality score combines high return on equity with low debt to equity and low earnings variability. Stocks are weighted by market cap times quality score and are rebalanced semi-annually.

Strategy Descriptions

- **Growth/Stability (Gro/Stblty):** Growth and Stability uses S&P Quality methodology to select the top stocks by quality score from the cap-weighted index. Quality score combines high return on equity with low accruals and low debt to equity. Stocks are weighted by market cap times quality score and are rebalanced semi-annually.
- **Standard Momentum (Std Mom):** Uses the AQR Momentum methodology to select the top third of companies by momentum from the top 1000 stocks by market cap, where momentum is defined as prior year returns skipping the most recent month. Stocks are weighted by market cap and are rebalanced quarterly.
- **Sharpe Ratio Momentum (SR Mom):** Uses the MSCI Momentum methodology to select companies from the Large+Mid universe based on momentum score. Momentum score combines prior 6-month and 12-month Sharpe ratios. Stocks are weighted by market cap times momentum score and are rebalanced semi-annually, with additional ad-hoc rebalances triggered by volatility spikes.
- **RAFI Dynamic Multi-Factor (RAFI DMF):** RAFI Dynamic Multi-Factor Index methodology to dynamically weight the RAFI Value Factor, RAFI LV Factor, RAFI Quality Factor, RA Momentum Factor, and RAFI Size Factor Indices based on long-term reversal and short term momentum. Dynamic allocations are adjusted quarterly.
- **Scientific Beta 6-Factor Equal Weight (SciBeta 6 Factor):** Uses the EDHEC SciBeta Six-Factor methodology to equally weight six factor indices: value (top half by Book/Price), momentum (top half by prior-year return, skipping most recent month), mid-cap (bottom half by market cap), low volatility (bottom half by prior two-year standard deviation of weekly returns), profitability (top half by Gross Profits/Assets), and investment (bottom half by asset growth). Stocks within each factor are diversified via five diversification methods. The portfolio is rebalanced quarterly.
- **Quality/Value/ Low Volatility (Qual/Val/Vol):** Uses the MSCI Factor Mix A-Series index methodology to equally weight the Quality Index, Fundamentally Reweighted Index, and Minimum Volatility Index.

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