



alpha architect

ALPHA ARCHITECT QUANTITATIVE VALUE INDEXES (QV AND IQV INDEX)

We Empower Investors Through Education | Affordable Alpha

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IMPORTANT INFORMATION - DISCLOSURES

This document describes the technology behind our Indexes.

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Data is provided by FactSet and Alpha Architect. Attribution results are provided on a best-efforts-basis and are provided for informational purposes only.

We Educate Investors on Systematic Factor Investing



Wesley R. Gray, Ph.D.

PhD/MBA, University of Chicago
BS Economics, Wharton
Captain, Marine Corps

Wesley R. Gray, Ph.D. has been an active participant in financial markets throughout his career. He is the Founder, CEO and Co-CIO for Alpha Architect, an SEC-Registered Investment Advisor. Dr. Gray has published multiple academic articles and books, to include the co-authored books Quantitative Value, DIY Financial Advisor, and Quantitative Momentum.

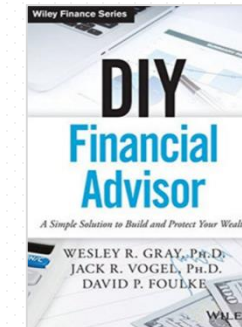
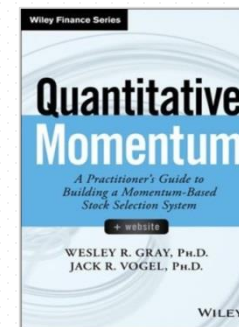


Jack R. Vogel, Ph.D.

PhD, Drexel University
MS Mathematics, Drexel Univ.
BS Mathematics, U. of Scranton

Jack Vogel, Ph.D., conducts research in empirical asset pricing and behavioral finance, and has collaborated with Dr. Gray on multiple projects. He is the CFO and Co-CIO for Alpha Architect, an SEC-Registered Investment Advisor. Dr. Vogel has published multiple academic articles and co-authored the books DIY Financial Advisor, and Quantitative Momentum.

Published multiple **research-focused** finance books



Published in leading, **peer-reviewed** academic journals

- "Why do Enterprise Multiples Predict Expected Stock Returns?" Journal of Portfolio Management (2019)
- "What Motivates Buy-Side Analysts to Share Recommendations Online?" Management Science (2018)
- "Do Fund Managers Identify and Share Profitable Ideas?" Journal of Financial and Quantitative Analysis (2017)
- "Enhancing the Investment Performance of Yield-Based Strategies," Journal of Investing (2014).
- "Analyzing Valuation Measures: A Performance Horse-Race over the Past 40 Years," Journal of Portfolio Management (2012).

Present in **major publications** + editor of academic website

- [Wall Street Journal](#) (multiple articles)
- [CFA Institute](#) (multiple articles)
- [Forbes](#) (multiple articles)
- [Alpha Architect](#) (editor)

Numerous **working papers** (more available upon request)

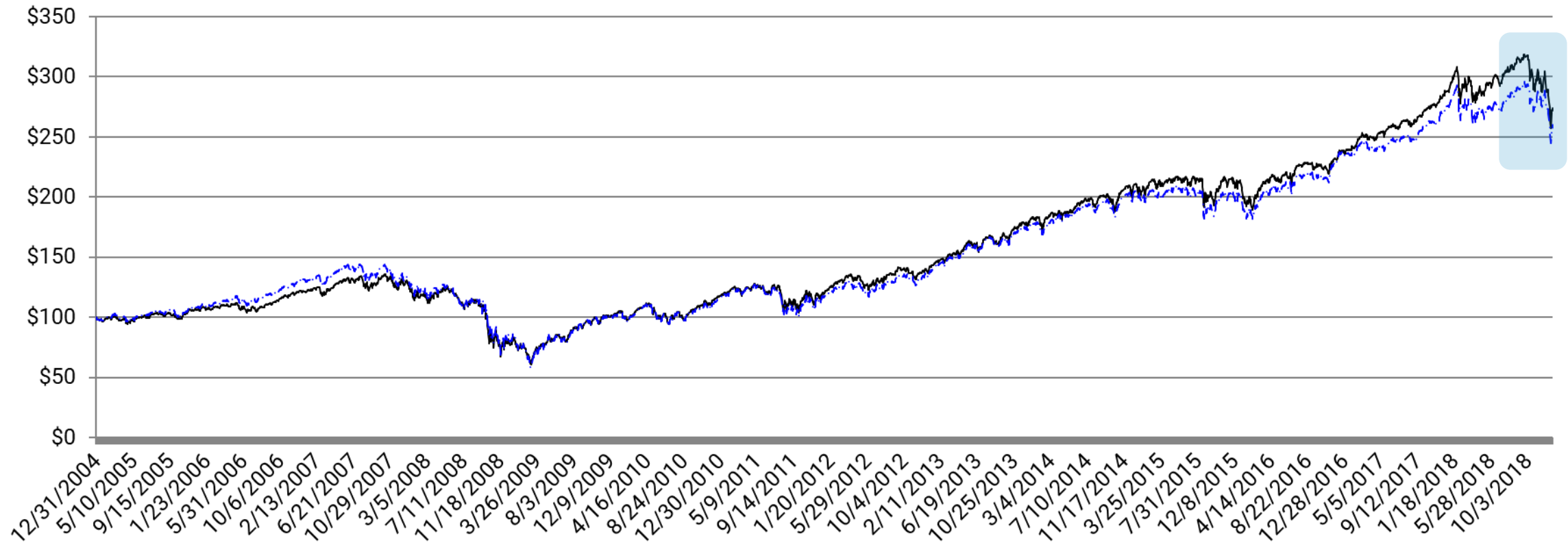
- "On the Performance of Cyclically Adjusted Valuation Measures"
- "Using Maximum Drawdown to Capture Tail Risk"
- "Does Complexity Imply Value? AAI Value Strategies from 1963 to 2013"
- "Limited Attention and Asset Price Efficiency"
- [Our SSRN working paper website](#)

Closet Indexes¹ May Deliver Passive Market Results

but they may not deliver academic factor results

Invested Growth of \$100 from 2005 to 2018

— SPY: SPDR S&P 500 ETF - - - VTV: Vanguard Value ETF

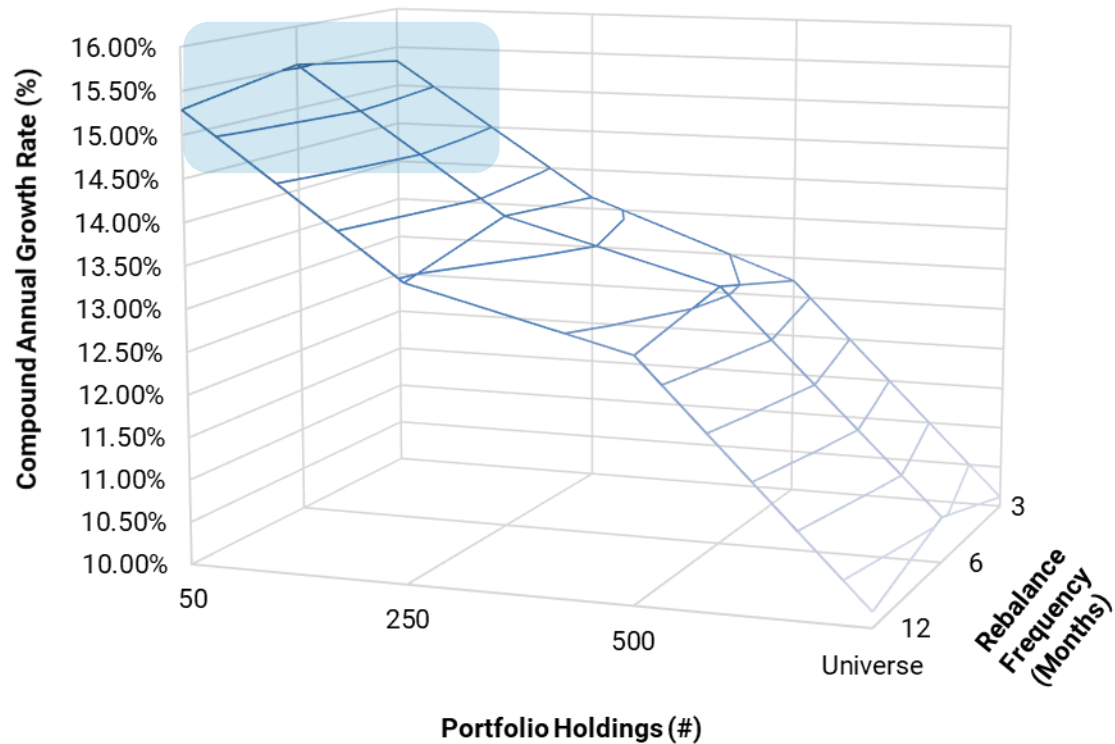


¹A "closet index" is generally considered to be a strategy that is marketed as being different than a broad passive index but is closely related to a broad passive index with minimal deviations in the underlying holdings and performance profile. VTV was chosen because it is the largest "smart beta" ETF as per <https://www.etf.com/channels/smart-beta-etfs> (accessed June 1, 2019). Performance is measured from 1/1/2005 to 12/31/2018 and is based on total returns, including dividends and distributions. Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. For more information see the following paper: K.J. Martijn Cremers & Quinn Curtis, Do Mutual Fund Investors Get What They Pay For? The Legal Consequences of Closet Index Funds (November 24, 2015) at 1, available at <http://ssrn.com/abstract=2695133> (last visited June 1, 2019).

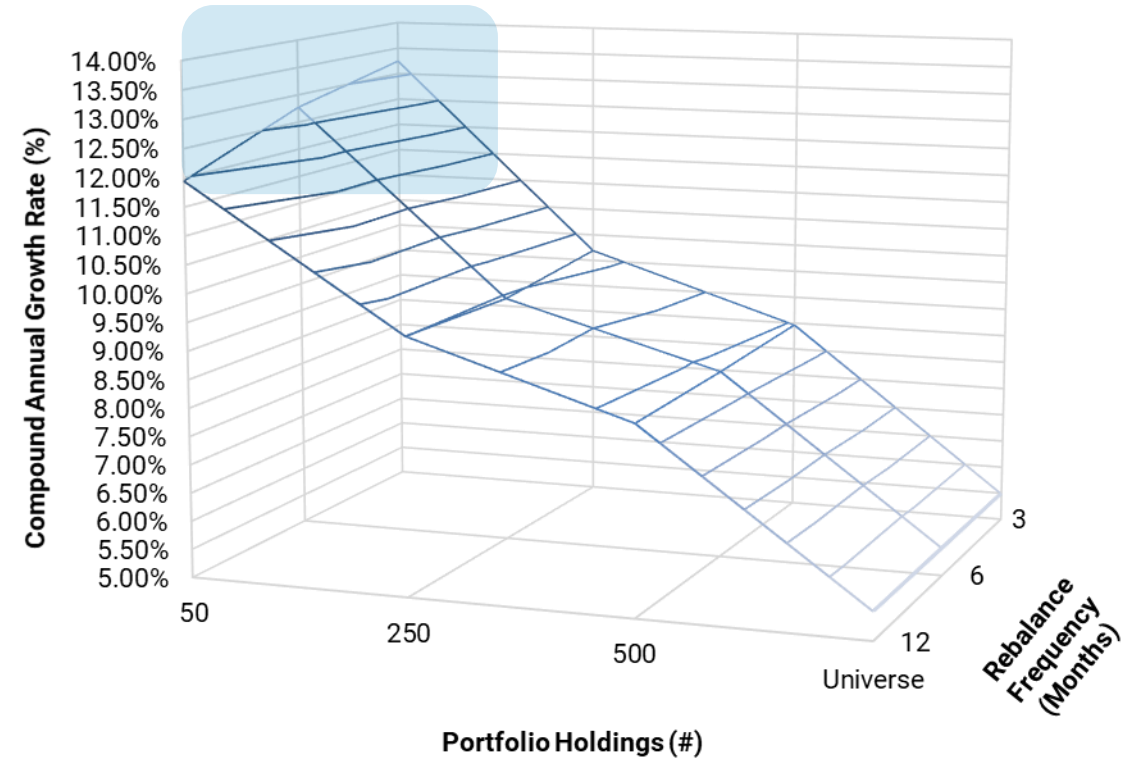
We Believe in Focused Academic Factor Premiums

Simulated EBIT/TEV sorted portfolio compound annual returns by concentration and rebalance

**Portfolio Construction and Historical Returns
(US Stocks)**



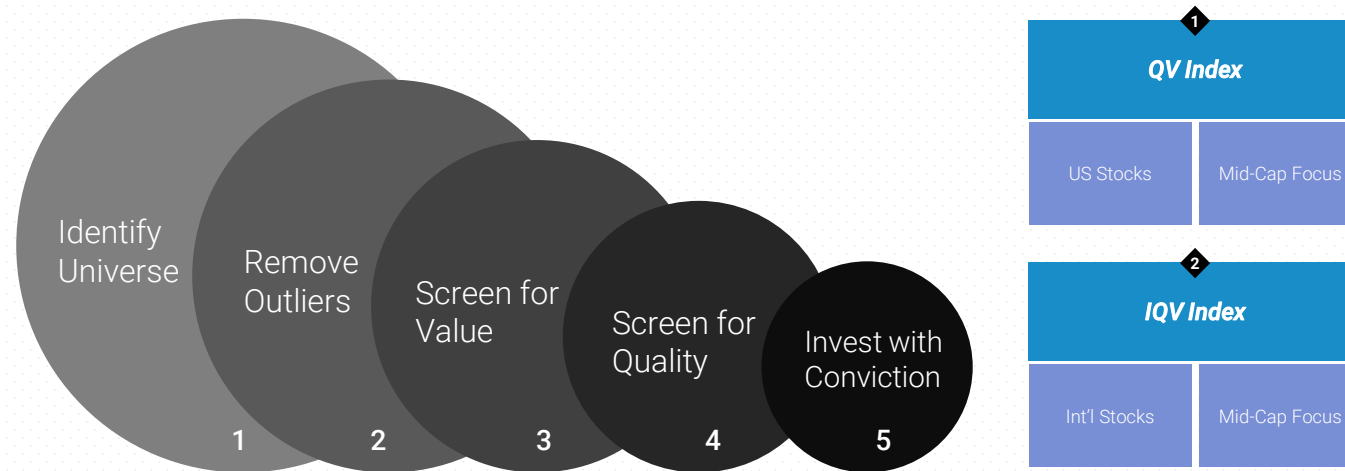
**Portfolio Construction and Historical Returns
(International Stocks)**



Source: Factset. Universe is the largest 1000 U.S. or international developed firms by market capitalization and broken into portfolios of 50-, 250-, or 500-stocks based on EBIT/TEV ranking (higher is better). The rebalance frequency is 3-, 6-, or 12-months. We average overlapping portfolio results and show the compound annual returns for the respective portfolios. The period is from 1/1/1990 to 3/31/2019. The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor actually attained. Additional information regarding the construction of these results is available upon request. Indexes are unmanaged, do not reflect management or trading fees, and one cannot invest directly in an index. All returns are gross total returns and include the reinvestment of distributions (e.g., dividends).

Our Quantitative Value Index Lineup

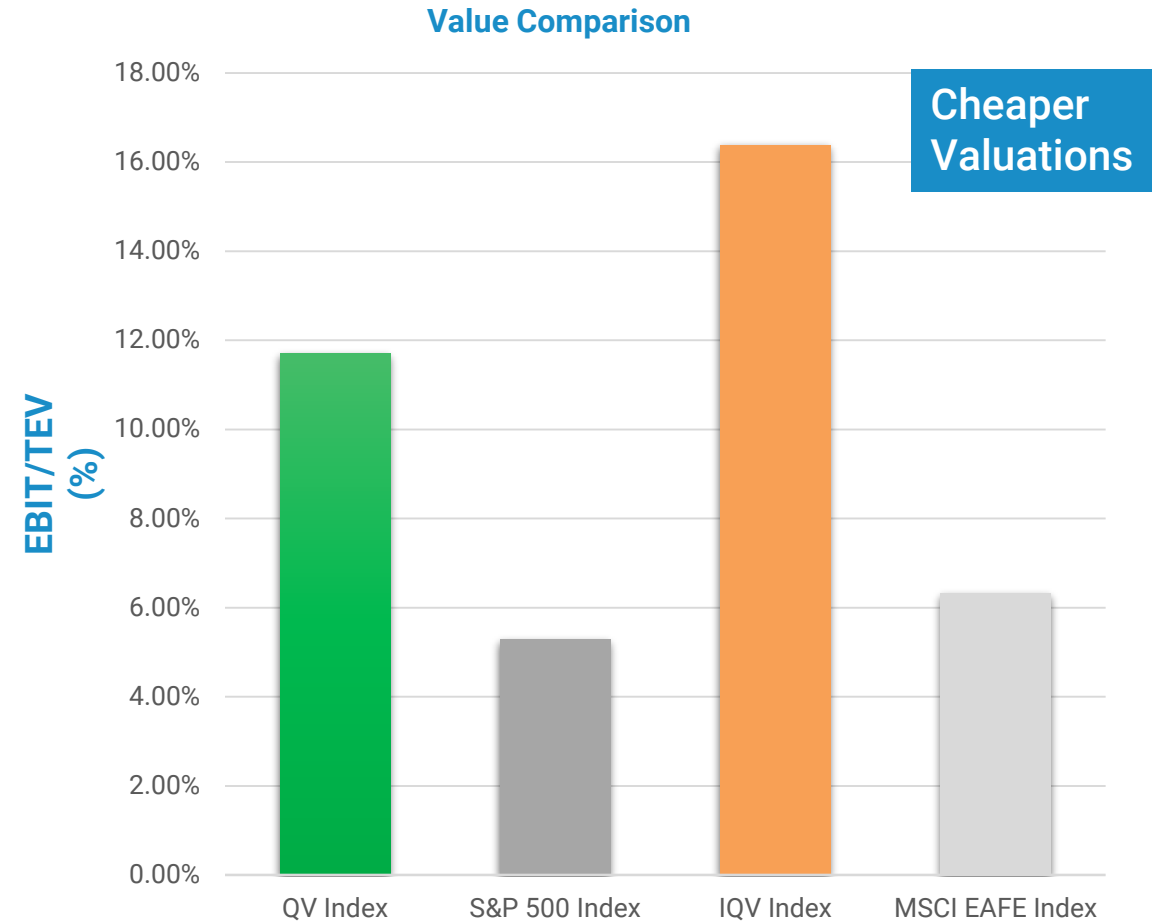
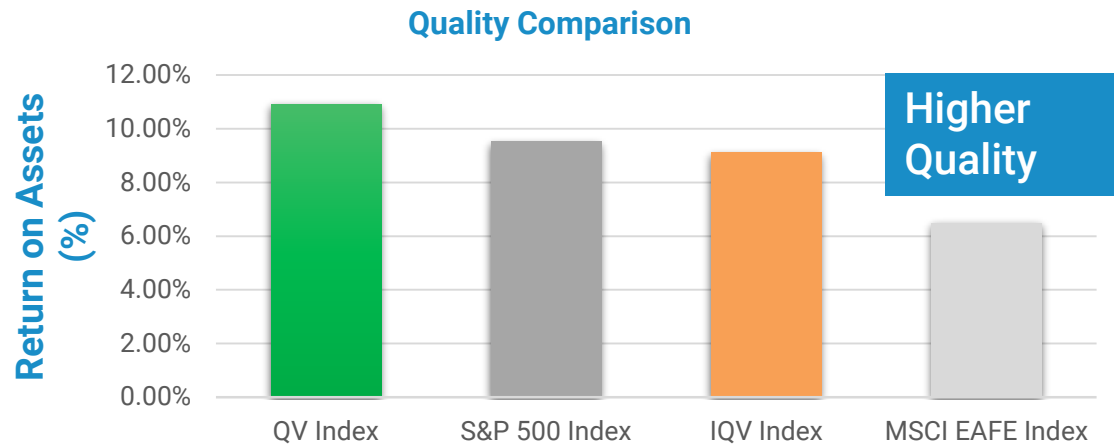
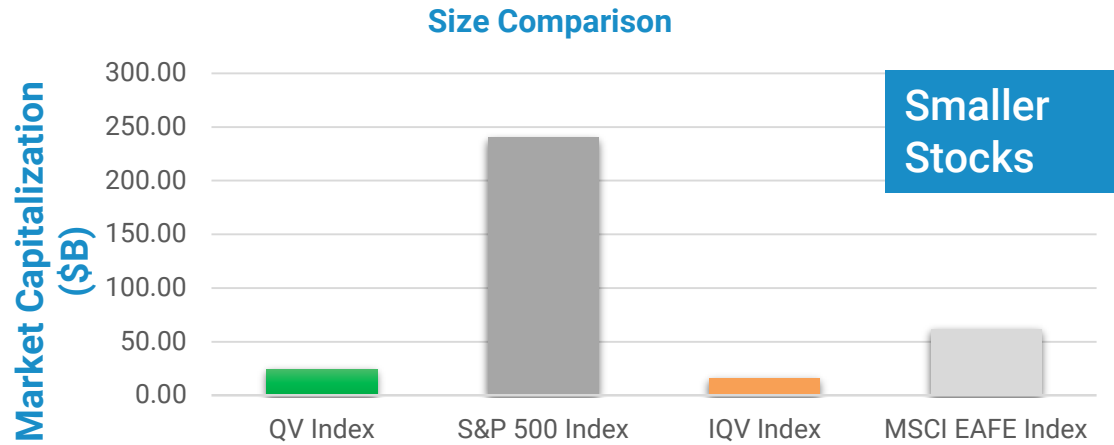
Index Name	Index Ticker	Index Inception Date	Factor Exposures	Strategy Overview	Weighting Methodology
U.S Quantitative Value	QV INDEX	1/1/1992	Focused Value	Top decile EBIT/TEV, split by quality	Equal-Weight
International Quantitative Value Index	IQV INDEX	1/1/1992	Focused Value	Top decile EBIT/TEV, split by quality	Equal-Weight



*Information on our Indexes are available at alphaarchitect.com/indexes or upon request.

Quantitative Value Index Characteristics

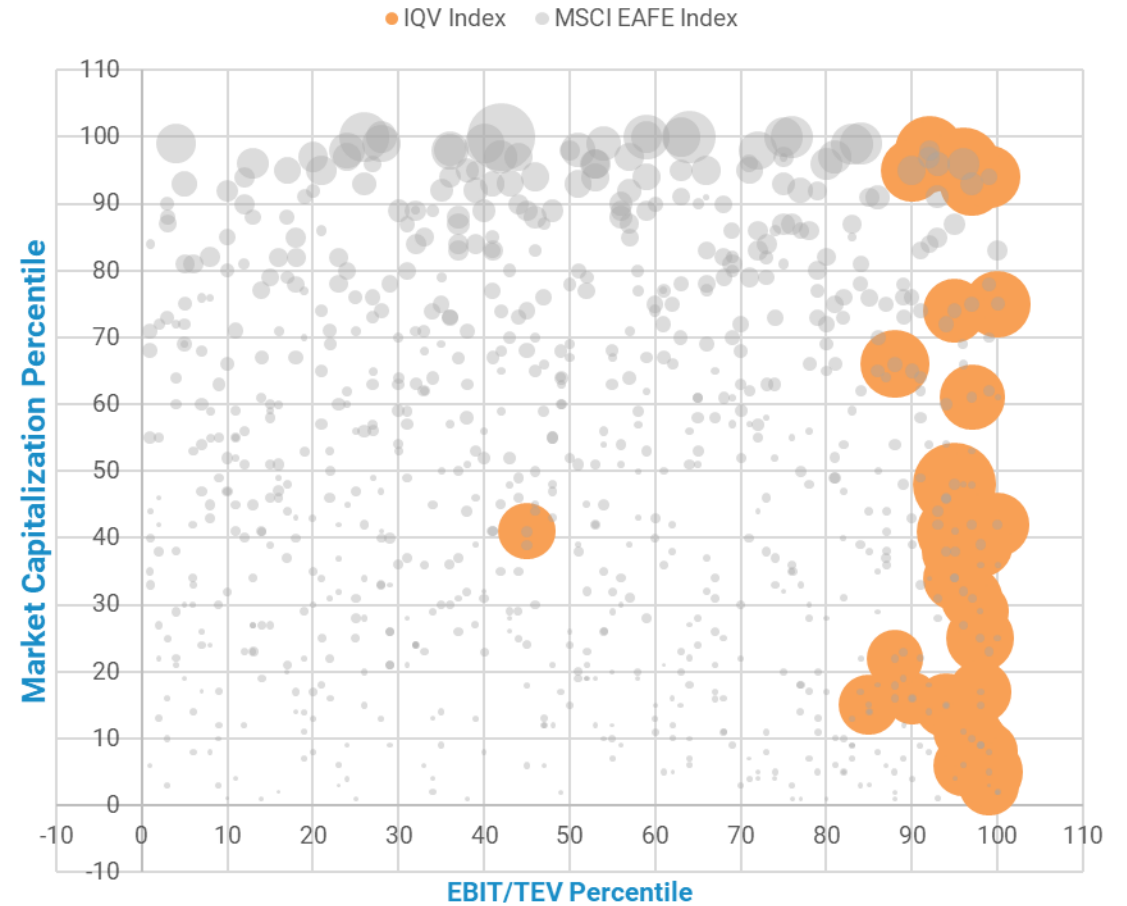
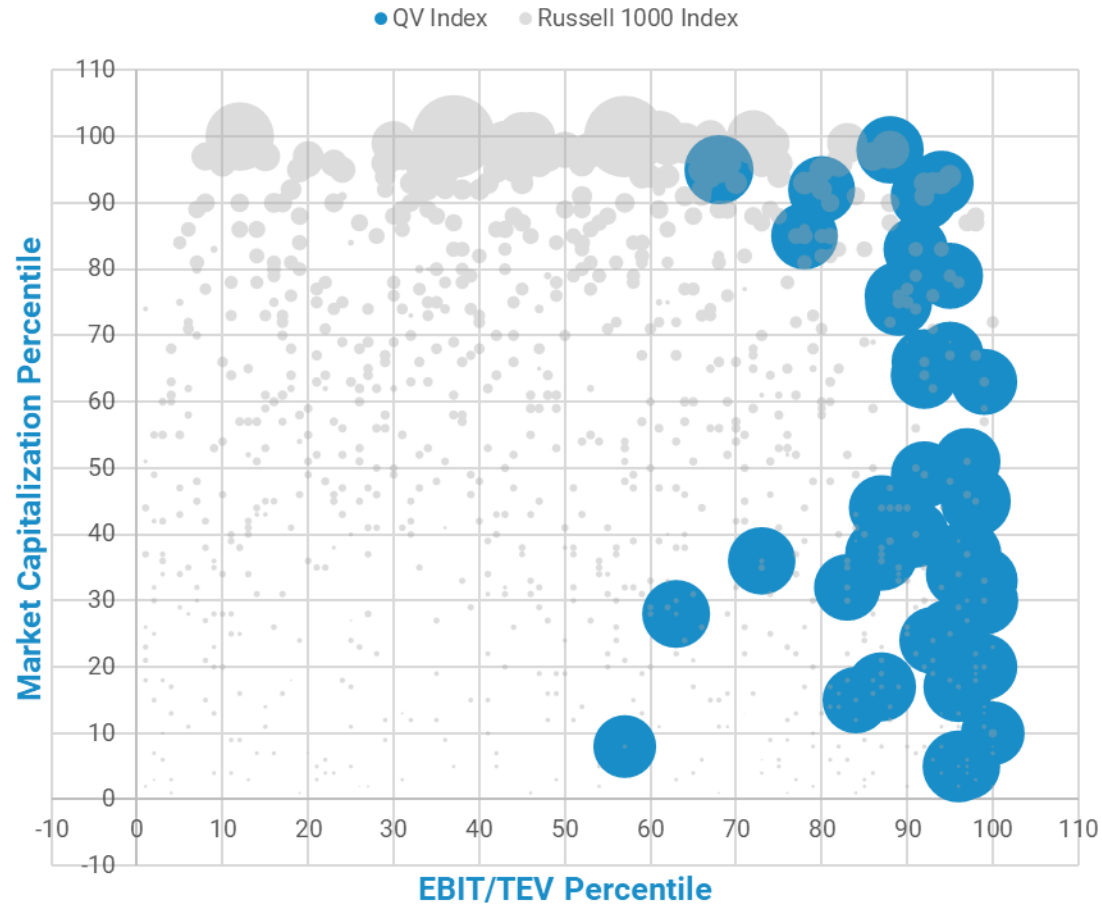
The Indexes seek to own smaller, cheaper, and higher quality stocks



Source: Please see disclosures for additional information. Additional information regarding the construction of these results is available upon request. Indexes are unmanaged, do not reflect management or trading fees, and one cannot invest directly in an index. Characteristics are from FactSet and derived via the ETFs that track the respective Indexes. Characteristics are holdings-weighted.

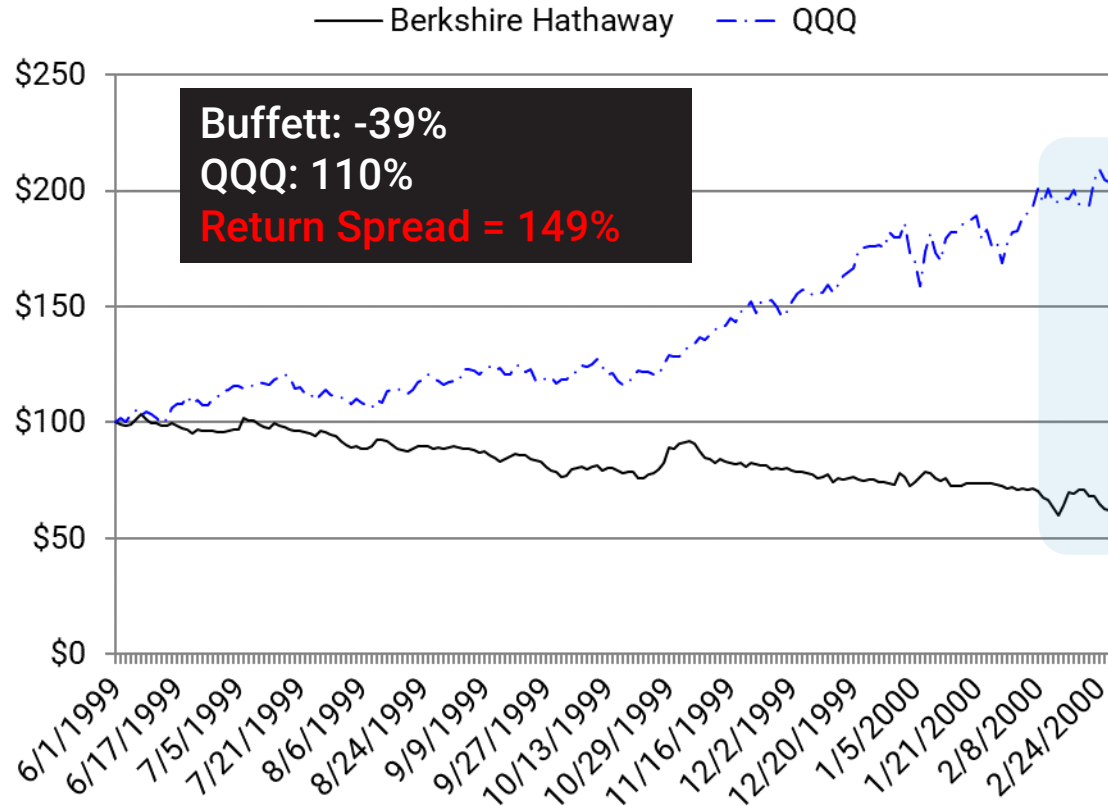
Quantitative Value Index: Characteristics

Quantitative Value Indexes are concentrated in cheap companies across the size spectrum



Important Reminder: Being Unique, Means Being Different

9-Months of Extreme Relative Performance Pain



Warren Buffett

“Charlie, should we buy tech?”

“Warren Buffett may be losing his magic touch.”

BARRON'S


Sustainable Investing
Requires Perspective

Source: Factset. 6/1/1999 to 2/29/2000. The results are hypothetical results and are NOT an indicator of future results and do NOT represent returns that any investor actually attained. Please see disclosures for additional information. Additional information regarding the construction of these results is available upon request.

Potential Costs and Benefits of Our Indexes

Goal	QV/IQV Index	Passive Index
Differentiated Value Exposure	High	Low
Factor Concentration	High	Low
Potential for Excess Return	High	Low

*Information on our Indexes are available at alphaarchitect.com/indexes or upon request.

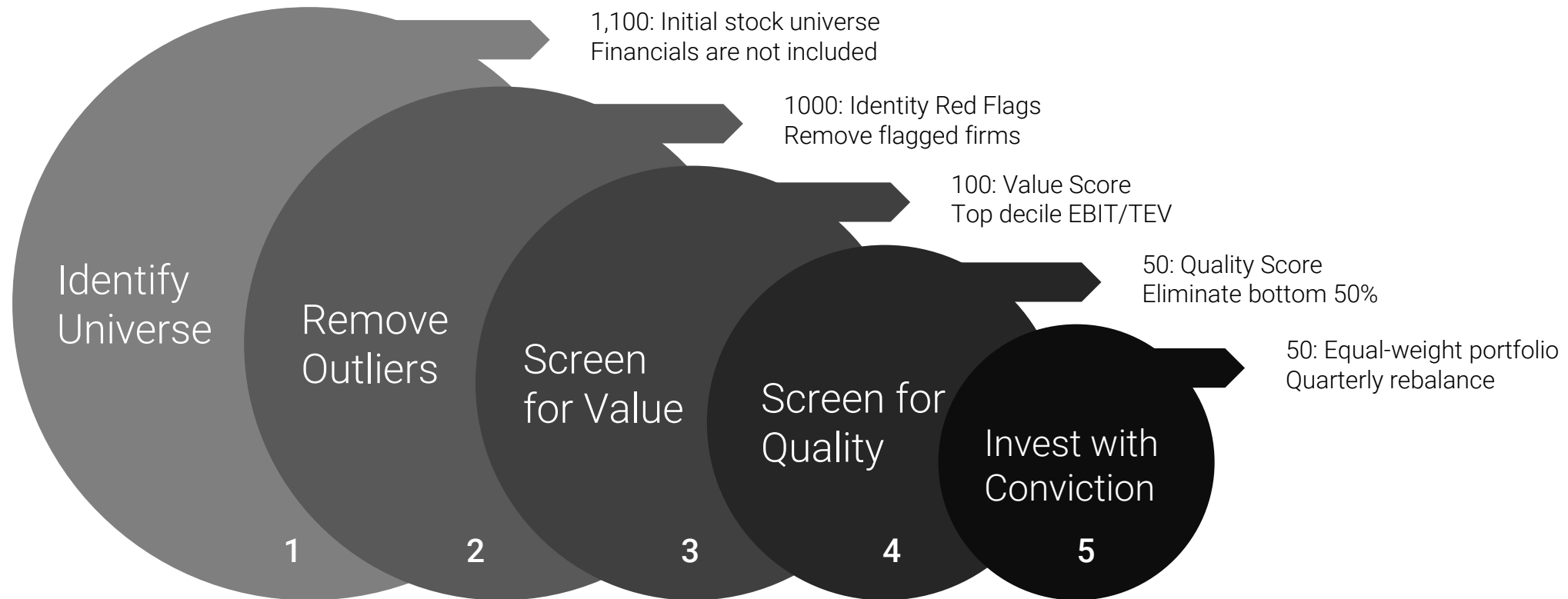


Quantitative Value Index Methodology

The Quantitative Value Indexes Stock Selection Details

The Indexes seek to buy the **cheapest, highest** quality value stocks¹

- QV Index universe consists of mid and large-cap stocks
- IQV Index universe consists of developed international mid and large-cap stocks



¹This example is provided for illustration purposes only. The actual numbers may vary for the QV Index. For the IQV Index, modifications to steps #2 and #4 are made because of data limitations associated with international stocks. The IQV rebalance is less frequent because of the increased costs associated with investing in international stocks. IQV generally has 50 stocks versus 40 stocks for QV because the starting universe is generally larger.

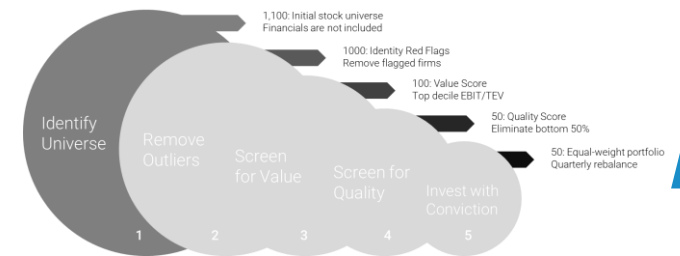
Step 1: Identify Universe

Liquidity Restrictions

- Mid- and large-cap universe

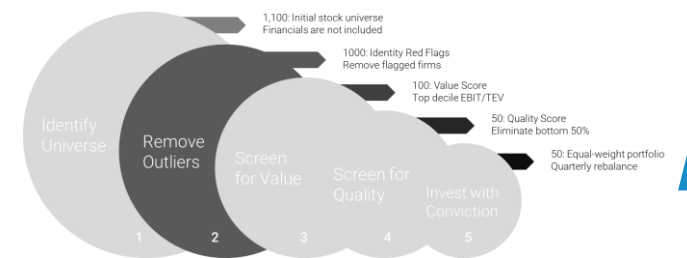
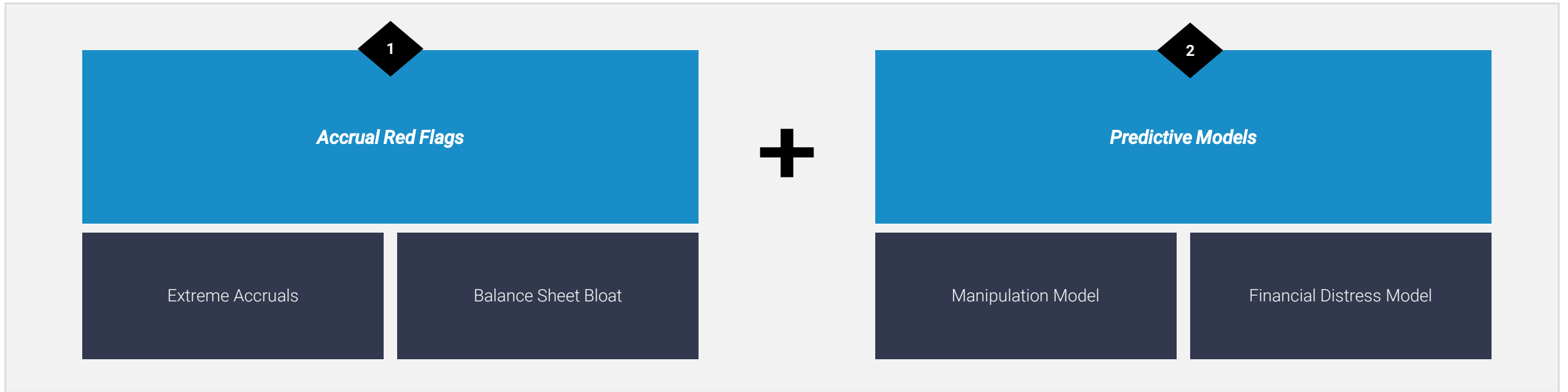
Universe Rules

- Operating companies only: no ADRs, REITs, ETFs, and CEFs
- 25% sector constraint
- Financial firms are eliminated due to the unique nature of their financial statements



Step 2: Remove Outliers

Forensic accounting screens seek to avoid “value traps”



Step 2: Remove Outliers

Forensic accounting screens seek to avoid “value traps”

1 Extreme Accruals

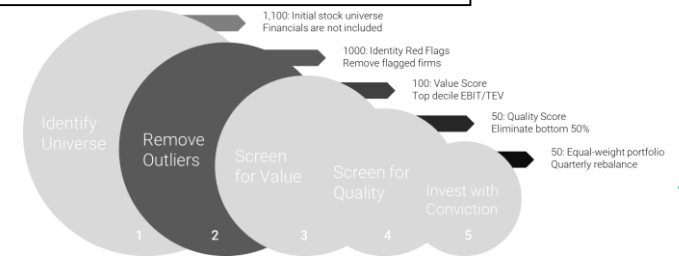
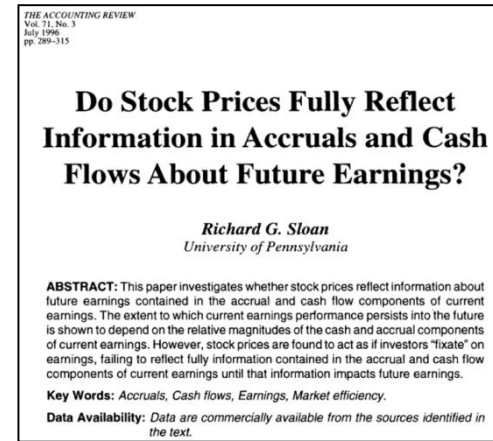
$$STA = \text{Net Income} - \text{Cash Flow from Operations}$$

- Scaled by Total Assets

2 Balance Sheet Bloat

$$SNOA = \text{Operating Assets} - \text{Operating Liabilities}$$

- Scaled by Total Assets



Step 2: Remove Outliers

Forensic accounting screens seek to avoid “value traps”

1 Manipulation Model

- PROBM = Manipulation prediction model
- Seeks to identify potential shenanigans

Home - Financial Analysts Journal - List of Issues - Volume 55, Issue 5 - The Detection of Earnings Manipulation

The Detection of Earnings Manipulation

Messod D. Beneish
DOI: <http://dx.doi.org/10.2469/faj.v55.n5.2296>

Abstract PDF References Cited by

Abstract
Presented are a profile of a sample of earnings manipulators, their distinguishing characteristics, and a suggested model for detecting manipulation. The model's variables are designed to capture either the financial statement distortions that can result from manipulation or preconditions that might prompt companies to engage in such activity. The results suggest a systematic relationship between the probability of manipulation and some financial statement variables. This evidence is consistent with the usefulness of accounting data in detecting manipulation and assessing the reliability of reported earnings. The model identifies approximately half of the companies involved in earnings manipulation prior to public discovery. Because companies that are discovered manipulating earnings see their stocks plummet in value, the model can be a useful screening device for investment professionals. The screening results, however, require determination of whether the distortions in the financial statement numbers result from earnings manipulation or have another structural root.

Author Information
Messod D. Beneish is an associate professor at the Kelley School of Business, Indiana University.

2 Financial Distress Model

- DISTRESS = Financial distress prediction model
- Seeks to identify potential distressed

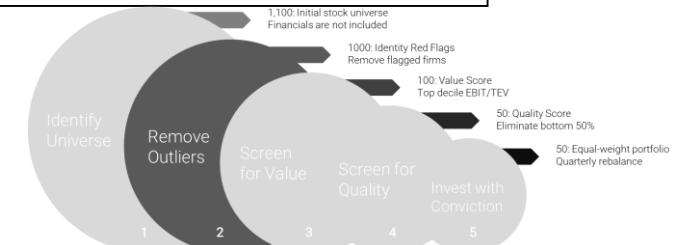
THE JOURNAL OF FINANCE • VOL. LXIII, NO. 6 • DECEMBER 2008

In Search of Distress Risk

JOHN Y. CAMPBELL, JENS HILSCHER, and JAN SZILAGYI*

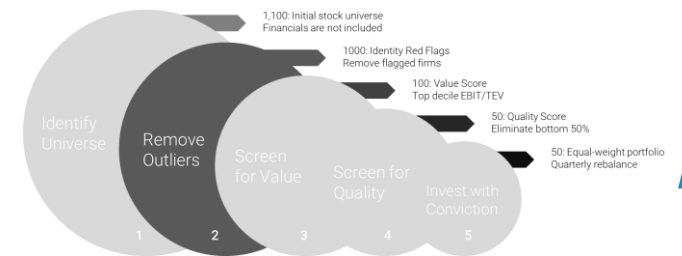
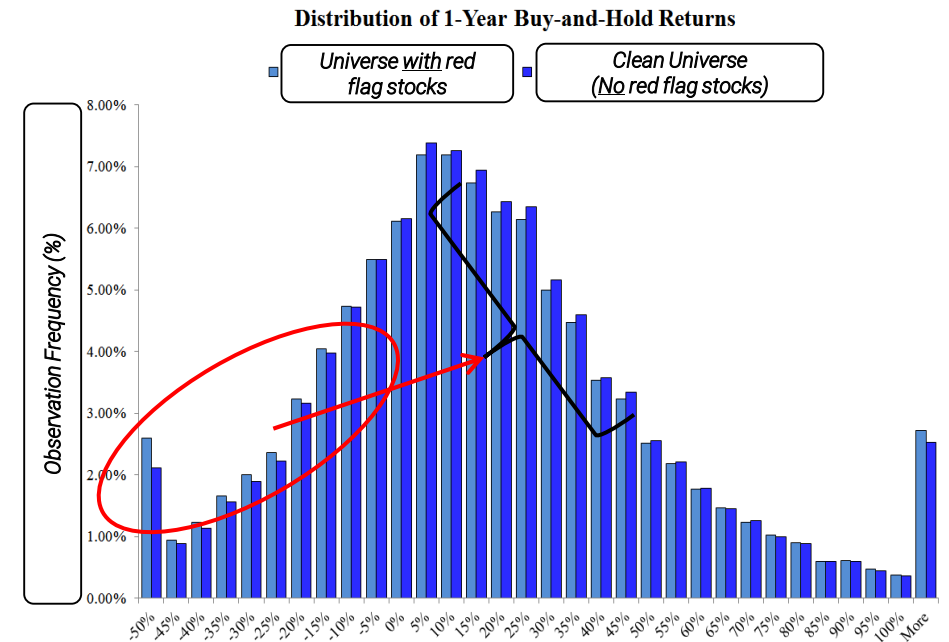
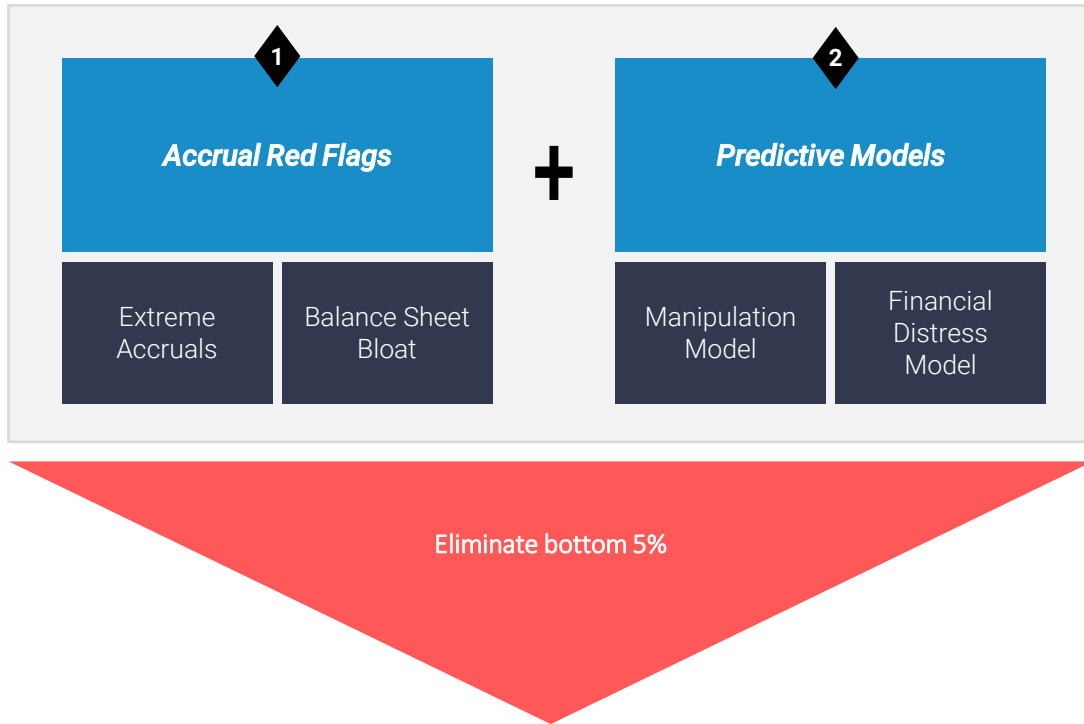
ABSTRACT
This paper explores the determinants of corporate failure and the pricing of financially distressed stocks whose failure probability, estimated from a dynamic logit model using accounting and market variables, is high. Since 1981, financially distressed stocks have delivered anomalously low returns. They have lower returns but much higher standard deviations, market betas, and loadings on value and small-cap risk factors than stocks with low failure risk. These patterns are more pronounced for stocks with possible informational or arbitrage-related frictions. They are inconsistent with the conjecture that the value and size effects are compensation for the risk of financial distress.

THE CONCEPT OF FINANCIAL DISTRESS has been invoked in the asset pricing literature to explain otherwise anomalous patterns in the cross-section of stock returns (Chan and Chen (1991) and Fama and French (1996)). The idea is that certain companies have an elevated probability that they will fail to meet their financial obligations; the stocks of these financially distressed companies tend to move together, so their risk cannot be diversified away; and investors charge a premium for bearing such risk.¹ The premium for distress risk may not be captured by the standard Capital Asset Pricing Model (CAPM) if corporate failures



Step 2: Remove Outliers

Eliminate firms that are in the extreme 5% of any negative screen



Step 3: Value Screen

Academic research highlights the potential benefits of enterprise multiples over other value metrics

Journal of Financial and Quantitative Analysis

Article Metrics

Volume 46, Issue 6 December 2011, pp. 1629-1650 Cited by 5

New Evidence on the Relation between the Enterprise Multiple and Average Stock Returns

Tim Loughran (a1) and Jay W. Wellman (a2)

DOI: <https://doi.org/10.1017/S0022109011000445> Published online: 07 June 2011

Abstract Practitioners increasingly use the enterprise multiple (EM) as a valuation measure. EM is (equity value + debt + preferred stock - cash) / (EBITDA). We document that EM is a strong determinant of stock returns. Following Fama and French (1993) and Chen, Novy-Marx, and Zhang (2010), we create an EM factor that generates a return premium of 5.28% per year. We interpret EM as a proxy for the discount rate. Firms with low EM values appear to have higher discount rates and higher subsequent stock returns than firms with high EM values.

“...the enterprise multiple is a strong determinant of stock returns...”

Journal of Financial and Quantitative Analysis

Article Metrics

Volume 50, Issue 4 August 2015, pp. 781-800

The Enterprise Multiple Investment Strategy: International Evidence

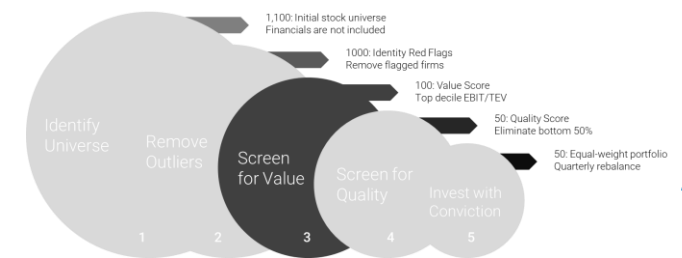
Christian Walkshäusl (a1) and Sebastian Lobe (a2)

DOI: <https://doi.org/10.1017/S002210901500023X> Published online: 13 August 2015

Abstract The enterprise multiple (EM) predicts the cross section of international returns. The return predictability of EM is similarly pronounced in developed and emerging markets and likewise strong among small and large firms. An international portfolio of low-EM firms outperforms a portfolio of high-EM firms by about 1% per month. The EM value premium is individually significant for the majority of countries, remains largely unexplained by existing asset pricing models, is robust after controlling for comovement with the respective U.S. premium, and is highly persistent for up to 5 years after portfolio formation, making it a promising strategy for investors.

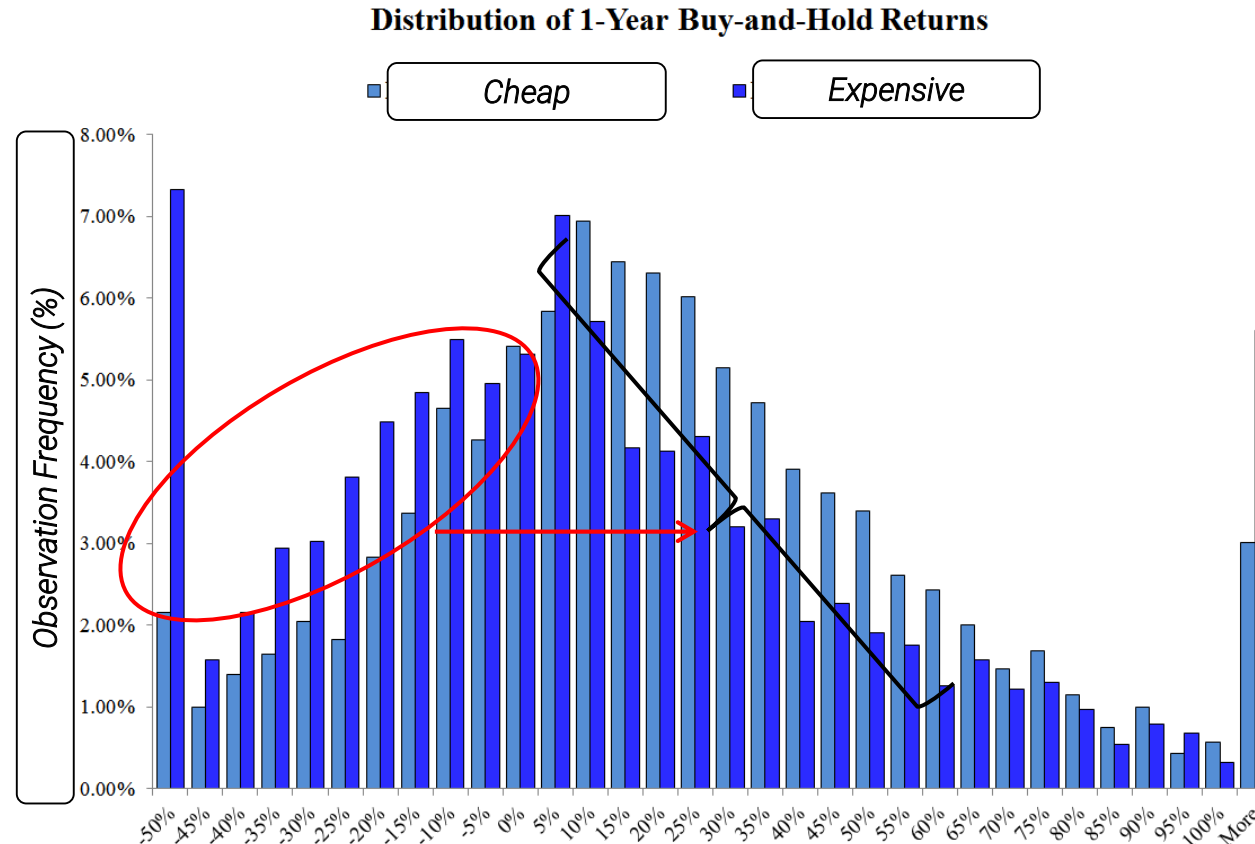
“...return predictability is pronounced in developed and emerging markets...”

Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. Index returns are for illustrative purposes only and do not represent actual fund performance. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns. Indexes are unmanaged and one cannot invest directly in an index.

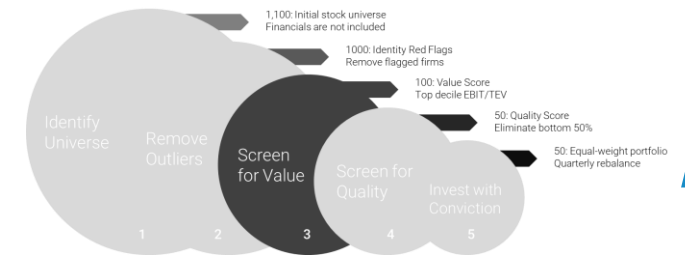


Step 3: Value Screen

Buying cheap stocks has historically shifted the return distribution in an investor's favor

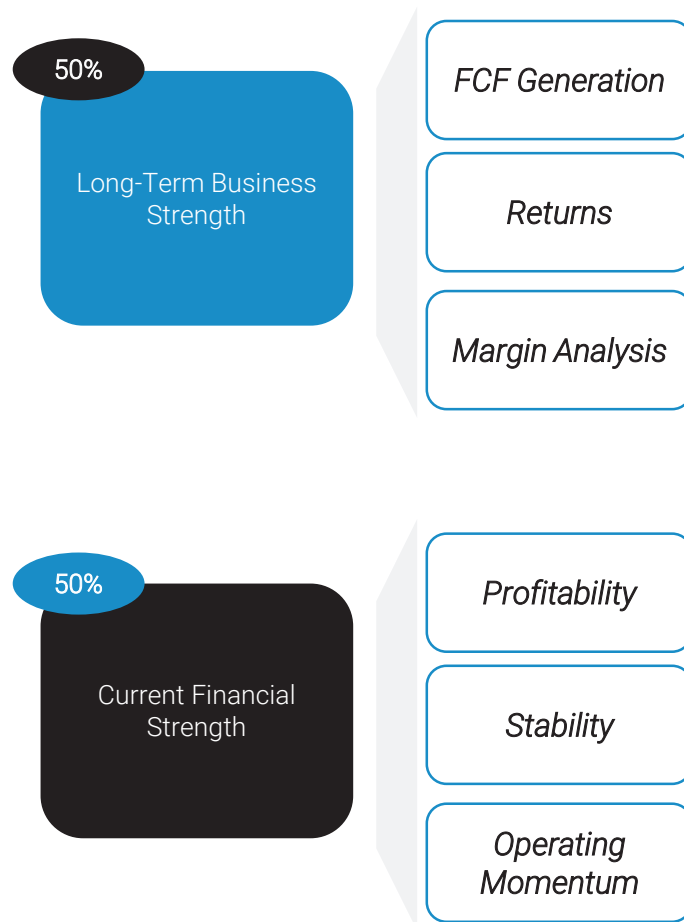


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Step 4: Quality Screen

We focus on fundamentals among the cheapest stocks in our universe



FCF Generation (1/4)

- Long term FCF relative to assets
- *Can you generate FCF through a cycle?*

Economic Returns (1/2)

- Long term return on assets (50%)
- Long term return on capital (50%)
- *Can you generate returns on investments?*

Margin Analysis(1/4)

- Long term margin stability (MS)
- Long term margin growth (MG)
- Max (MS, MG) to score firms based on best margin measure
- *Do you have a defensible business model?*

Current profitability (3/10)

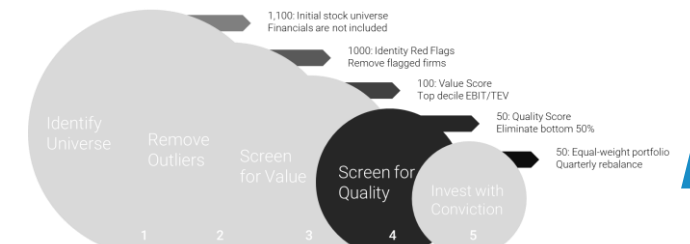
- Positive return on assets
- Positive free cash flow
- High free cash flow to net income

Stability (3/10)

- Paying down debt
- Current ratio improvement
- Net stock repurchases

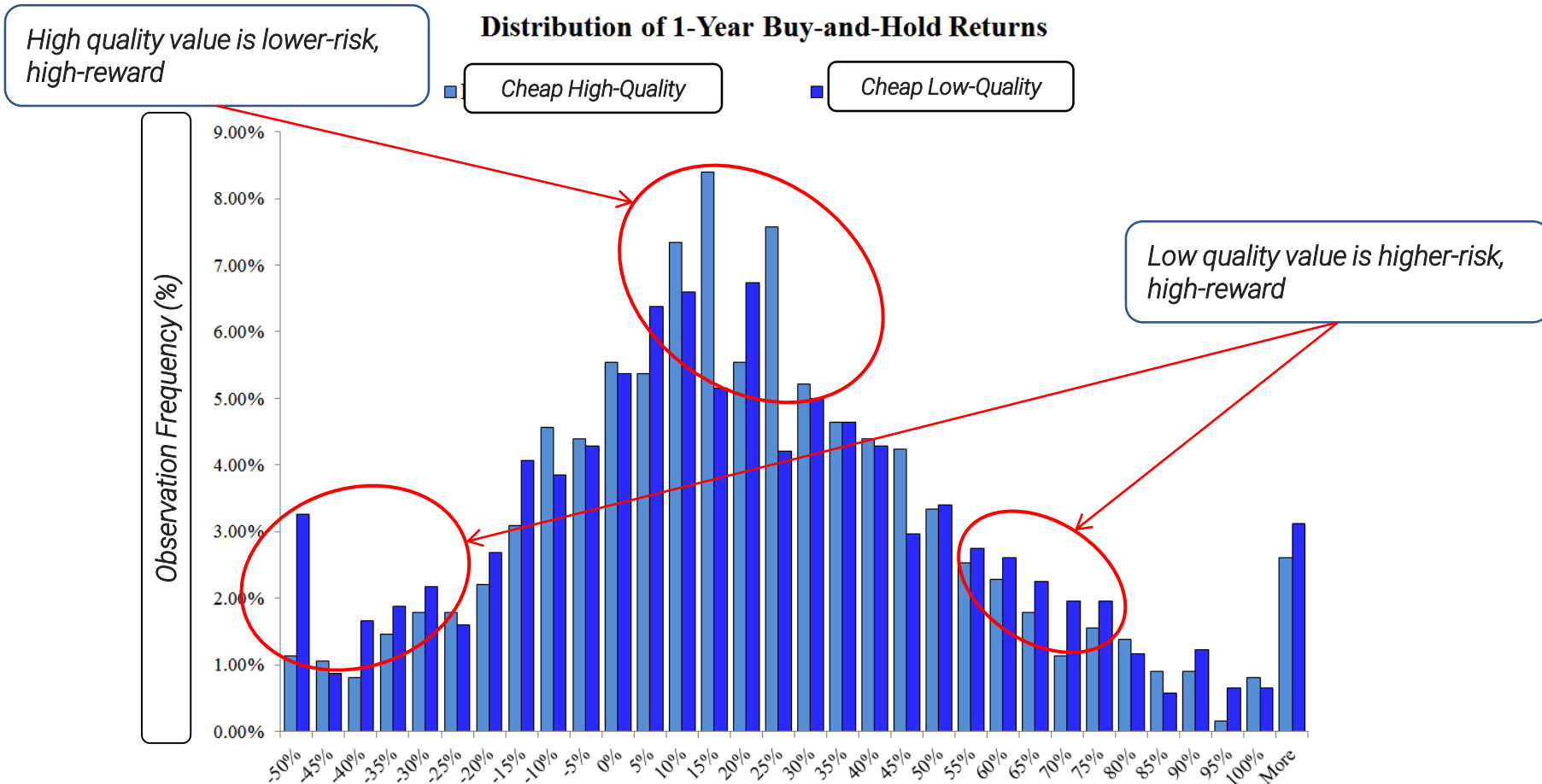
Recent operational improvements (4/10)

- Improving ROA
- Improving FCF/Assets
- Improving gross margin
- Improving asset turnover

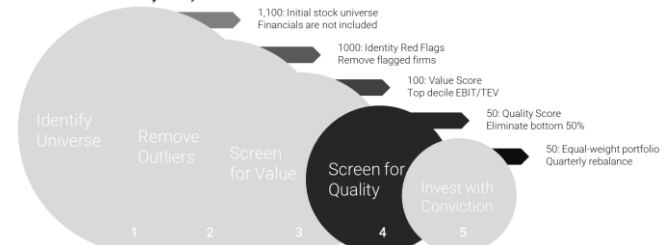


Step 4: Quality Screen

Buying cheap stocks has historically shifted the return distribution in an investor's favor

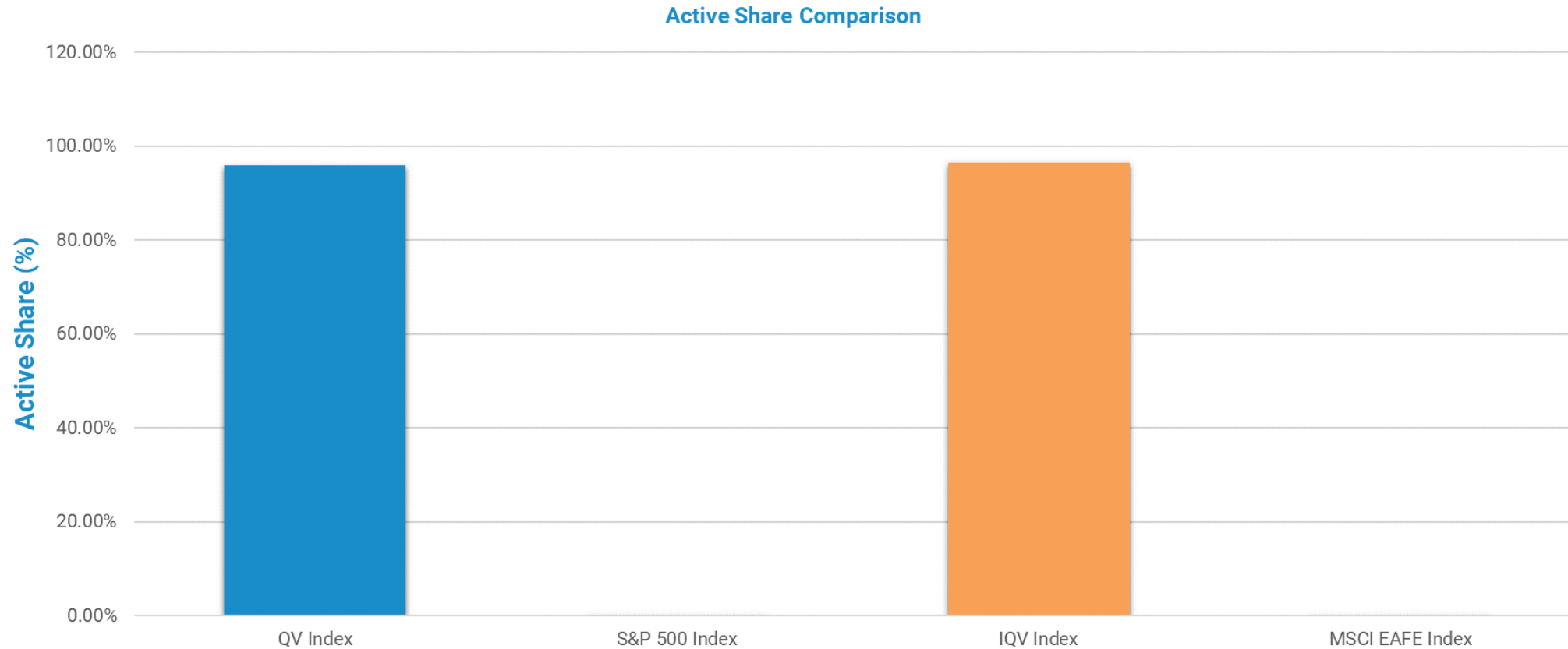


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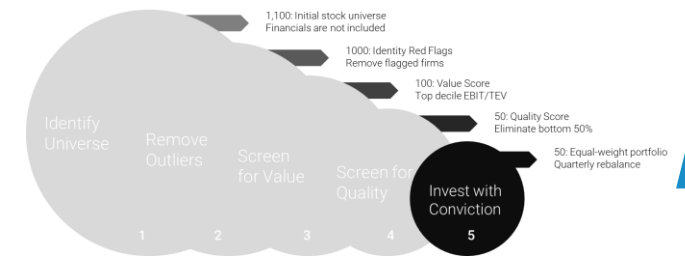


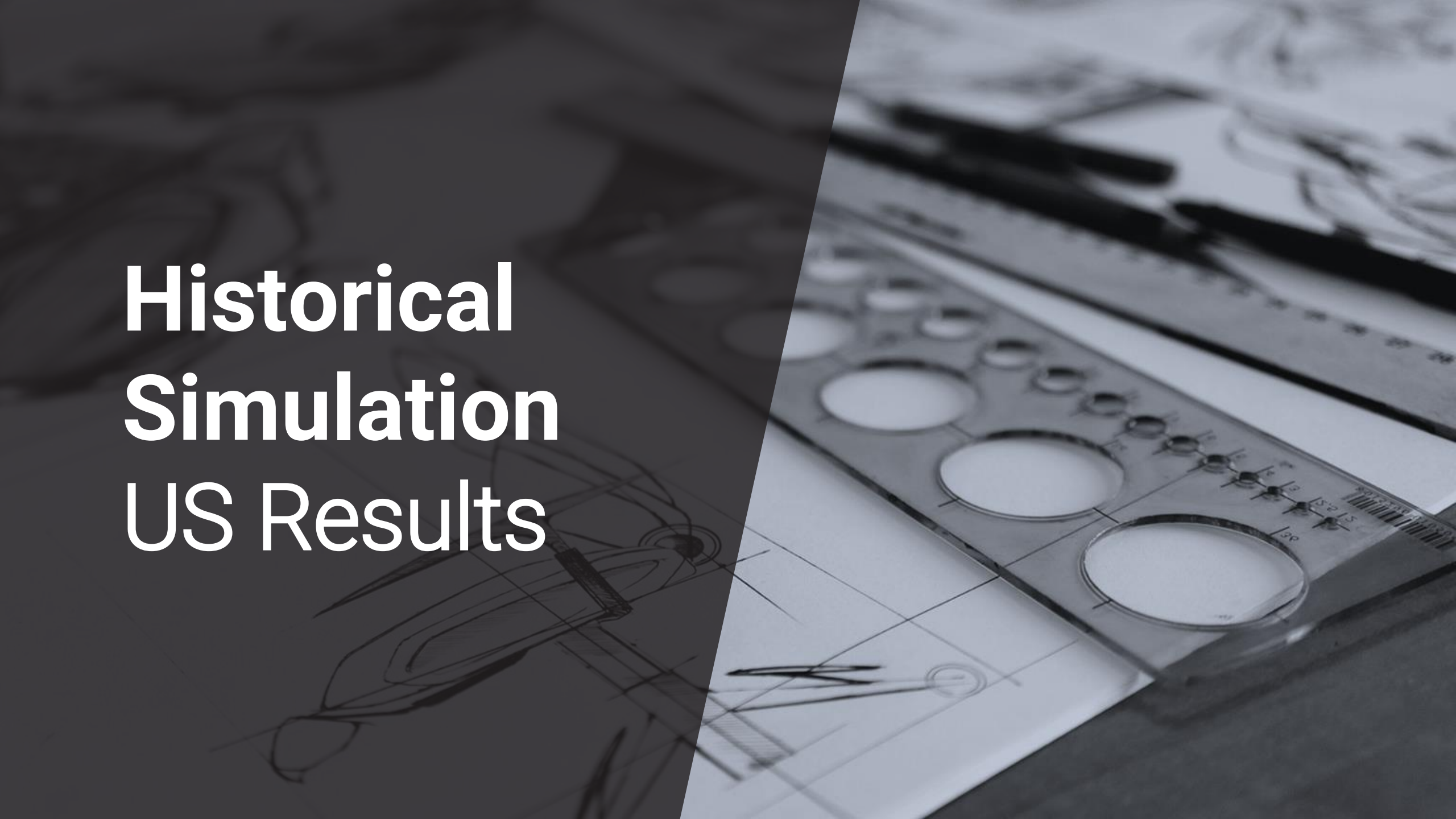
Step 5: Invest with conviction

Our Indexes have high active share relative to standard benchmarks



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Historical Simulation US Results

Simulated Strategy Background

- Simulated Historical Performance: 1/1/1992 to 12/31/2018
- Follows the first 5 steps of the Quantitative Value Index Methodology
- Quarterly rebalanced and equal-weighted
- QV Index results are net of 100bps management fee and 100bps transaction costs (2% total)
- Alpha Architect calculations through 10/31/2014; Solactive calculations thereafter
- All returns are total returns and include the reinvestment of distributions (e.g., dividends)
- Data sources include CRSP, Compustat, Bloomberg, and Solactive
- Legend
 - QV_INDEX_NET = Quantitative Value (net of fees)
 - FF_VAL = Generic Value portfolio from Ken French's website
 - Top decile of firms based on book-to-market, value-weighted
 - MSCI US Value = MSCI US Value Total Return Index
 - SP500 = S&P 500 Total Return Index
- Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. Index returns are for illustrative purposes only and do not represent actual fund performance. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns. Indexes are unmanaged and one cannot invest directly in an index.
- Please see the disclosures at the end of this document for additional information.

Simulated Summary Statistics

Higher potential returns and higher potential risks

Summary Statistics	QV_INDEX_NET	FF_VAL	MSCI US VALUE	SP500
CAGR	11.99%	11.02%	8.10%	9.06%
Sharpe Ratio (RF=T-Bills)	0.57	0.47	0.45	0.51
Worst Drawdown	-50.98%	-70.80%	-55.38%	-50.95%
1-Year Annualized Return	-18.21%	-21.94%	-7.18%	-4.38%
3-Year Annualized Return	4.13%	6.02%	7.77%	9.26%
5-Year Annualized Return	-0.28%	2.98%	6.63%	8.50%
10-Year Annualized Return	12.24%	9.22%	10.65%	13.12%
Since Inception (1/1992)	11.99%	11.02%	8.10%	9.06%

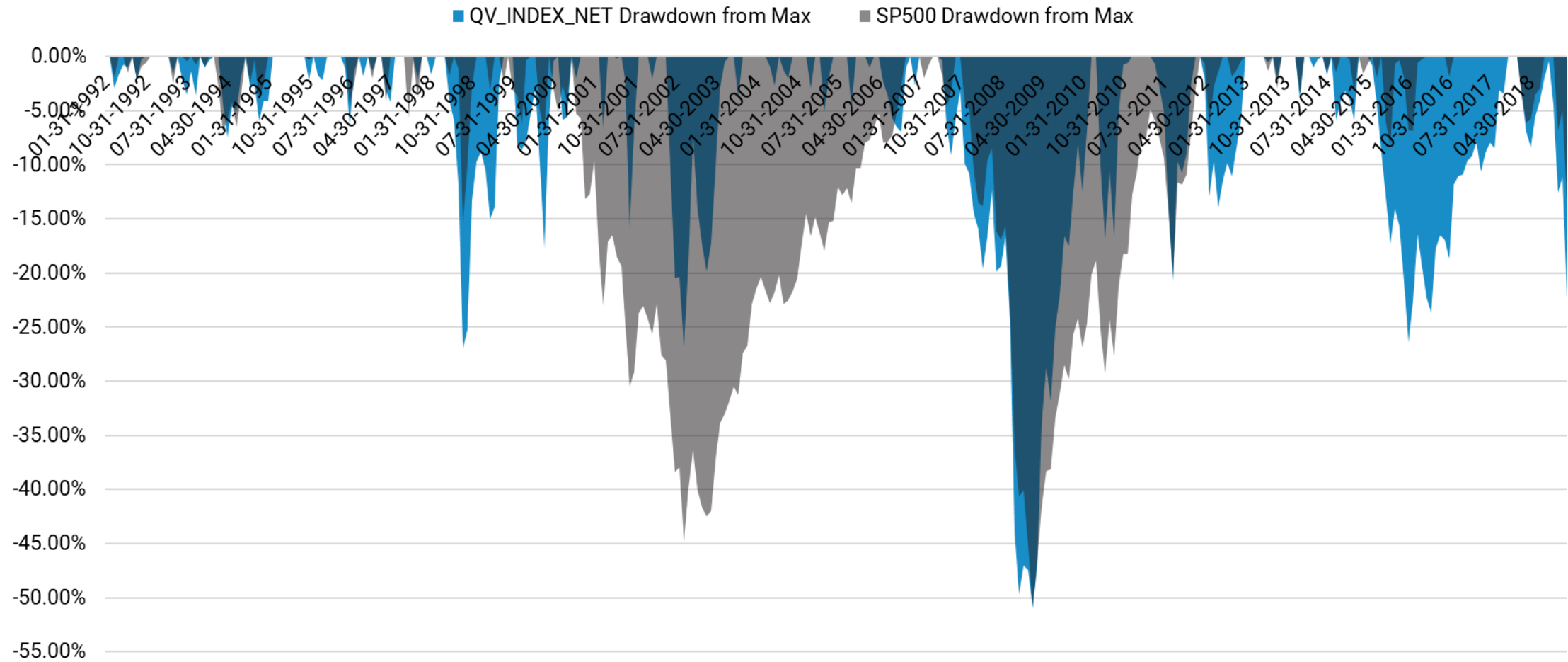
Correlation Matrix	QV_INDEX_NET	FF_VAL	MSCI US VALUE	SP500
QV_INDEX_NET	100.00%	76.89%	80.94%	79.60%
FF_VAL	76.89%	100.00%	82.27%	79.39%
MSCI US VALUE	80.94%	82.27%	100.00%	95.18%
SP500	79.60%	79.39%	95.18%	100.00%

**Bold denotes values less than |.5|



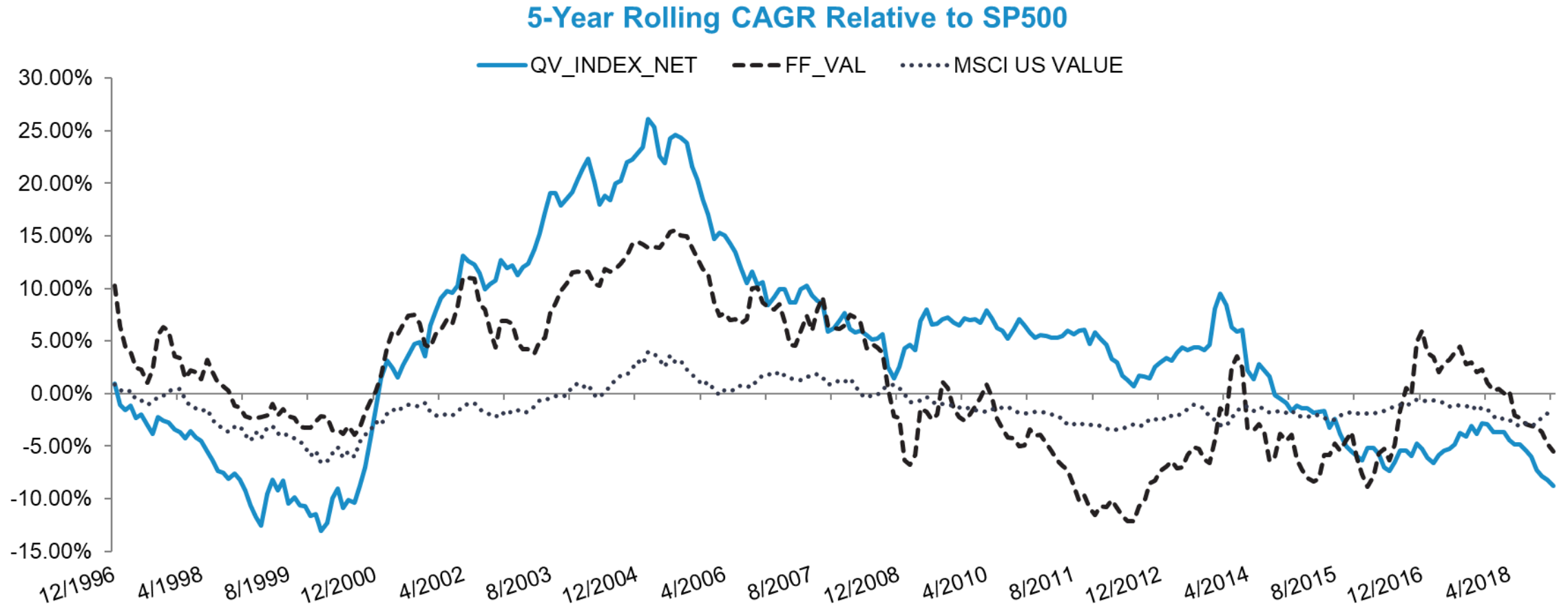
Simulated Drawdown Analysis

Potential for large losses



Simulated Relative Performance

Potential for large deviations from standard benchmarks





Historical Simulation International Results

Simulated Strategy Background

- Simulated Historical Performance: 1/1/1992 to 12/31/2018
- Adjusted Quantitative Value process for International stocks (primarily developed markets)
 - Semi-annual rebalance and equal-weighted
 - IQV results are net of 100bps management fee and 100bps transaction costs (2% total)
 - Alpha Architect calculations through 12/31/2014; Solactive calculations thereafter
 - All returns are total returns and include the reinvestment of distributions (e.g., dividends)
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 - Average of 3 top market-cap quintile portfolios with highest book-to-market, value-weighted
 - EAFE VALUE = MSCI EAFE Value Total Return Index
 - EAFE = MSCI EAFE Total Return Index
- Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. Index returns are for illustrative purposes only and do not represent actual fund performance. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns. Indexes are unmanaged and one cannot invest directly in an index.
- Please see the disclosures at the end of this document for additional information.

Simulated Summary Statistics

Higher potential returns and higher potential risks

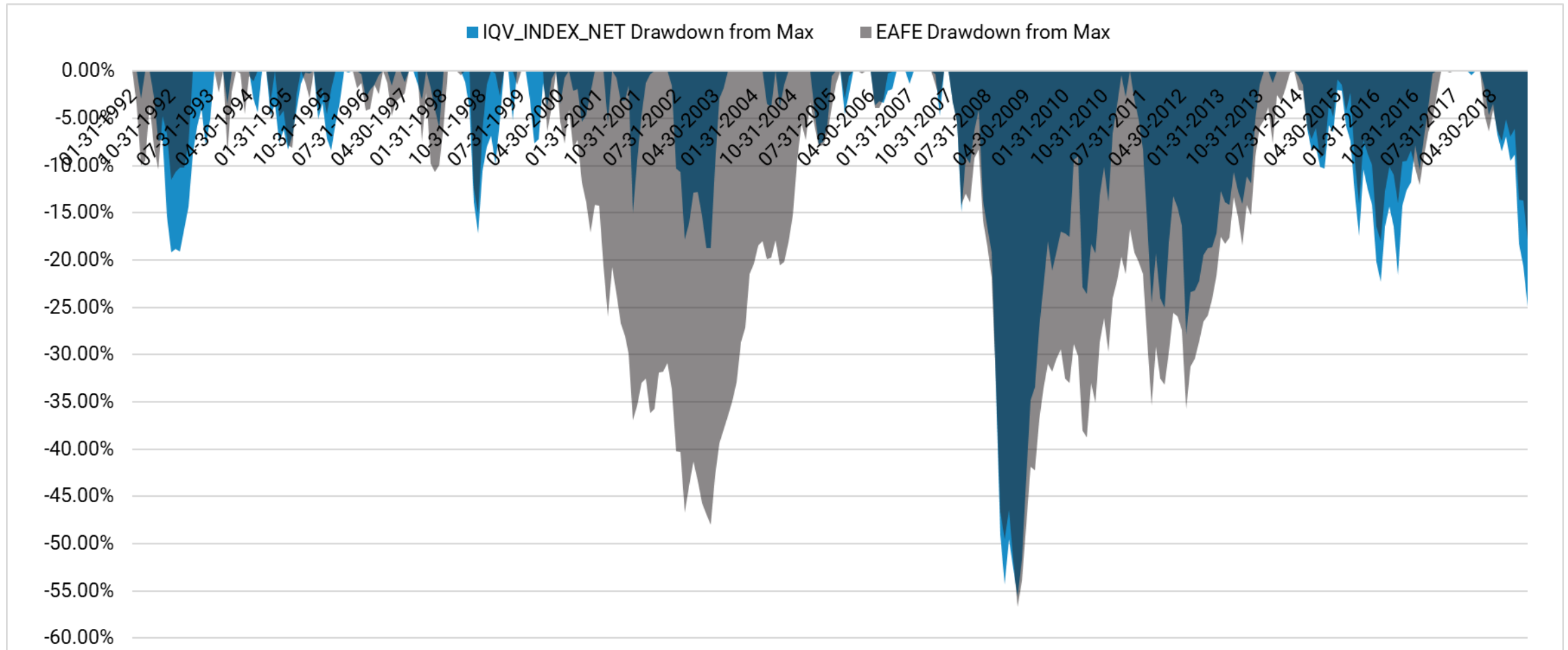
Summary Statistics	IQV_INDEX_NET	FF_INT_VAL	EAFE VALUE	EAFE
CAGR	10.25%	7.61%	5.69%	4.87%
Sharpe Ratio (RF=T-Bills)	0.52	0.37	0.27	0.22
Worst Drawdown	-55.63%	-57.54%	-58.93%	-56.68%
1-Year Annualized Return	-22.87%	-16.40%	-14.78%	-13.79%
3-Year Annualized Return	2.50%	4.87%	2.82%	2.88%
5-Year Annualized Return	-0.43%	0.45%	-0.61%	0.53%
10-Year Annualized Return	7.28%	6.50%	5.50%	6.32%
Since Inception (1/1992)	10.25%	7.61%	5.69%	4.87%

Correlation Matrix	IQV_INDEX_NET	FF_INT_VAL	EAFE VALUE	EAFE
IQV_INDEX_NET	100.00%	89.88%	88.23%	87.08%
FF_INT_VAL	89.88%	100.00%	94.67%	92.49%
EAFE VALUE	88.23%	94.67%	100.00%	98.11%
EAFE	87.08%	92.49%	98.11%	100.00%

**Bold denotes values less than |.5|

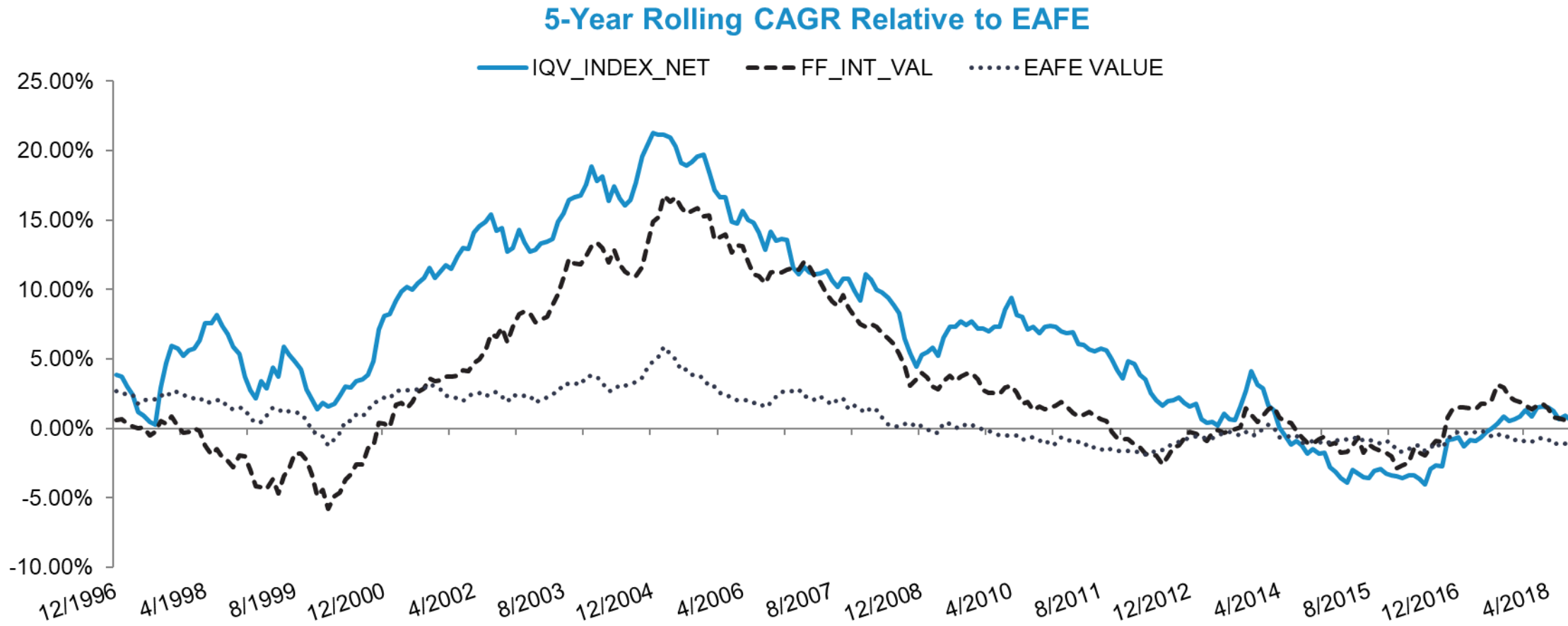
Simulated Drawdown Analysis

Potential for large losses



Simulated Relative Performance

Potential for large deviations from standard benchmarks



Portfolio Applications

The image is a composite graphic. The left side is a dark, semi-transparent overlay containing the text 'Portfolio Applications' in a bold, white, sans-serif font. The right side shows a technical drawing on a grid background. It features a series of concentric circles and smaller circles arranged in a pattern, possibly representing a mechanical part or a design element. A ruler is visible at the bottom right, and a pen or pencil lies across the top right. The overall aesthetic is professional and technical.

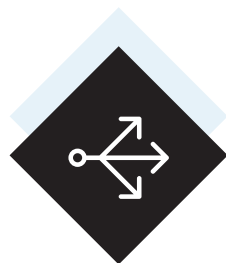
How to Use Our Indexes: Deployment Options



Core Satellite

Combine an aggressive factor portfolio alongside a core low-cost market beta portfolio.

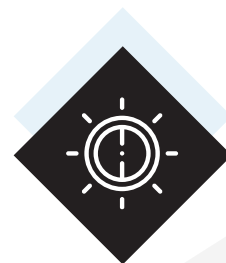
-
- +Potential for higher returns
 - Potential for tracking error



Factor Diversification

Deploy a focused factor allocation alongside a low-tracking error factor exposure.

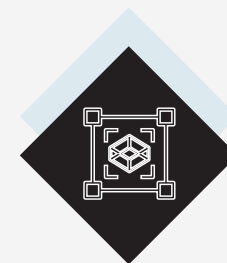
-
- +Potential factor diversification
 - Potential for tracking error



Alternative Exposure

Deploy the exposure in an alternative sleeve, where tracking error expectations are high.

-
- +Potential to diversify portfolio
 - Potential for tracking error



AA Model*

Deploy the exposures in accordance with custom Alpha Architect allocation models.

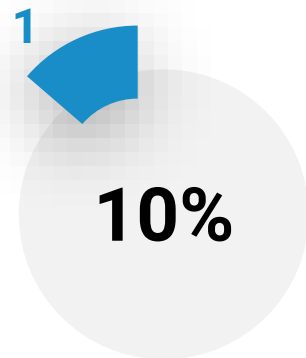
-
- +Max leverage on AA research efforts
 - Potential for tracking error

*Contact us for additional information.

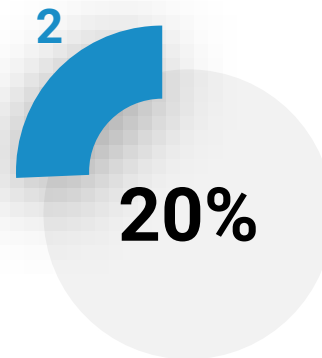
Core-Satellite Allocation: 3 variations for different objectives

Contact us for customized model solutions to minimize behavioral issues

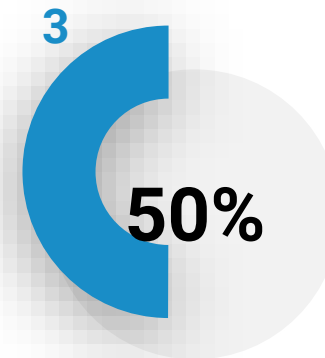
Examples below with different global (i.e., 50% QV Index/IQV Index) value factor exposures



Benchmark
Constrained



Benchmark
Aware



Focused
Factors

Simulated Strategy Background

- Simulated Historical Performance: 1/1/1992 to 12/31/2018
- QV & IQV
 - Adjusted Quantitative Value process for International stocks (primarily developed markets).
 - Equal-weighted. Quarterly rebalance for QV and Semi-annual rebalance for IQV.
 - QV & IQV = Equal-weight across QV Net Index and IQV Net Index.
 - QV and IQV Index results are net of 100bps management fee and 100bps transaction costs (2% total).
 - Alpha Architect calculations through 10/31/2014 for QV and 12/31/2014 for IQV; Solactive calculations thereafter.
- All returns are total returns and include the reinvestment of distributions (e.g., dividends).
- Data sources include Alpha Architect and Bloomberg.
- Legend
 - MSCI WORLD = MSCI World Net Total Return USD Index
 - WORLD + 10% QV & IQV = 90% in MSCI WORLD and 10% in QM/IQM Index, monthly rebalanced
 - WORLD + 20% QV & IQV = 80% in MSCI WORLD and 20% in QM/IQM Index, monthly rebalanced
 - WORLD + 50% QV & IQV = 50% in MSCI WORLD and 50% in QM/IQM Index, monthly rebalanced
- Performance figures contained herein are hypothetical, unaudited and prepared by Alpha Architect, LLC; hypothetical results are intended for illustrative purposes only. Past performance is not indicative of future results, which may vary. Index returns are for illustrative purposes only and do not represent actual fund performance. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns. Indexes are unmanaged and one cannot invest directly in an index.
- Please see the disclosures at the end of this document for additional information.

Simulated Summary Statistics

Adding focused factor exposure generates higher risk-adjusted returns

Summary Statistics	MSCI WORLD	MSCI WORLD + 10% QV&IQV	MSCI WORLD + 20% QV&IQV	MSCI WORLD + 50% QV&IQV
CAGR	6.64%	7.14%	7.64%	9.09%
Sharpe Ratio (RF=T-Bills)	0.35	0.38	0.41	0.50
Worst Drawdown	-54.03%	-53.83%	-53.64%	-53.12%
1-Year Annualized Return	-8.71%	-9.94%	-11.15%	-14.71%
3-Year Annualized Return	6.31%	6.05%	5.79%	5.00%
5-Year Annualized Return	4.56%	4.10%	3.63%	2.22%
10-Year Annualized Return	9.67%	9.72%	9.76%	9.86%
Since Inception (1/1992)	6.64%	7.14%	7.64%	9.09%

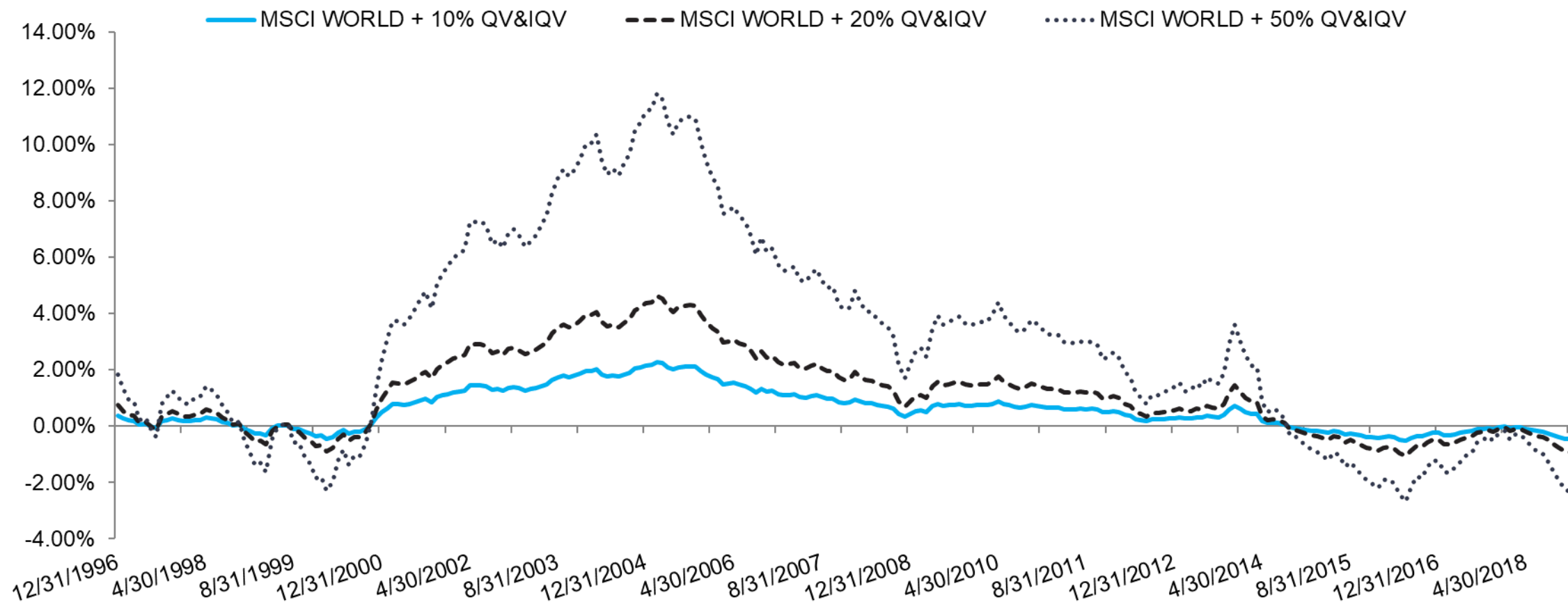
Correlation Matrix	MSCI WORLD	MSCI WORLD + 10% QV&IQV	MSCI WORLD + 20% QV&IQV	MSCI WORLD + 50% QV&IQV
MSCI WORLD	100.00%	99.84%	99.36%	96.17%
MSCI WORLD + 10% QV&IQV	99.84%	100.00%	99.84%	97.57%
MSCI WORLD + 20% QV&IQV	99.36%	99.84%	100.00%	98.65%
MSCI WORLD + 50% QV&IQV	96.17%	97.57%	98.65%	100.00%

**Bold denotes values less than |.5|

Simulated Relative Performance

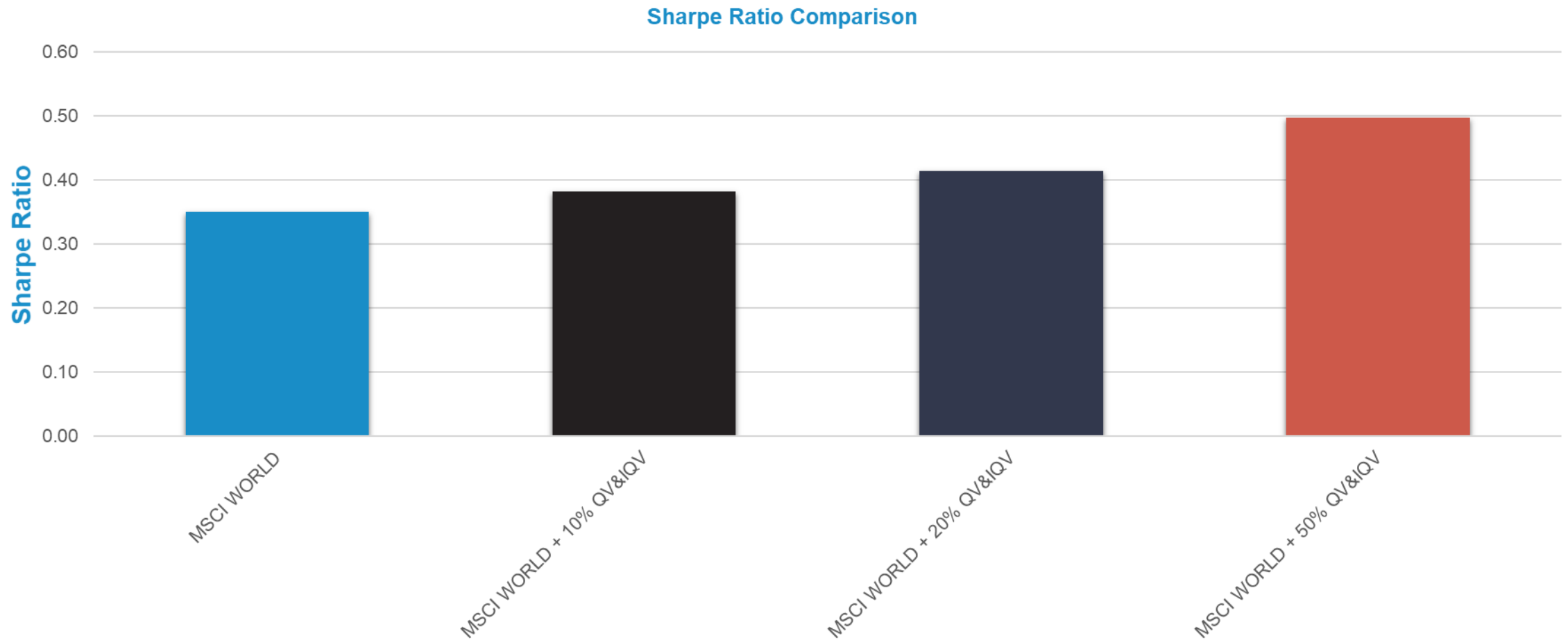
Potential for deviations from standard benchmarks

5-Year Rolling CAGR Relative to MSCI WORLD



Simulated Risk-Adjusted Performance

Potential to enhance risk-adjusted performance





alpha architect

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Appendix

A dark, moody photograph of a desk. On the right, a silver laptop is partially visible. In the center, a pair of round-rimmed glasses rests on a white notebook. The left side of the image is dominated by a semi-transparent dark overlay that contains the word 'Appendix' in a clean, white, sans-serif font.

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There are risks involved with investing, including loss of principal. There is no assurance that the objectives of any strategy or fund will be achieved or will be successful. No investment strategy, including diversification, can protect against market risk or loss. Current and future portfolio holdings are subject to risk. Past performance does not guarantee future results.

There is a risk of substantial loss associated with trading commodities, futures, options and other financial instruments. Before trading, investors should carefully consider their financial position and risk tolerance to determine if the proposed trading style is appropriate. Investors should realize that when trading futures, commodities and/or granting/writing options one could lose the full balance of their account. It is also possible to lose more than the initial deposit when trading futures and/or granting/writing options. All funds committed to such a trading strategy should be purely risk capital.

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Index returns are for illustrative purposes only and do not represent actual fund performance. References to an index do not imply that the portfolio will achieve returns, volatility or other results similar to that index. The composition of the index may not reflect the manner in which a portfolio is constructed in relation to expected or achieved returns, portfolio guidelines, restrictions, sectors, correlations, concentrations, volatility or tracking error targets, all of which are subject to change. Index performance returns do not reflect any management fees, transaction costs, or expenses, which would reduce returns.

Indexes are unmanaged and one cannot invest directly in an index. There are no active components of indexes; therefore, using them as a proxy can be of limited value because there is no guarantee that the portfolio would have been managed to match the index. Realized returns and/or volatility may come in higher or lower than expected.

Annual performance is calculated based on monthly return streams, geometrically linked as of the end of the specified month end.

Results, unless cited otherwise, are shown gross of fees and do not reflect the effect of investment fees which would lower performance. Performance reflects the reinvestment of dividends and other earnings. The following hypothetical illustrates the compound effect fees have on investment return: For an account charged 1% with a stated annual return of 10%, the net total return before taxes would be reduced from 10% to 9%. A ten year investment of \$100,000 at 10% would grow to \$259,374, and at 9%, to \$236,736 before taxes. For a complete description of all fees and expenses, please refer to Alpha Architect's Form ADV Part 2A.

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IMPORTANT INFORMATION - DISCLOSURES

- Simulated Historical Performance: All returns are total returns and include the reinvestment of distributions (e.g., dividends).
- Index Characteristics Data Source: Characteristics are from FactSet and derived via the ETFs that track the respective Indexes. Characteristics are holdings-weighted. The data for the performance and factor attribution analysis are from Alpha Architect and Solactive.
- The S&P 500 Index (SP500) is a capitalization-weighted index that measures the performance of the broad U.S. equity market.
- The MSCI EAFE Index (EAFE) is a capitalization-weighted index that measures the performance of developed market equities, excluding the U.S. and Canada.
- The MSCI World Index is a capitalization-weighted index that measures the performance of developed market equities.
- EBIT/TEV is defined as earnings before interest and taxes divided by total enterprise value.
- Momentum (2-12) is defined as the cumulative total return for the past 12 months, excluding the last (12th) month.
- Size is defined as the total market value of the company's listed equity.
- Return on assets is defined as net income divided by total assets.
- Compound annualized growth rate, or CAGR, is defined as the annualized growth of an initial investment to the ending investment value if you assume that the investment has been compounding over the time period.
- Standard Deviation: Sample standard deviation
- Downside Deviation: Sample standard deviation, but only monthly observations below 41.67bps (5%/12) are included in the calculation
- Sharpe Ratio (annualized): Average monthly return minus treasury bills divided by standard deviation
- Sortino Ratio (annualized): Average monthly return minus treasury bills divided by downside deviation
- Appraisal Ratio (annualized): CAPM regression intercept estimate divided by regression residual volatility
- Worst Drawdown: Worst peak to trough performance (measured based on monthly returns)
- Rolling X-Year Win %: Percentage of rolling X periods that a strategy outperforms
- Sum (5-Year Rolling MaxDD): Sum of all 5-Year rolling drawdowns
- Down %: The Down Number Ratio is a measure of the number of periods that the investment was down when the benchmark was down, divided by the number of periods that the benchmark was down. The smaller the ratio, the better
- Up %: The Up Number Ratio is a measure of the number of periods that the investment was up when the benchmark was up, divided by the number of periods that the benchmark was up. The larger the ratio, the better
- Tracking Error: Tracking Error is measured by taking the square root of the average of the squared deviations between the investment's returns and the benchmark's returns
- Negative Correlation: Correlation of returns relative to benchmark returns when the benchmark is negative
- Positive Correlation: Correlation of returns relative to benchmark returns when the benchmark is positive
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