# Barclays Equity Factor Indices

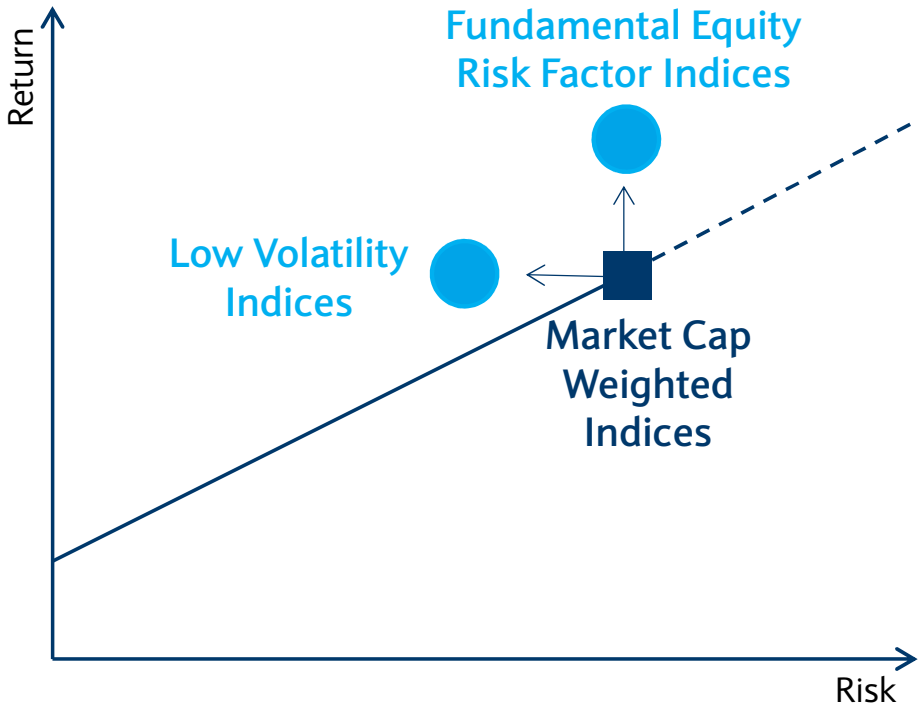

EFS Solutions
July 2015

# Smart Beta

- Market-cap-weighted indices have a large-cap bias, whereby larger-cap companies greatly influence the performance and smaller-cap companies are arguably underrepresented

## Smart Beta Indices:

- Assume that the equity market is not efficient
- Applies an alternative stock-weighted tilt or bias
- Provide exposure to well-documented equity risk premia based upon deep academic research (included in each risk factor section)
- Aim to capture return associated with risk factors
- Provide style / risk factor diversification benefits

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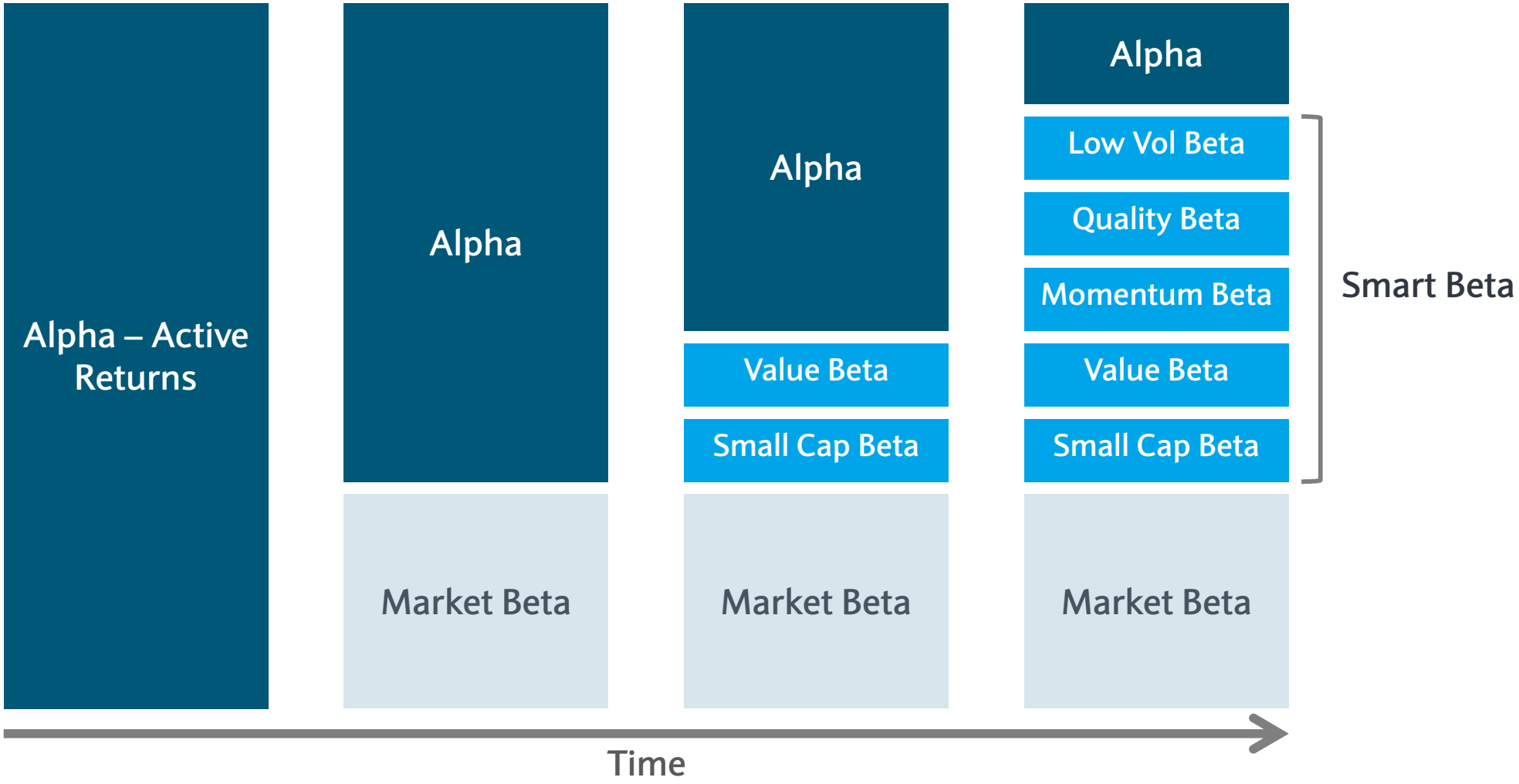
# Behaviour Drives Fundamental Equity Risk Factors

There is significant academic research on investor's "systematic biases", explaining why fundamental equity risk factors exist. Table below is a summary:

| Momentum | Value | Low Volatility | Quality |
|---|---|---|---|
| ▪ **Behavioural effects:** Under-reaction to positive news, differing news processing time horizons<br>▪ **Bandwagon effects:** buying/selling biggest winners/losers | ▪ **Loss aversion:** over-estimation of risk of stocks prone to drawdowns, or sensitive to economic shocks, e.g. large companies with high operating leverage that adapt slowly<br>▪ **Winner's complacency :** Under-estimation of risk of stocks trading above their entry-point price i.e. having a "performance cushion" e.g. growth stocks | ▪ **Lottery effect:** preference for lottery-like payoffs<br>▪ **Leverage constraints/ aversion**<br>▪ **Tracking error constraint:** a low vol stock tilt introduces low beta and leads to large tracking error against broad benchmarks | ▪ **Empirical effect detected by researchers**<br>▪ **Investor preferences:** prefer smaller amount in riskier stocks than larger amount in less risky stocks |

# Decomposing Active Equity Returns

Fundamental equity risk factor styles explain the majority of active equity returns



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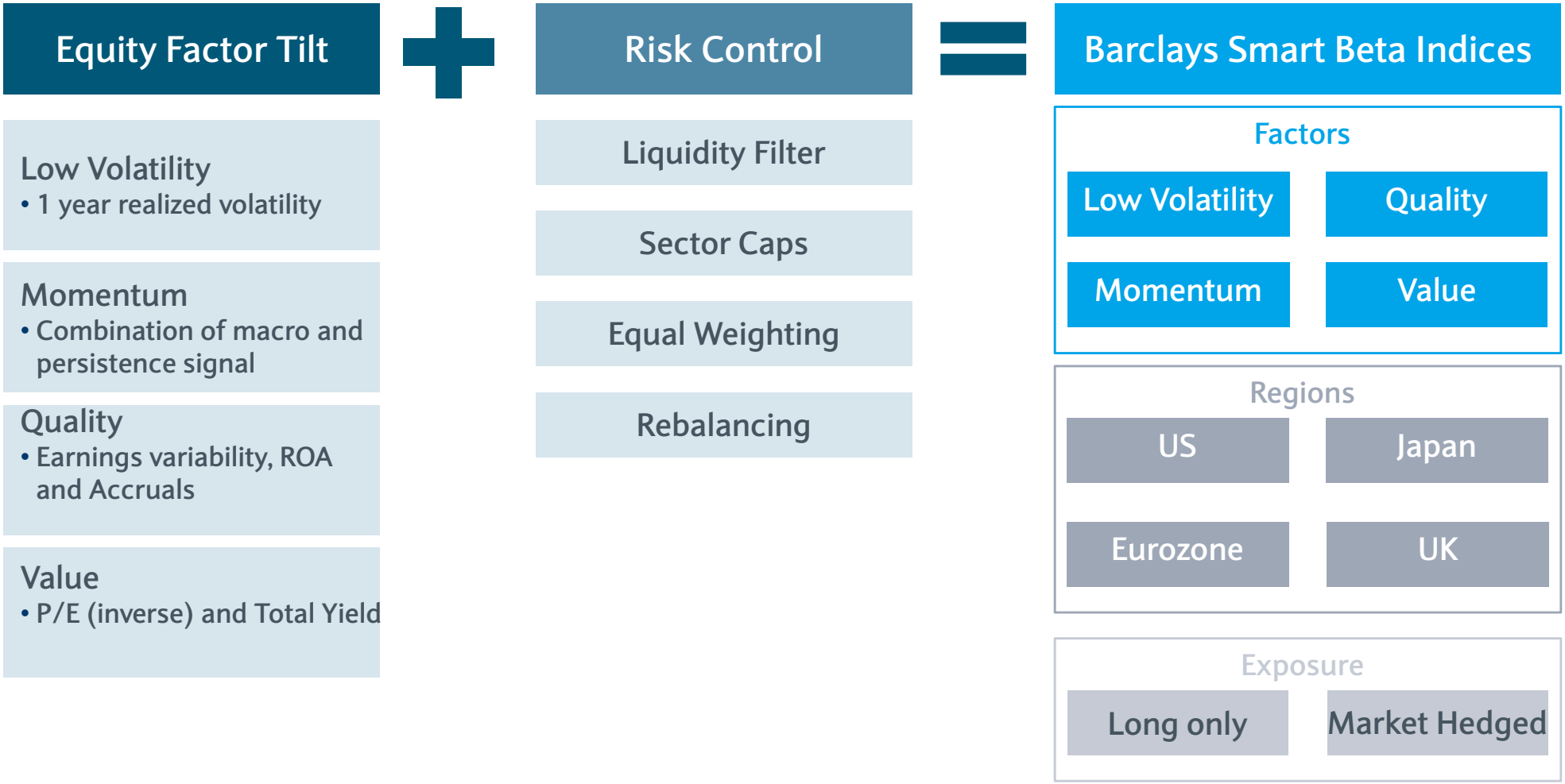
# Barclays Equity Factor Indices

Stock selection with smart equity risk factor tilts complimented with consistent risk controls



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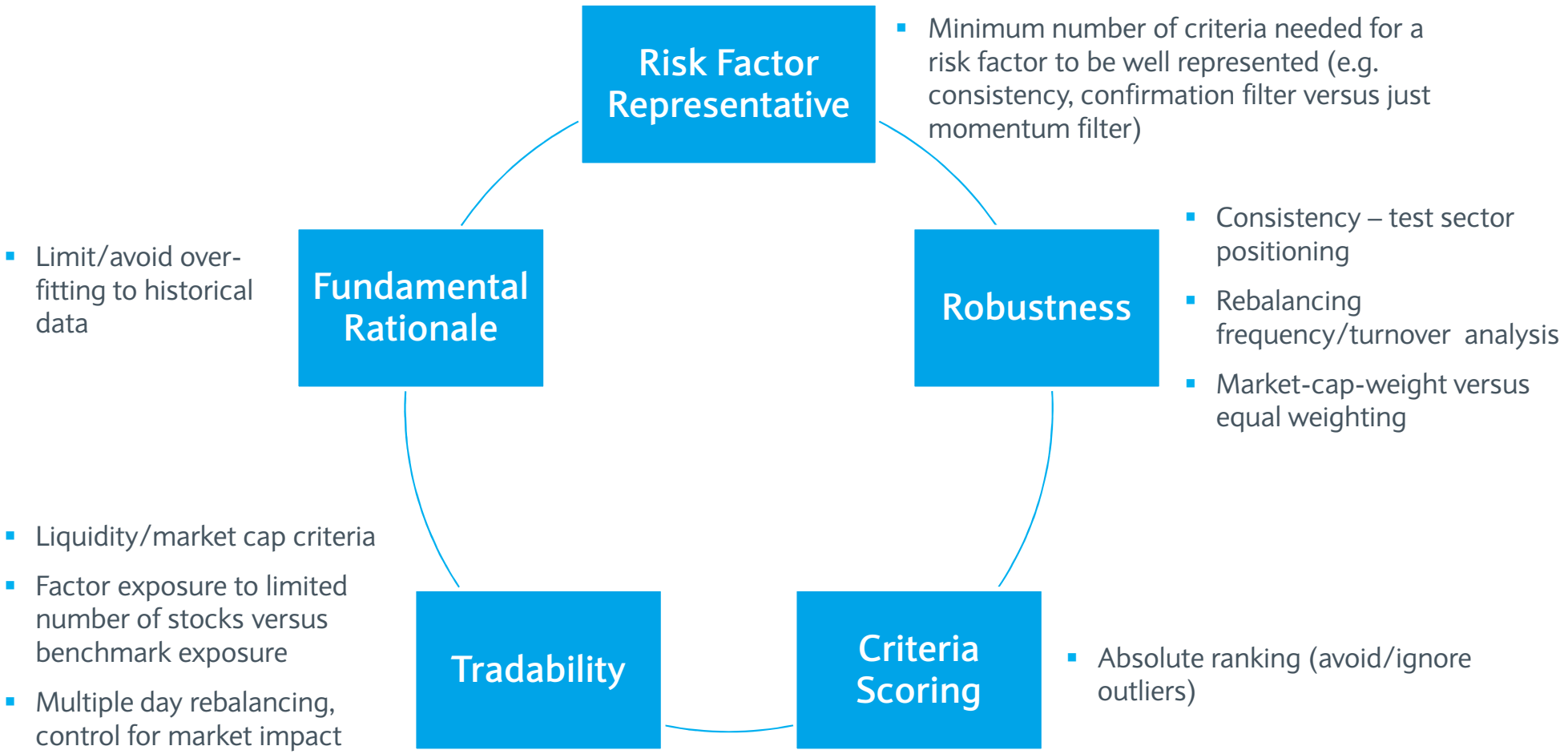
# Why Equity Risk Factors?

- Factors give investors exposure to well-documented risk premia in Equity markets that have a strong backing by academic research
- Selected factor indices have historically outperformed market-cap-weighted benchmark indices over the long term (see summary performance statistics in each section)
- Pure factor indices (market hedged) show low correlation to each other (see correlation matrix)
- Factor indices can be seen as a toolbox for investors expanding the available investment choices
- Factor indices allow investors to tilt towards chosen factors

# Barclays' Approach in Designing Equity Risk Factor Indices

The focus is on capturing a specific equity risk factor with consistent risk control



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# MOMENTUM FACTOR

# Momentum – Rationale/Academic Papers

- **Rationale – Momentum evidence**
  - Efficient-market hypothesis (EMH) assumes that past performance contains no information for future performance (markets are "informationally efficient")
  - However, extensive academic literature has documented that stocks' historical price dynamics can be predictive of their future returns. Over the past two decades over 300 papers around momentum have been published
    - First research goes back as far as 1937. Cowles and Jones (1937) demonstrate the tendency of investments to exhibit persistence in price performance[1]
    - Jegadeesh and Titman (1993) show that price momentum based on 6m to 12m window provided significant abnormal profits[2]
    - Carhart (1997) introduces the four-factor extending the Fama-French factor model by adding the momentum factor[3]
    - Rouwenhorst (1998) observes momentum in international stock returns[4]
    - Asness et al. (2009) write that momentum delivers abnormal returns in a variety of markets and asset classes[5]
    - Fama and French (2012) also find strong momentum returns in various regions[6]

- **Why does it exist?**
  - **Behavioural effects:** Under-reaction to positive news, differing news processing time horizons
  - **Bandwagon effects:** buying/selling biggest winners/losers

[1]Source: Cowles and Jones (1937), "Some a posteriori probabilities in stock market action", Econometrica, Journal of the Econometric Society
[2]Source: Jegadeesh and Titman (1993), "Returns to Buying Winners and Selling Losers: Implication for Stock Market Efficiency", Journal of Finance
[3]Source: Carhart (1997), "On Persistence in Mutual Fund Performance", Journal of Finance
[4]Source: Rouwenhorst(1998), "International Momentum Strategies", Journal of Finance
[5]Source: Asness, Moskowitz and Petersen (2009), "Value and Momentum Everywhere", AFA 2010 Atlanta Meetings Paper
[7]Source: Fama and French (2012), "Size, value and momentum in international stock returns", Journal of Financial Economics

# Momentum Equity Indices –Summary

- Geography: five regions available (US, Eurozone, UK, Japan and Global)
- Universe: all stocks from the respective region after applying liquidity filters
- Sector restrictions: max 20% from any single sector
- Available formats: Long-only indices in Total return, Excess return and Price return versions, market-hedged indices in Total return and Excess return versions

## Performance stats

| Index | Ticker | Start Date | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Return diff vs Benchmark | %age Vol vs Benchmark |
|---|---|---|---|---|---|---|---|---|
| US Momentum TR | BXIIMUTU | 31-Dec-02 | 11.26% | 16.70% | 0.56 | -56.12% | 1.70% | 120% |
| US Benchmark | SPXT | 31-Dec-02 | 9.55% | 13.97% | 0.54 | -55.25% | | |
| EU Momentum TR | BXIIMETE | 31-Oct-04 | 6.61% | 16.64% | 0.29 | -55.54% | 2.42% | 96% |
| EU Benchmark | SX5T | 31-Oct-04 | 4.19% | 17.24% | 0.13 | -58.58% | | |
| UK Momentum TR | BXIIMGTG | 31-Oct-04 | 10.87% | 14.42% | 0.56 | -41.75% | 3.55% | 106% |
| UK Benchmark | TUKXG | 31-Oct-04 | 7.32% | 13.65% | 0.34 | -44.79% | | |
| Japan Momentum TR | BXIIMJTJ | 31-Jul-05 | 3.66% | 21.13% | 0.16 | -67.56% | 0.56% | 103% |
| Japan Benchmark | TPXD100 | 31-Jul-05 | 3.10% | 20.48% | 0.12 | -62.81% | | |

Source: Barclays as if 30th June 2015. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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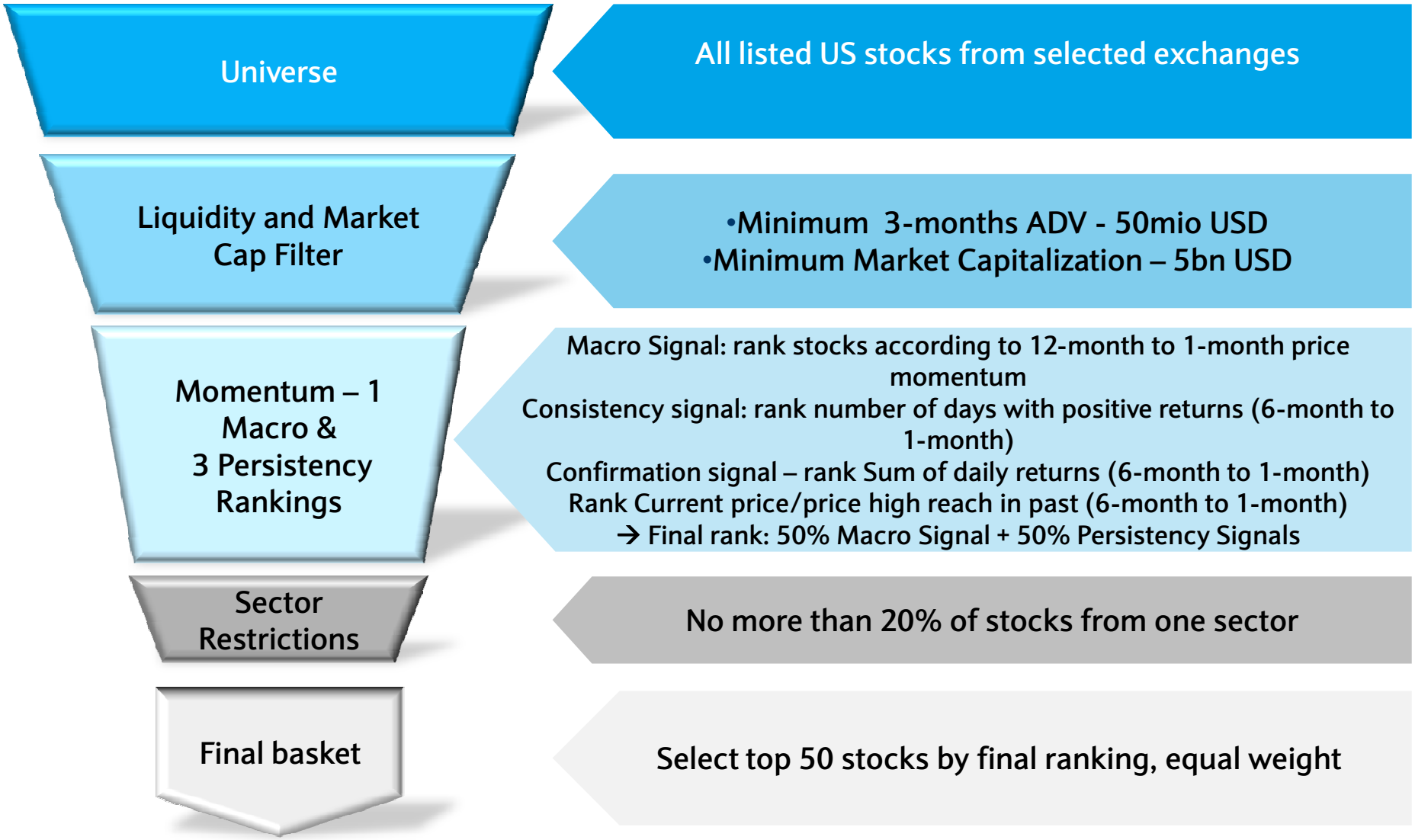
# Momentum Equity Indices – Mechanics – US Example



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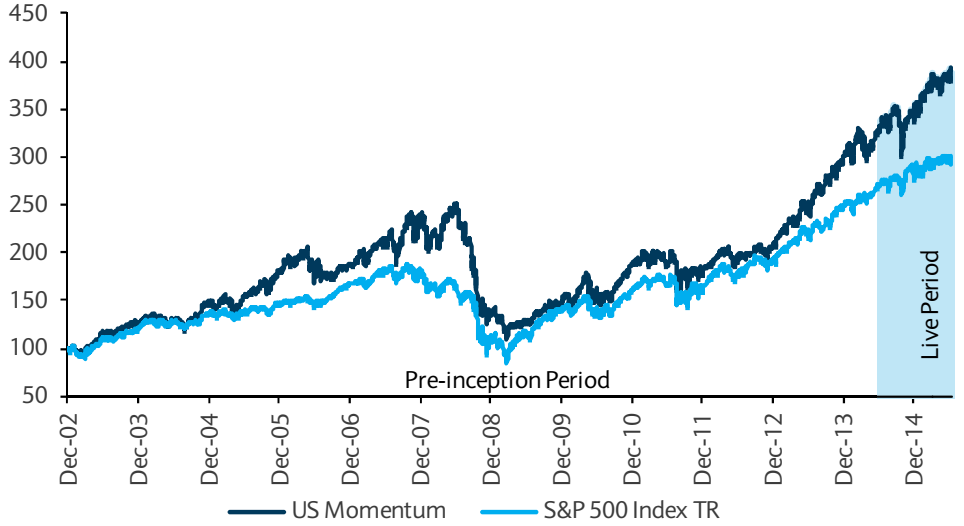
# US Momentum Index

## Overview

- Universe: all common US stocks from NYSE and NASDAQ exchanges
- Filters for liquidity based on minimum Market cap and 3m ADV
- Filters for minimum track record at time of selection
- 50 stocks with highest momentum rank (max 20% per sector)
- Monthly Rebalancing
- Equal Weighting
- Dividends are gross

## Simulated/Live Index Evolution Since Index Base Date




| Key Information | |
|---|---|
| Featured Index | US Momentum |
| Bloomberg Ticker | BXIIMUTU |
| Excess/Total Return | TR in USD |
| Live date | Jul-14 |
| Benchmark | S&P 500 Index TR |
| Average Annualised total Return* | 11.25% |
| Average Annualised Volatility* | 16.65% |
| Sharpe Ratio* | 0.58 |
| Currency | USD |

Source: Barclays. Pre-inception period: Index Base Date is December 2002. Index Live Date is July 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# US Momentum Index – Simulated/ Live Past Performance table

| Performance Measures* | 1 Year | 3 Years | 5 Years | Since Base |
|---|---|---|---|---|
| Average Annual Total Return | 13.86% | 24.46% | 21.11% | 11.48% |
| Average Annualised Volatility | 11.71% | 10.88% | 12.53% | 16.43% |
| Sortino Ratio | 2.97 | 6.47 | 3.81 | 1.00 |
| Sharpe Ratio | 1.18 | 2.24 | 1.68 | 0.61 |

| Monthly Returns and Drawdown | 1 Year | Since Base |
|---|---|---|
| Best 1 Month Total Return | 7.18% | 10.52% |
| Worst 1 Month Total Return | -3.59% | -18.90% |
| Percentage of Positive Months | 58% | 65% |
| Maximum Drawdown | -14.86% | -56.12% |

| Monthly and Annual Total Returns (light blue background denotes live data) | | | | | | | | | | | | | | Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year | Year |
| 2003 | -1.07% | -0.59% | 2.82% | 5.69% | 7.16% | 1.34% | 1.87% | 3.10% | -3.18% | 8.61% | 2.50% | 0.21% | 31.67% | 28.68% |
| 2004 | 1.05% | 1.97% | -1.23% | -3.74% | 0.72% | 4.28% | -4.42% | -1.06% | 5.32% | 2.87% | 8.30% | 1.76% | 16.18% | 10.88% |
| 2005 | -3.60% | 4.64% | -0.85% | -6.24% | 5.04% | 4.90% | 4.06% | 1.61% | 4.41% | -1.74% | 3.59% | 3.00% | 19.62% | 4.91% |
| 2006 | 10.15% | -3.47% | 3.52% | 0.11% | -5.14% | 1.38% | -5.78% | -1.76% | 0.11% | 5.08% | -0.34% | 1.26% | 4.14% | 15.79% |
| 2007 | 4.96% | -1.72% | 2.27% | 4.09% | 4.46% | -1.91% | -1.08% | 1.04% | 8.10% | 6.63% | -5.45% | 3.57% | 26.93% | 5.49% |
| 2008 | -10.68% | 2.23% | -1.40% | 9.46% | 5.26% | -0.89% | -8.29% | -4.20% | -18.90% | -13.95% | -6.55% | 0.73% | -40.67% | -37.00% |
| 2009 | -8.95% | -8.72% | 5.65% | 0.60% | 2.00% | 1.23% | 6.28% | 1.44% | 3.34% | -5.54% | 7.02% | 4.48% | 7.33% | 26.46% |
| 2010 | -6.84% | 7.38% | 8.97% | 4.57% | -8.60% | -6.92% | 5.16% | -2.29% | 10.52% | 5.14% | 2.87% | 5.23% | 25.35% | 15.06% |
| 2011 | 0.76% | 3.37% | 1.66% | 0.30% | -0.60% | -1.43% | -2.97% | -4.74% | -7.80% | 8.39% | 1.26% | -0.49% | -3.15% | 2.11% |
| 2012 | 1.77% | 4.75% | 3.60% | 1.04% | -5.75% | 2.66% | 0.63% | 0.18% | 2.27% | -2.21% | 2.89% | 2.11% | 14.38% | 16.00% |
| 2013 | 5.92% | 2.03% | 4.74% | 0.97% | 3.83% | -0.89% | 7.98% | -1.66% | 6.00% | 3.33% | 2.13% | 4.15% | 45.50% | 32.39% |
| 2014 | -0.21% | 6.83% | -3.69% | -1.27% | 4.49% | 3.72% | -2.05% | 7.18% | -3.24% | -1.14% | 3.52% | 1.19% | 15.58% | 13.69% |
| 2015 | 2.11% | 3.43% | 2.19% | -3.59% | 5.01% | -0.96% | | | | | | | 8.22% | 1.23% |

Source: Barclays. Pre-inception period: Index Base Date is December 2002. Index Live Date is July 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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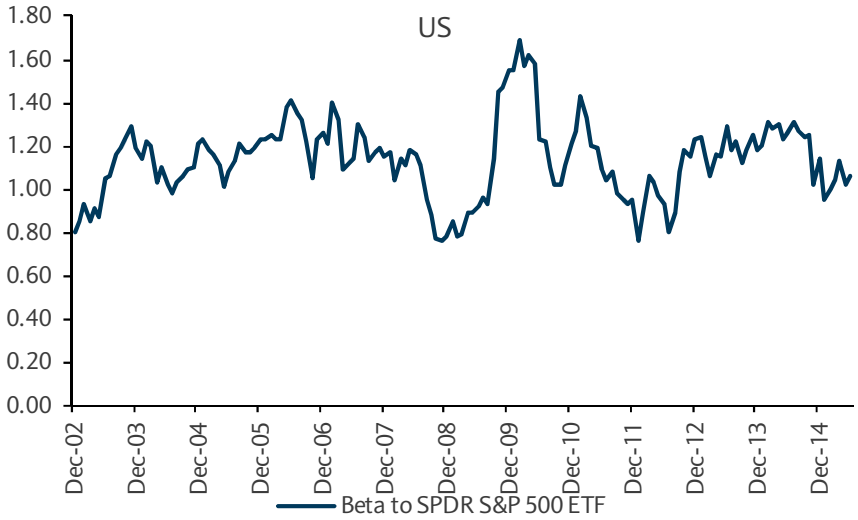
# US Momentum Market Hedged Index

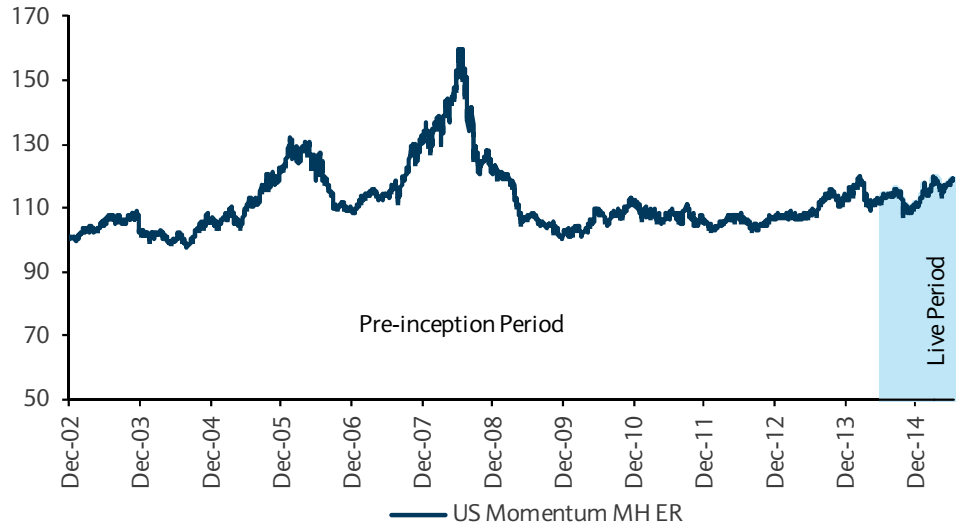
## Overview

- Market Hedged indices aim to provide investors access to the Momentum risk premia
- Beta is calculated monthly by averaging the betas of each of the Momentum portfolio constituents against the benchmark
- The beta exposure is hedged monthly by shorting the benchmark index (Short index)
- Short Index: SPDR S&P 500 ETF (with Gross Dividends reinvested)
- Monthly Rebalancing
- Dividends are gross

## Historical Beta over time




## Simulated/Live Index Evolution Since Index Base Date




| Key Information | |
|---|---|
| Featured Index | US Momentum MH ER |
| Bloomberg Ticker | BXIIMMUE |
| Excess/Total Return | ER in USD |
| Live date | Jul-14 |
| Benchmark | N/A |
| Average Annualised Excess Return* | 1.36% |
| Average Annualised Volatility* | 9.75% |
| Sharpe Ratio* | 0.14 |

Source: Barclays. Pre-inception period: Index Base Date is December 2002. Index Live Date is July 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# US Momentum Market Hedged Index – Simulated/Live Past Performance table

| Performance Measures* | 1 Year | 3 Years | 5 Years | Since Base |
|---|---|---|---|---|
| Average Annual Excess Return | 4.74% | 3.86% | 1.92% | 1.36% |
| Average Annualised Volatility | 10.31% | 7.74% | 7.19% | 9.75% |
| Sortino Ratio | 0.85 | 0.86 | 0.46 | 0.23 |
| Sharpe Ratio | 0.46 | 0.50 | 0.27 | 0.14 |

| Monthly Returns and Drawdown | 1 Year | Since Base |
|---|---|---|
| Best 1 Month Excess Return | 5.28% | 9.34% |
| Worst 1 Month Excess Return | -4.52% | -10.96% |
| Percentage of Positive Months | 58% | 56% |
| Maximum Drawdown | -7.25% | -37.30% |

**Monthly and Annual Total Returns** (light blue background denotes live data)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | 1.27% | 0.67% | 1.83% | -1.23% | 2.20% | 1.08% | 0.01% | 0.89% | -1.84% | 1.97% | 1.06% | -5.75% | 1.91% |
| 2004 | -1.21% | 0.41% | 0.77% | -2.29% | -0.83% | 2.27% | -1.09% | -1.49% | 4.35% | 1.27% | 3.64% | -1.76% | 3.85% |
| 2005 | -0.81% | 2.11% | 1.32% | -3.91% | 1.67% | 5.02% | -0.09% | 2.91% | 3.52% | 1.13% | -1.35% | 3.42% | 15.64% |
| 2006 | 7.13% | -4.12% | 1.52% | -1.29% | -1.09% | 1.30% | -6.08% | -4.60% | -3.19% | 1.36% | -2.32% | -0.34% | -11.73% |
| 2007 | 3.19% | 1.55% | 0.84% | -1.33% | 0.78% | -0.10% | 3.71% | 0.15% | 3.46% | 5.21% | -0.62% | 4.91% | 23.72% |
| 2008 | -3.83% | 5.35% | -0.75% | 4.16% | 3.96% | 9.34% | -7.00% | -5.90% | -10.96% | 1.05% | -1.77% | -0.58% | -8.46% |
| 2009 | -2.71% | -0.11% | -0.73% | -7.62% | -3.07% | 1.21% | -0.74% | -2.01% | 0.29% | -1.50% | -1.97% | 1.57% | -16.36% |
| 2010 | -1.33% | 2.18% | -1.12% | 2.12% | 4.58% | -1.19% | -3.05% | 2.82% | 0.83% | 1.09% | 3.05% | -2.08% | 7.86% |
| 2011 | -1.92% | -1.17% | 1.98% | -3.06% | 0.94% | 0.92% | -0.66% | 1.11% | -1.08% | -2.12% | 1.61% | -1.45% | -4.94% |
| 2012 | -2.19% | 1.39% | 0.68% | 1.80% | 0.40% | -1.30% | -0.13% | -1.83% | 0.31% | 0.05% | 2.11% | 0.92% | 2.13% |
| 2013 | -0.27% | 0.43% | 0.51% | -1.39% | 1.31% | 1.15% | 0.93% | 1.89% | 1.86% | -1.69% | -1.48% | 1.07% | 4.33% |
| 2014 | 4.23% | 1.28% | -4.73% | -2.22% | 1.72% | 1.08% | -0.19% | 1.92% | -1.50% | -3.69% | 0.35% | 0.96% | -1.15% |
| 2015 | 5.28% | -1.82% | 3.80% | -4.52% | 3.40% | 1.14% | | | | | | | 7.14% |

Source: Barclays. Pre-inception period: Index Base Date is December 2002. Index Live Date is July 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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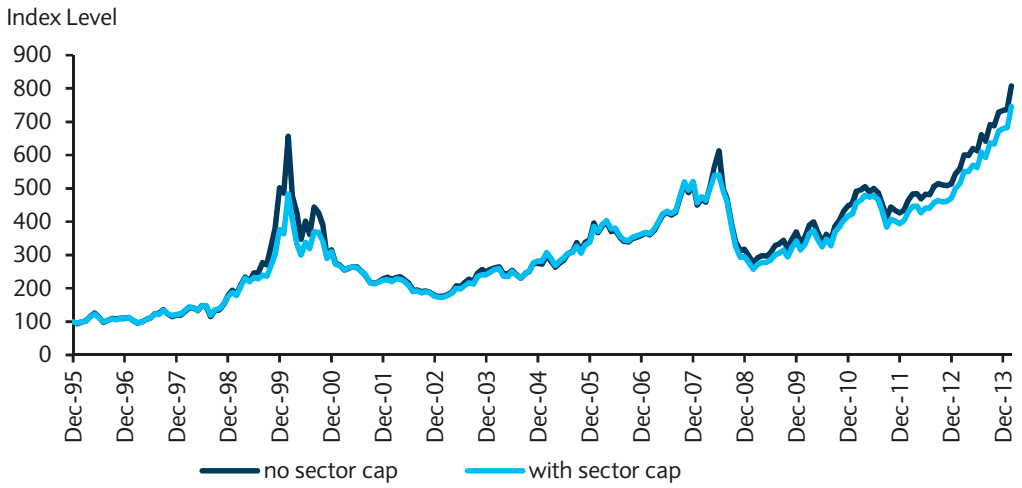
# MOMENTUM ROBUSTNESS TESTS

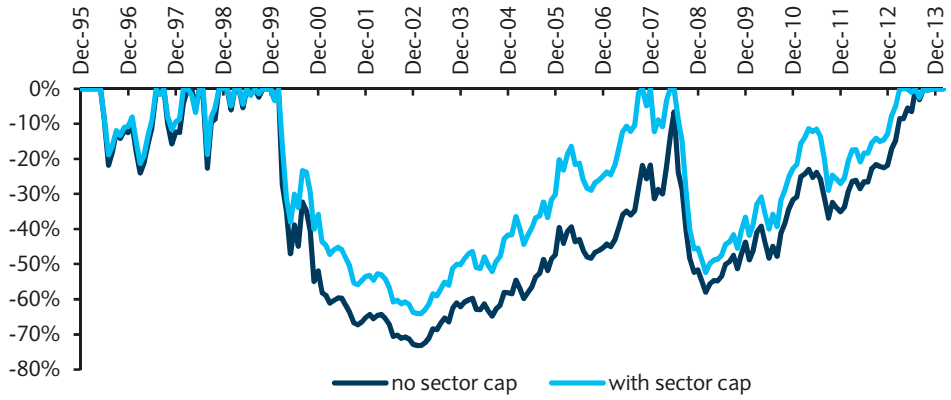
# Diversification Benefit of Adding a Sector Cap?

- Simple 12/1-month price momentum
- Adding a sector cap (max 20% per sector)
- Absolute returns are lower but risk-adjusted returns improved
- Slightly lower drawdowns

## Simulated past performance




## Drawdowns




## Performance stats

| | no sector cap | with sector cap |
|---|---|---|
| Returns | 12.19% | 11.69% |
| Volatlity | 28.22% | 24.21% |
| return/vol | 0.43 | 0.48 |
| max drawdown | -73.2% | -64.1% |

Source: Barclays, Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. Volatilities are calculated on monthly returns, observation period 29th December 1995 to 28th February 2014. All performance data is simulated.



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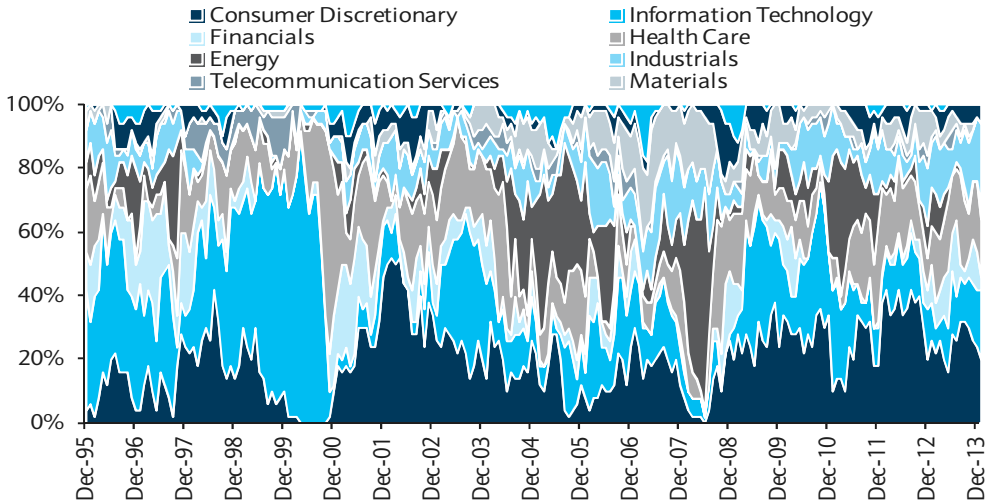
# Sector Cap Versus No Cap

- 1998 – 2000 most of the stocks are in IT sector
- Is Momentum just a sector positioning strategy?

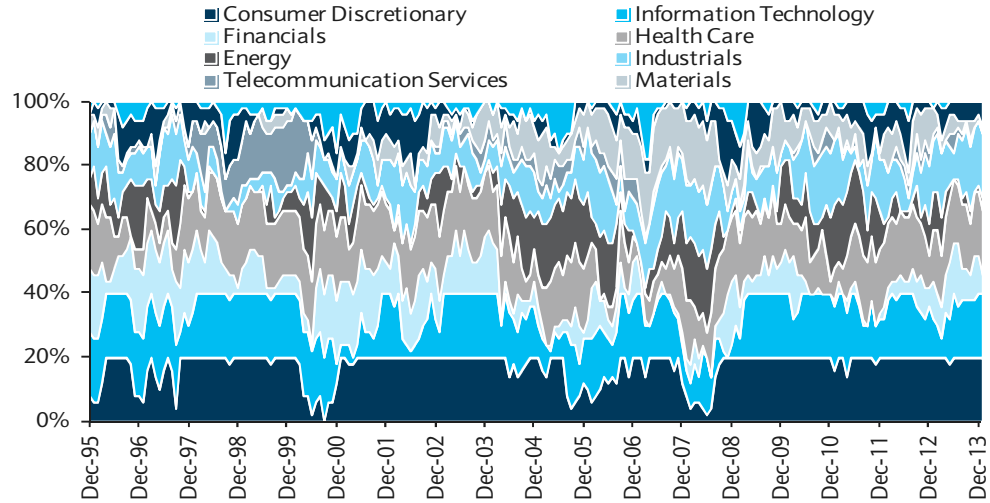
## Average historical exposure (Dec 95 – Feb 14)

| | Avg exposure no cap | Avg exposure with sector cap |
|---|---|---|
| Consumer Discretionary | 20% | 17% |
| Information Technology | 23% | 16% |
| Financials | 8% | 10% |
| Health Care | 15% | 16% |
| Energy | 10% | 9% |
| Industrials | 9% | 12% |
| Telecommunication Services | 3% | 4% |
| Materials | 5% | 7% |
| Consumer Staples | 4% | 6% |
| Utilities | 2% | 3% |

## Historical sector allocation – no cap




## Historical sector allocation – 20% sector cap




Source: Barclays, Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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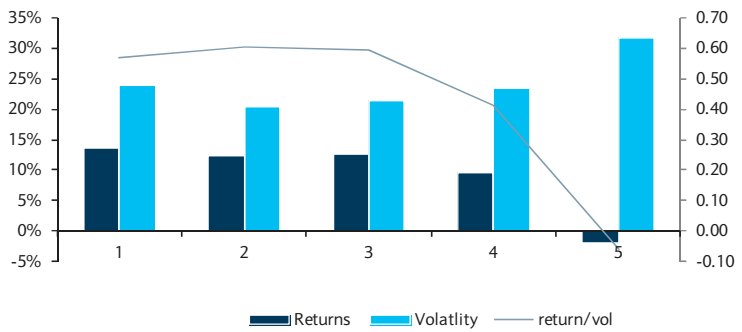
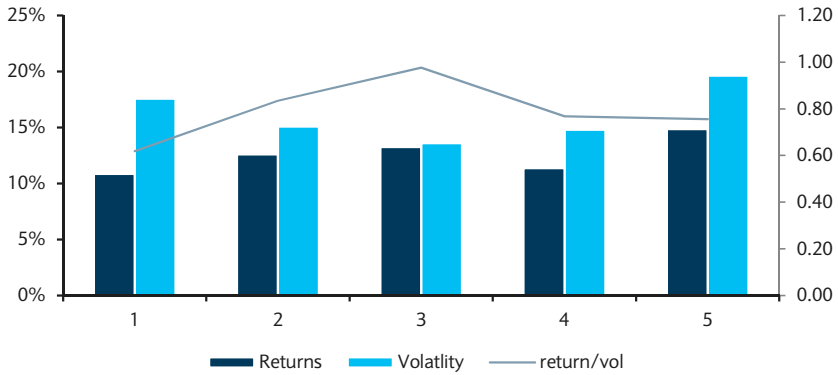
# Is Momentum a Sector Positioning Strategy?

- Simple 12-month/1-month m price momentum applied to each sector (min market cap 1bn, min ADV highest 1000 stocks)
- Quintile 1 with past winner based on momentum ranking
- In 6 out 9 sectors (excluding Telecommunications due to small universe) the past winners have higher risk-adjusted returns compared to the past losers (Consumer staples, Health Care and Industrials are the exceptions)
- Decreasing risk-adjusted returns for most of the sectors

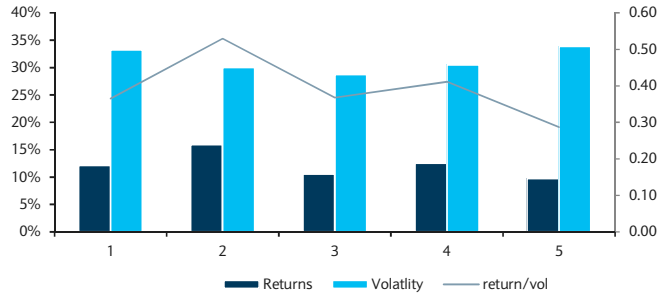
## Consumer Discretionary




## Consumer Staples




## Energy




## Financials


Source: Barclays, Period Dec 95 – Feb 14. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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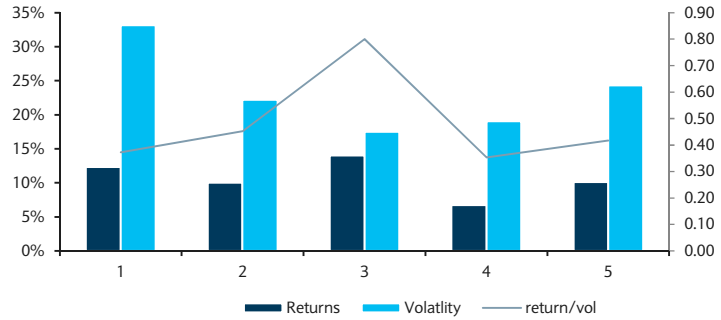
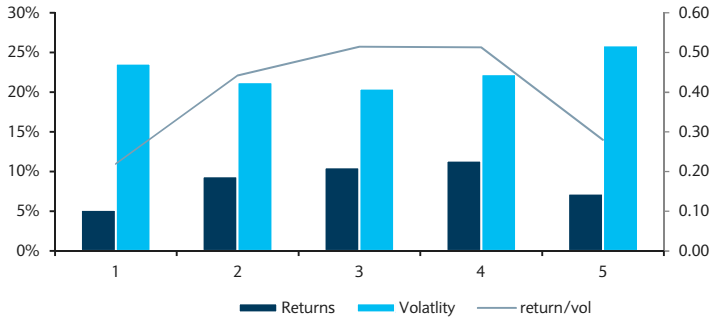
# Is Momentum a Sector Positioning Strategy? (cont'd)

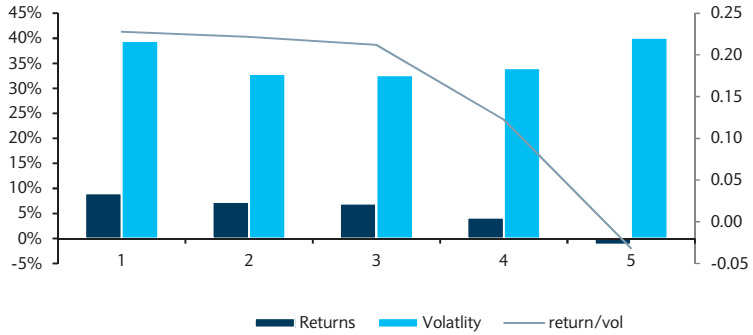
## Healthcare



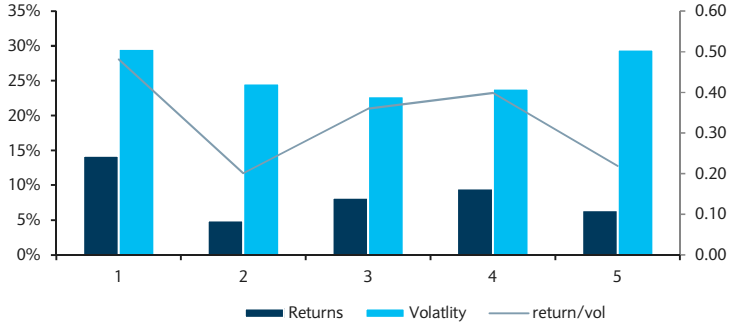

## Industrials



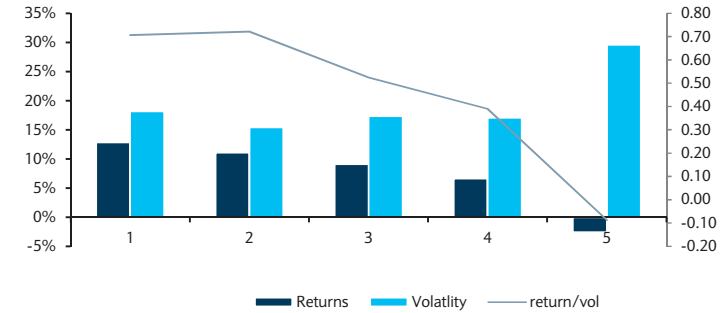

## IT Sector




## Materials




## Utilities




Source: Barclays, Period Dec 95 – Feb 14. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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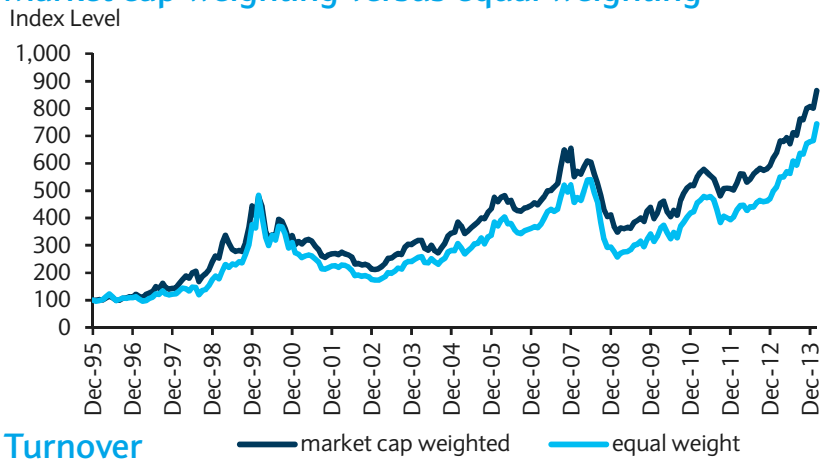
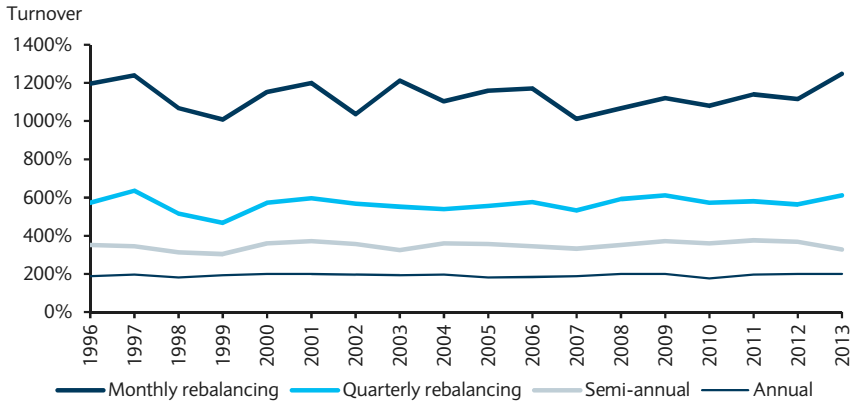
# Robustness of Momentum Strategy

- Monthly returns highest on absolute and risk-adjusted basis
- Turnover increases heavily with higher rebalancing frequency

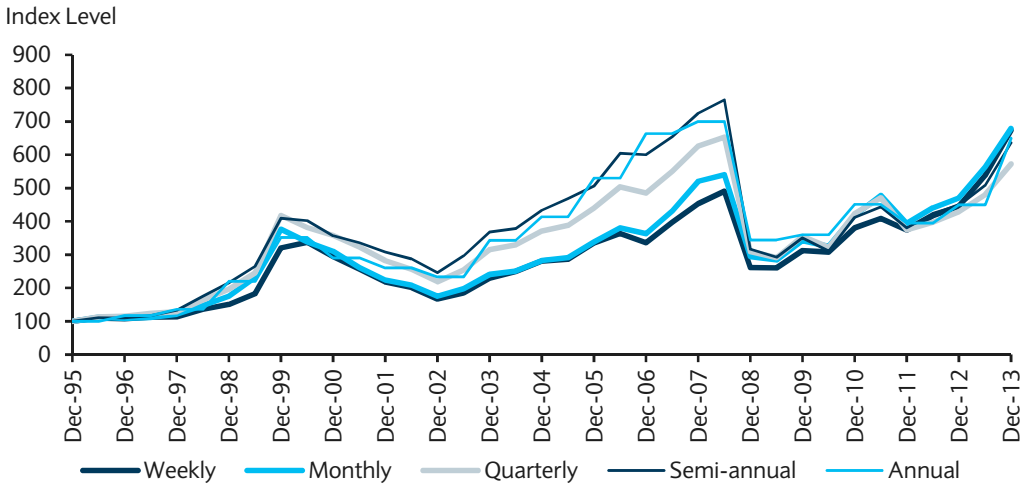
## Market cap weighting versus equal weighting




## Turnover




## Different rebalancing frequency




## Performance stats – rebalancing days (Dec 95 – Dec 13)

| | Weekly | Monthly | Quarterly | Semi-annual | Annual |
|---|---|---|---|---|---|
| Returns | 11.18% | 11.23% | 10.17% | 10.81% | 10.95% |
| Volatlity | 26.60% | 26.80% | 28.66% | 29.99% | 29.67% |
| return/vol | 0.42 | 0.42 | 0.35 | 0.36 | 0.37 |

## Performance stats – Different weight (monthly rebalance)

| | market cap | equal weight |
|---|---|---|
| Returns | 12.61% | 11.69% |
| Volatlity | 22.35% | 24.21% |
| return/vol | 0.56 | 0.48 |

Source: Barclays, Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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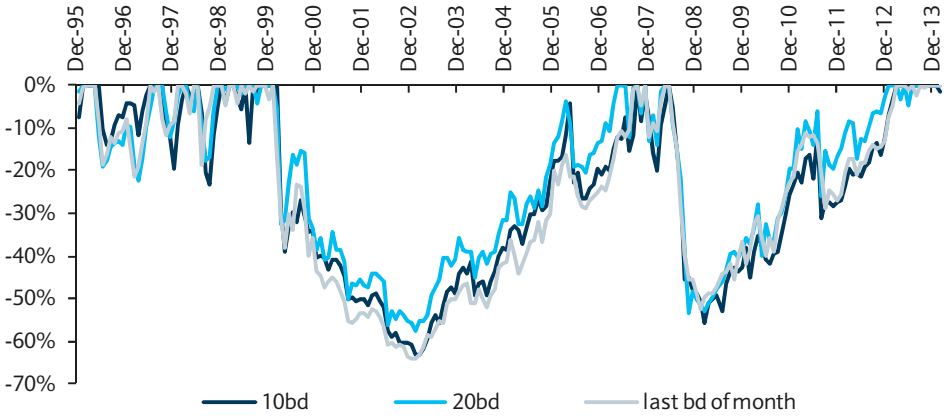
# Robustness of Momentum Strategy – cont'd

- Different rebalancing days with small difference
- Last business day best risk-adjusted returns
- Similar drawdowns

## Different rebalancing days


## Drawdowns




## Performance stats (Dec 95 – Mar 14)

| | 10bd | 20bd | last bd of month |
|---|---|---|---|
| Returns | 11.99% | 12.23% | 11.46% |
| Volatlity | 26.63% | 26.59% | 24.17% |
| return/vol | 0.45 | 0.46 | 0.47 |
| max dd | -63.35% | -57.41% | -64.07% |

Source: Barclays, Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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# VALUE FACTOR

# Value – Rationale/Academic Papers

- **Rationale**
  - Value premium with extensive backing in academic literature
  - Selection of key papers published
    - Graham and Dodd (1934) published "Security Analysis" which is seen as the classic book for value investing[1]
    - Basu (1977) concludes that low P/E portfolios did earn superior returns on a risk-adjusted basis[2]
    - Rosenberg, Reid and Lanstein (1985) show that a book/price strategy and a "specific-return-reversal" strategy lead to the conclusion that prices on the NYSE are inefficient[3]
    - Fama and French (1992) observe that small caps and stocks with a low Price-to-Book ratio tended to do better than the market (Fama-French three-factor model)[4]
    - Lakonishok et al (1994) provide evidence that value strategies yield higher returns exploiting suboptimal behaviour of the typical investor[5]
    - Campbell, Shiller and Winter (1998) look at value measures on a sector level[6]
    - Chan and Lakonishok (2004) update previous research and conclude that value investing still generates superior returns[7]
    - Fama and French (2012) also find strong value returns in various regions[8]
- **Possible explanations**
  - **Loss aversion:** over-estimation of risk of stocks prone to drawdowns, or sensitive to economic shocks, e.g. large companies with high operating leverage that adapt slowly
  - **Winner's complacency :** Under-estimation of risk of stocks trading above their entry-point price i.e. having a "performance cushion" e.g. growth stocks

[1]Source: Graham and Dodd (1934), "Security Analysis", McGraw-Hill Companies, New York
[2]Source: Basu (1977), "RetInvestment Performance of Common Stocks in Relation to their Price-Earnings Ratios: A Test of the Efficient Markets Hypothesis.", Journal of Finance
[3]Source: Rosenberg, Reid and Lanstein (1985), "Persuasive evidence of market inefficiency", Journal of Portfolio Management
[4]Source: Fama and French (1992), "The Cross-Section of Expected Stock Returns", Journal of Finance
[5]Source: Lakonishok et al. (1994), "Contrarian Investment, Extrapolation, and Risk", Journal of Finance
[6]Source: Campbell , Shiller and Winter(1998), "Valuation Ratios and the Long-Run Stock Market Outlook", Journal of Portfolio Management
[7]Source: Chan and Lakonishok (2004), "Value and Growth Investing: Review and Update", Financial Analysts Journal
[7]Source: Fama and French (2012), "Size, value and momentum in international stock returns", Journal of Financial Economics

# Value Equity Indices – Summary

- Geography: five regions available (US, Eurozone, UK, Japan and Global)
- Universe: all stocks from the respective region after applying liquidity filters
- Sector restrictions: max 20% from any single sector
- Available formats: Long-only indices in Total return, Excess return and Price return versions, market-hedged indices in Total return and Excess return versions

## Performance stats

| Index | Ticker | Start Date | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Return diff vs Benchmark | %age Vol vs Benchmark |
|---|---|---|---|---|---|---|---|---|
| US Value TR | BXIIVUTU | 30-Nov-02 | 11.30% | 15.97% | 0.59 | -61.55% | 2.63% | 115% |
| US Benchmark | SPXT | 30-Nov-02 | 8.67% | 13.92% | 0.48 | -55.25% | | |
| EU Value TR | BXIIVETE | 31-Dec-04 | 6.29% | 18.78% | 0.24 | -60.84% | 1.66% | 109% |
| EU Benchmark | SX5T | 31-Dec-04 | 4.63% | 17.28% | 0.15 | -58.58% | | |
| UK Value TR | BXIIVGTG | 31-Dec-04 | 9.21% | 16.18% | 0.41 | -57.10% | 2.45% | 118% |
| UK Benchmark | TUKXG | 31-Dec-04 | 6.76% | 13.67% | 0.33 | -44.79% | | |
| Japan Value TR | BXIIVJTJ | 31-Aug-05 | 8.91% | 20.76% | 0.41 | -66.37% | 4.91% | 103% |
| Japan Benchmark | TPXD100 | 31-Aug-05 | 4.00% | 20.24% | 0.10 | -62.81% | | |

Source: Barclays as if 30th June 2015. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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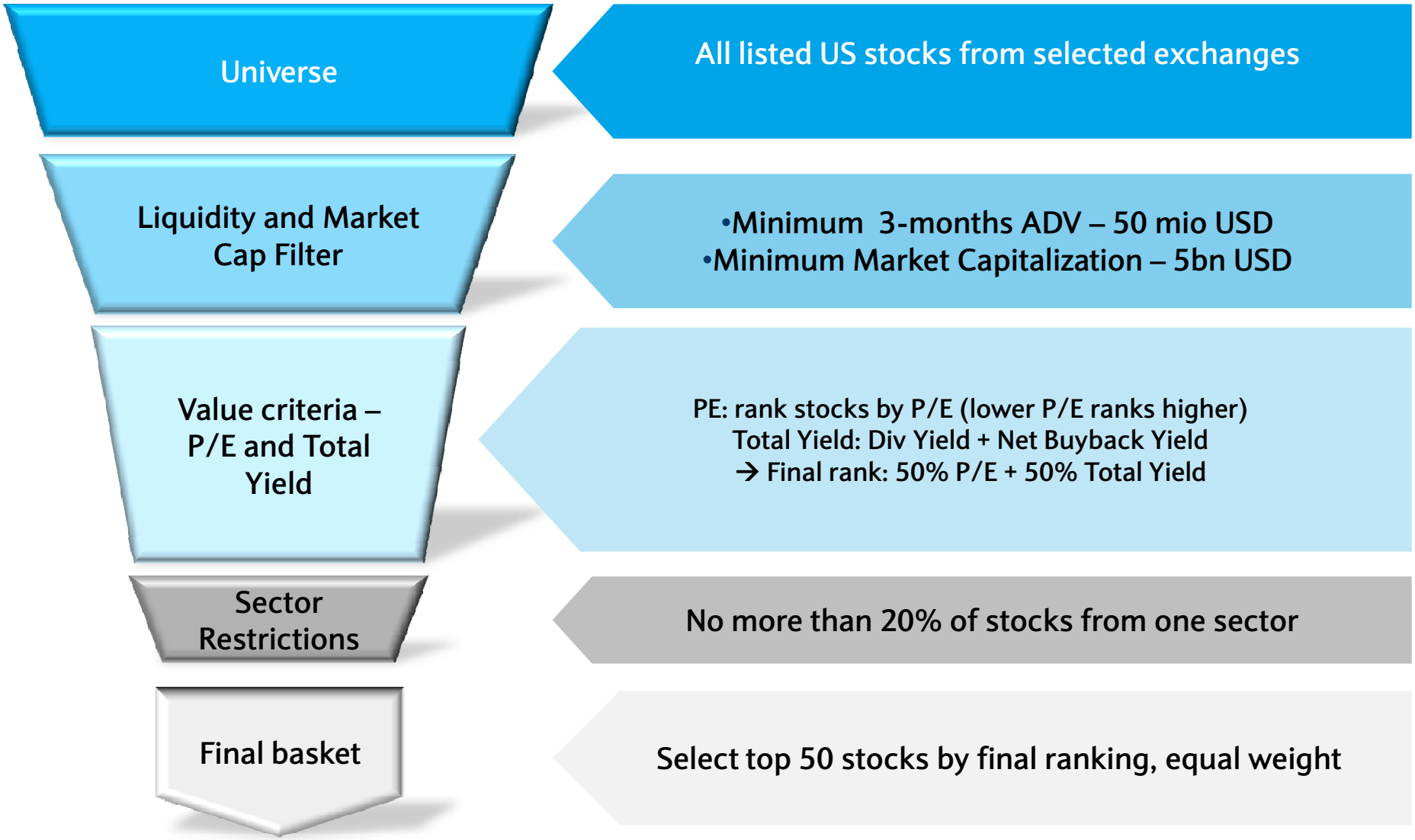
# Value Equity Indices – Mechanics – US Example



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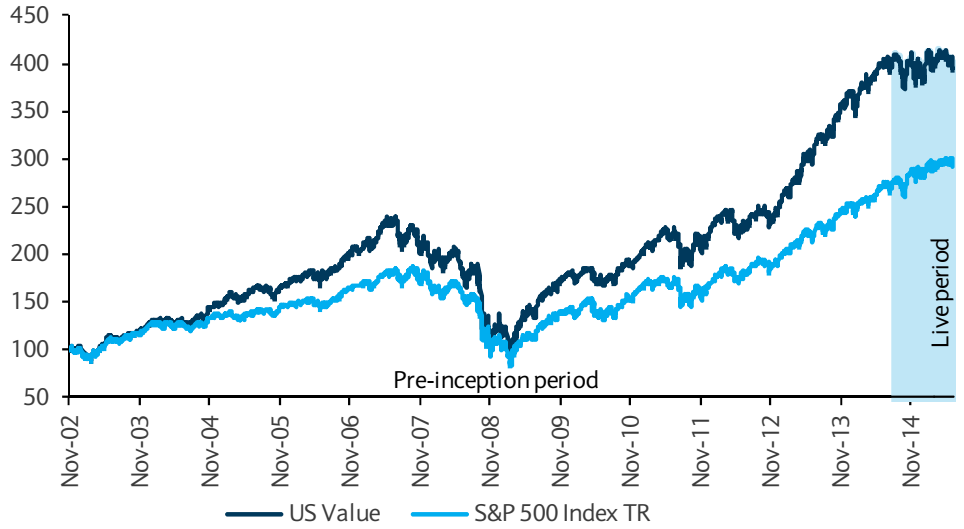
# US Value Index

## Overview

- Universe: all common US stocks from NYSE and NASDAQ exchanges
- Filters for liquidity based on minimum Market cap and 3m ADV
- Filters for minimum track record at time of selection
- 50 stocks with value rank (max 20% per sector)
- Quarterly Rebalancing
- Equal Weighting
- Dividends are gross

## Simulated/Live Index Evolution Since Index Base Date




| Key Information | |
|---|---|
| Featured Index | US Value |
| Bloomberg Ticker | BXIIVUTU |
| Excess/Total Return | TR in USD |
| Live date | Sep-14 |
| Benchmark | S&P 500 Index TR |
| Average Annualised total Return* | 11.90% |
| Average Annualised Volatility* | 16.01% |
| Sharpe Ratio* | 0.65 |
| Currency | USD |

Source: Barclays. Pre-inception period: Index Base Date is November 2002. Index Live Date is September 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# US Value Index – Simulated/Live Past Performance table

| Performance Measures* | 1 Year | 3 Years | 5 Years | Since Base |
|---|---|---|---|---|
| Average Annual Total Return | -0.50% | 19.33% | 18.80% | 11.29% |
| Average Annualised Volatility | 10.52% | 10.63% | 12.95% | 15.92% |
| Sortino Ratio | -0.11 | 4.58 | 3.13 | 1.00 |
| Sharpe Ratio | -0.05 | 1.81 | 1.44 | 0.62 |

| Monthly Returns and Drawdown | 1 Year | Since Base |
|---|---|---|
| Best 1 Month Total Return | 7.21% | 16.89% |
| Worst 1 Month Total Return | -4.35% | -21.65% |
| Percentage of Positive Months | 42% | 64% |
| Maximum Drawdown | -9.00% | -61.55% |

| Monthly and Annual Total Returns (light blue background denotes live data) | | | | | | | | | | | | | | Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year | Year |
| 2003 | -3.14% | -3.43% | 1.38% | 8.88% | 6.44% | 1.50% | -0.20% | 2.81% | -0.08% | 3.66% | 2.31% | 5.63% | 28.10% | 28.68% |
| 2004 | 1.08% | 2.20% | -0.08% | -1.62% | 0.12% | 1.02% | -1.89% | 1.77% | 3.20% | 0.83% | 5.68% | 4.37% | 17.69% | 10.88% |
| 2005 | -0.88% | 5.77% | -0.61% | -2.59% | 2.99% | 2.51% | 3.45% | -1.92% | 0.51% | -2.51% | 3.42% | 1.05% | 11.35% | 4.91% |
| 2006 | 5.04% | -0.39% | 1.93% | 1.93% | -2.43% | 2.10% | 0.12% | 1.67% | 2.68% | 4.72% | 3.29% | 0.64% | 23.22% | 15.79% |
| 2007 | 1.87% | 0.09% | 1.24% | 5.72% | 4.87% | -1.72% | -5.55% | 0.04% | 3.15% | -0.28% | -5.38% | -2.00% | 1.38% | 5.49% |
| 2008 | -3.78% | -3.09% | -3.01% | 5.29% | 2.29% | -12.00% | 0.08% | 4.31% | -10.75% | -21.65% | -7.75% | 5.18% | -39.29% | -37.00% |
| 2009 | -9.06% | -11.85% | 9.70% | 16.89% | 6.95% | 0.88% | 8.06% | 4.27% | 2.97% | -1.14% | 7.15% | 2.77% | 40.09% | 26.46% |
| 2010 | -2.12% | 1.40% | 4.09% | -0.07% | -5.65% | -3.31% | 4.81% | -3.04% | 8.99% | 2.24% | -1.73% | 5.45% | 10.52% | 15.06% |
| 2011 | 3.55% | 3.23% | 1.74% | 4.46% | 1.73% | -1.38% | -3.97% | -4.15% | -6.15% | 12.05% | -0.12% | 1.02% | 11.33% | 2.11% |
| 2012 | 5.21% | 3.43% | 2.72% | 0.18% | -8.27% | 3.75% | 0.52% | 1.99% | 2.02% | -1.49% | -1.18% | 3.70% | 12.54% | 16.00% |
| 2013 | 7.41% | 0.48% | 5.63% | 3.01% | 5.23% | -0.08% | 5.70% | -1.26% | 3.86% | 4.37% | 4.61% | 3.49% | 51.24% | 32.39% |
| 2014 | -4.48% | 5.43% | 2.45% | 0.55% | 2.32% | 0.77% | -0.03% | 3.02% | -2.95% | 0.88% | -0.41% | 0.39% | 7.82% | 13.69% |
| 2015 | -4.35% | 7.21% | -2.15% | 1.03% | -0.20% | -2.44% | | | | | | | -1.30% | 1.23% |

Source: Barclays. Pre-inception period: Index Base Date is November 2002. Index Live Date is September 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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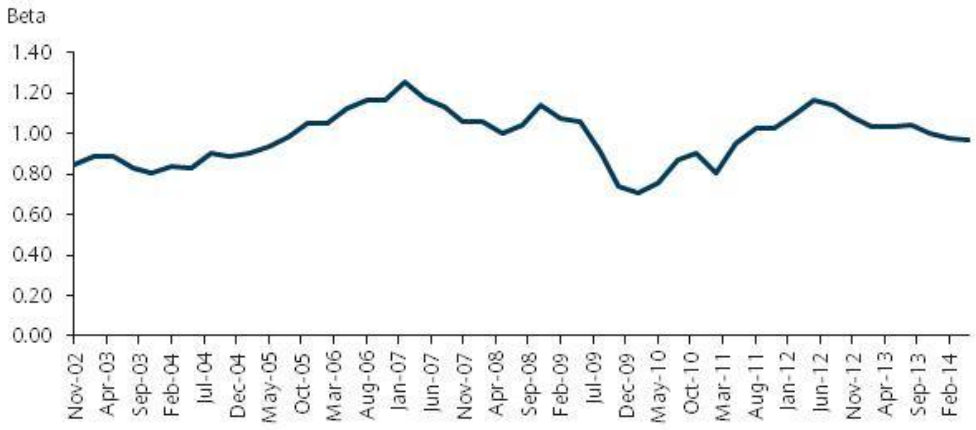
# US Market Hedged Value Index

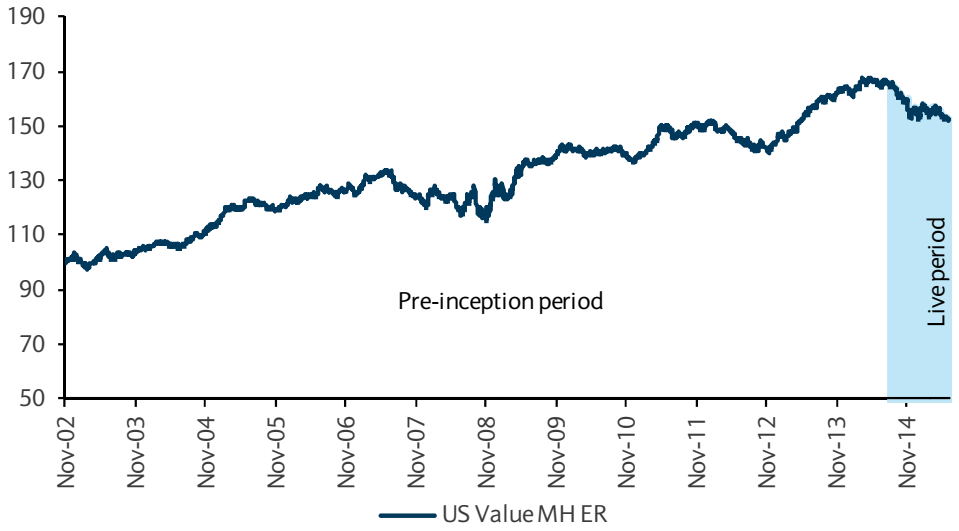
## Overview

- Market Hedged indices aim to provide investors access to the Value risk premia
- Beta is calculated monthly by averaging the betas of each of the Momentum portfolio constituents against the benchmark
- The beta exposure is hedged monthly by shorting the benchmark index (Short index)
- Short Index: SPDR S&P 500 ETF (with Gross Dividends reinvested)
- Quarterly Rebalancing
- Dividends are gross

## Historical Beta over time




## Simulated/Live Index Evolution Since Index Base Date




| Key Information | |
|---|---|
| Featured Index | US Value MH ER |
| Bloomberg Ticker | BXIIVMUE |
| Excess/Total Return | ER in USD |
| Live date | Sep-14 |
| Benchmark | N/A |
| Average Annualised Excess Return* | 3.36% |
| Average Annualised Volatility* | 5.09% |
| Sharpe Ratio* | 0.66 |

Source: Barclays. Pre-inception period: Index Base Date is November 2002. Index Live Date is September 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# US Market Hedged Value Index – Simulated/Live Past Performance table

| Performance Measures* | 1 Year | 3 Years | 5 Years | Since Base |
|---|---|---|---|---|
| Average Annual Excess Return | -7.06% | 1.72% | 1.71% | 3.36% |
| Average Annualised Volatility | 4.59% | 4.90% | 4.64% | 5.09% |
| Sortino Ratio | -2.15 | 0.68 | 0.71 | 1.34 |
| Sharpe Ratio | -1.54 | 0.35 | 0.37 | 0.66 |

| Monthly Returns and Drawdown | 1 Year | Since Base |
|---|---|---|
| Best 1 Month Excess Return | 1.44% | 6.37% |
| Worst 1 Month Excess Return | -3.04% | -3.81% |
| Percentage of Positive Months | 25% | 57% |
| Maximum Drawdown | -8.91% | -13.74% |

**Monthly and Annual Total Returns** (light blue background denotes live data)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | -0.91% | -2.21% | 0.62% | 1.75% | 1.43% | 0.52% | -1.85% | 1.14% | 0.82% | -0.82% | 1.46% | 1.57% | 3.48% |
| 2004 | -0.48% | 1.03% | 1.22% | -0.38% | -1.02% | -0.60% | 0.89% | 1.39% | 2.27% | -0.48% | 2.02% | 1.53% | 7.57% |
| 2005 | 1.11% | 3.78% | 0.99% | -0.88% | 0.09% | 2.38% | -0.07% | -1.09% | -0.30% | -0.20% | -0.95% | 1.32% | 6.22% |
| 2006 | 2.49% | -0.96% | 0.25% | 0.69% | 0.66% | 1.86% | -0.34% | -0.72% | -0.38% | 1.09% | 1.04% | -0.89% | 4.83% |
| 2007 | 0.20% | 2.87% | -0.11% | 0.32% | 0.81% | 0.15% | -1.84% | -1.06% | -1.32% | -1.83% | -0.53% | -0.98% | -3.34% |
| 2008 | 3.00% | -0.33% | -1.96% | -0.11% | 0.72% | -3.76% | 1.00% | 2.66% | -1.58% | -3.81% | 2.26% | 3.83% | 1.57% |
| 2009 | 0.05% | -0.40% | 0.85% | 6.37% | 1.41% | 0.86% | 0.18% | 0.57% | -0.17% | 0.62% | 1.62% | 1.30% | 13.90% |
| 2010 | 0.55% | -0.87% | -0.22% | -1.28% | 0.10% | 0.66% | -0.27% | 0.50% | 1.26% | -1.24% | -1.81% | -0.64% | -3.26% |
| 2011 | 1.52% | 0.23% | 1.79% | 2.05% | 2.57% | 0.23% | -1.87% | 0.49% | 0.85% | 1.03% | 0.04% | 0.05% | 9.26% |
| 2012 | 0.58% | -0.95% | -0.84% | 0.95% | -1.86% | -1.10% | -0.75% | -1.01% | -0.80% | 0.75% | -1.74% | 2.60% | -4.18% |
| 2013 | 2.12% | -0.82% | 1.78% | 1.04% | 3.14% | 1.39% | 0.26% | 1.83% | 0.50% | -0.33% | 1.59% | 0.92% | 14.21% |
| 2014 | -1.03% | 0.87% | 1.64% | -0.17% | 0.16% | -1.27% | 1.34% | -0.80% | -1.65% | -1.38% | -3.04% | 0.67% | -4.67% |
| 2015 | -1.38% | 1.44% | -0.40% | -0.10% | -1.63% | -0.28% | | | | | | | -2.35% |

Source: Barclays. Pre-inception period: Index Base Date is November 2002. Index Live Date is September 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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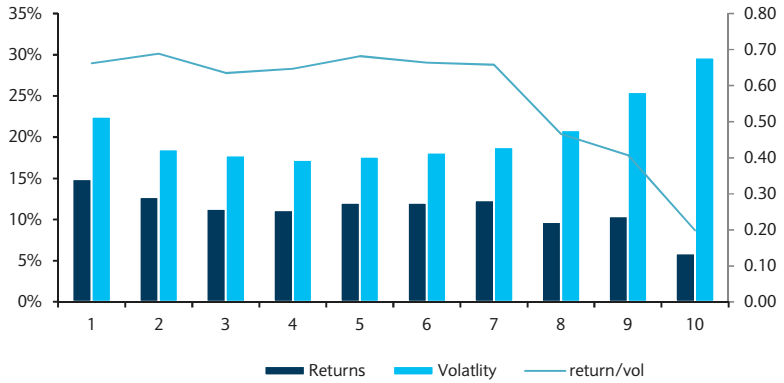
# VALUE ROBUSTNESS TESTS

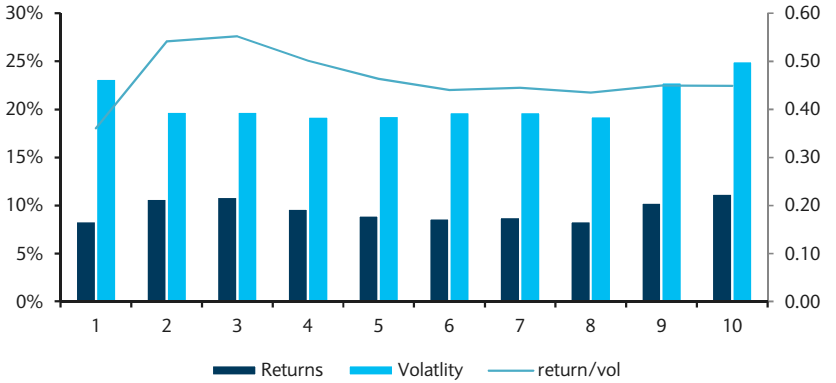
# Value Factors Overview

Decile ranking of various value factors (Period Jan 1995 – Jan 2014)

## Earnings / Price

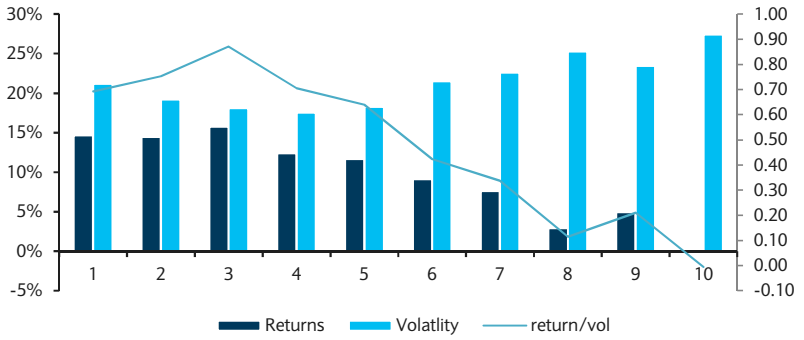



## Book Value / Price




## Sales / Price


## Cash Flow / Price




Source: Barclays, Period Jan 95 – Jan 14. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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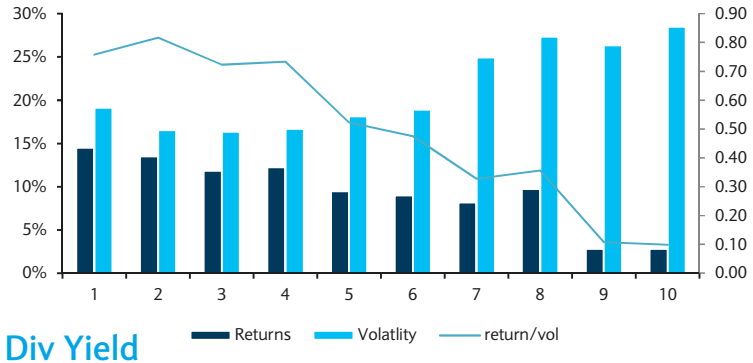
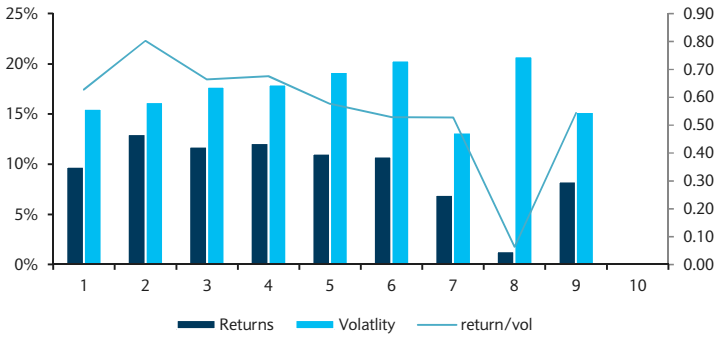
# Value Factor Decile Ranking

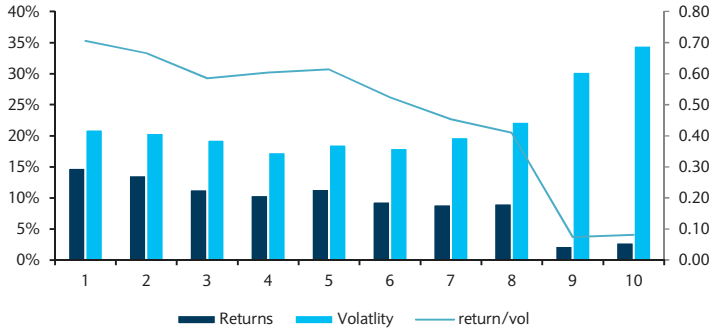
## Total Yield



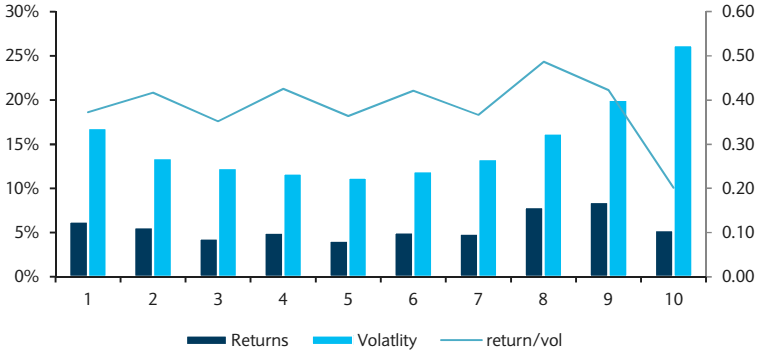

## Div Yield



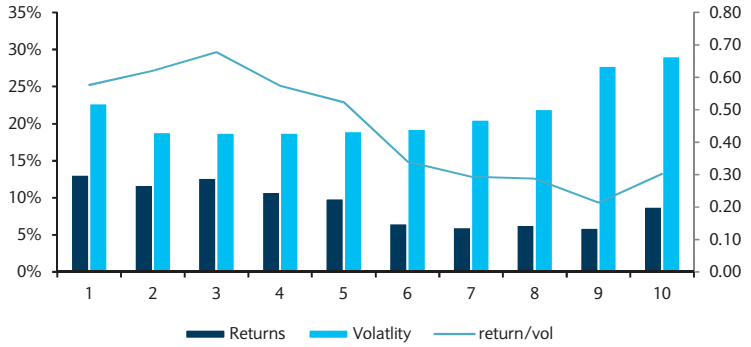

## EBITDA / EV




## IBES estimates




## Tax Paid




Source: Barclays, Period Jan 95 – Jan 14. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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# Value Factor – Highest Decile Comparison

- Book / price worst performing
- Total yield, EBITDA/EV and E/P with best performance

## Period Oct 01 – Jan 14

| Rankings start 2001 | Return/Risk | Factor |
|---|---|---|
| 1 | 0.72 | EBITDA/EV |
| 2 | 0.67 | Total Yield |
| 3 | 0.55 | EP |
| 4 | 0.49 | Div yield |
| 5 | 0.48 | CF/P |
| 6 | 0.44 | Tax paid |
| 7 | 0.42 | S/P |
| 8 | 0.40 | IBES |
| 9 | 0.28 | B/P |

## Period Jan 95 – Jan 14

| Rankings start 1995 | Return/Risk | Factor |
|---|---|---|
| 1 | 0.76 | Total Yield |
| 2 | 0.71 | EBITDA/EV |
| 3 | 0.69 | CF/P |
| 4 | 0.66 | EP |
| 5 | 0.63 | Div yield |
| 6 | 0.58 | Tax paid |
| 7 | 0.47 | S/P |
| 8 | 0.37 | IBES |
| 9 | 0.36 | B/P |

Source: Barclays, Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.

# Value Factor Across Sectors

- Universe 1000 most liquid stocks, Market cap min 1bn
- Total yield and P/E factor combined
- 3 out of 9 sectors where the highest ranked quintile underperforms the lowest (Consumer Discretionary, Energy and Utilities)
- 4 out of 9 sectors where the highest ranked quintile underperforms the sector benchmark (Consumer Discretionary, Energy, IT and Utilities)

| 11/2002 - 05/2014 | Consumer Discretionary | | | Consumer Staples | | |
|---|---|---|---|---|---|---|
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 11.64% | 14.98% | 10.44% | 19.75% | 8.15% | 9.80% |
| Vol | 33.58% | 34.21% | 24.13% | 18.58% | 19.37% | 12.49% |
| Return/Vol | 0.35 | 0.44 | 0.43 | 1.06 | 0.42 | 0.78 |
| | Energy | | | Financials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 13.48% | 23.86% | 14.49% | 10.01% | 1.33% | 2.03% |
| Vol | 29.14% | 38.89% | 22.66% | 23.11% | 41.23% | 31.40% |
| Return/Vol | 0.46 | 0.61 | 0.64 | 0.43 | 0.03 | 0.06 |
| | Health Care | | | Industrials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 18.43% | 6.80% | 8.73% | 17.16% | 10.59% | 10.44% |
| Vol | 22.54% | 25.52% | 16.02% | 27.24% | 32.24% | 23.31% |
| Return/Vol | 0.82 | 0.27 | 0.55 | 0.63 | 0.33 | 0.45 |
| | Information Technology | | | Materials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 10.88% | 9.16% | 9.71% | 22.80% | 10.17% | 11.09% |
| Vol | 28.81% | 38.83% | 24.28% | 35.48% | 41.42% | 27.29% |
| Return/Vol | 0.38 | 0.24 | 0.40 | 0.64 | 0.25 | 0.41 |
| | Utilities | | | | | |
| | Q1 | Q5 | Sector TR | | | |
| Return | 9.76% | 15.31% | 11.81% | | | |
| Vol | 17.43% | 24.52% | 16.04% | | | |
| Return/Vol | 0.56 | 0.62 | 0.74 | | | |

Source: Barclays, Volatilities are calculated based on quarterly observations. Observation period, November 2002 – May 2014. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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# QUALITY FACTOR

# Quality – Rationale/Academic Papers

**Rationale**

- Quality premium with long history of research in academic literature showing that high quality stocks outperformed low quality stocks with considerably less risk
- Selection of key papers published
  - Sloan (1996) is the first to document accruals anomaly (negative relationship between accounting accruals and subsequent stock returns)[1]
  - Piotroksi (2000) developed an F-Score using nice quality metrics[2]
  - Novy-Marx (2012) documents that strategies based on gross profitability generate value-like average excess returns but are highly dissimilar in both characteristics and covariances[3]
  - Fama and French (2013) introduce a five-factor asset pricing model adding profitability and investment patterns[4]
  - Asness et al. (2013) find strong and consistent abnormal returns using quality measures[5]

**Possible explanations**

- **Empirical effect detected by researchers**
- **Investor preferences:** prefer smaller amount in riskier stocks than larger amount in less risky stocks

[1]Source: Sloan (1996), "Do stock prices fully reflect information in accruals and cash flow about future earnings?", The Accounting Review 71
[2]Source: Piotroski(2000), "Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers", Journal of Accounting Research, 38
[3]Source: Novy-Marx (2013), "The Other Side of Value: The Gross Profitability Premium", Journal of Financial Economics
[4]Source: Fama and French (2013), "A Five-Factor Asset Pricing Model", Working paper
[5]Source: Assness et al (2013), "Quality minus Junk", Working paper

# Quality Equity Indices – Summary

- Geography: five regions available (US, Eurozone, UK, Japan and Global)
- Universe: all stocks from the respective region after applying liquidity filters
- Sector restrictions: max 20% from any single sector
- Available formats: Long-only indices in Total return, Excess return and Price return versions, market-hedged indices in Total return and Excess return versions

## Performance stats

| Index | Ticker | Start Date | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Return diff vs Benchmark | %age Vol vs Benchmark |
|---|---|---|---|---|---|---|---|---|
| US Quality TR | BXIIKUTU | 30-Nov-02 | 10.87% | 12.75% | 0.70 | -40.80% | 2.20% | 92% |
| US Benchmark | SPXT | 30-Nov-02 | 8.67% | 13.92% | 0.49 | -55.25% | | |
| EU Quality TR | BXIIKETE | 31-Dec-04 | 8.76% | 14.43% | 0.48 | -54.43% | 4.14% | 83% |
| EU Benchmark | SX5T | 31-Dec-04 | 4.63% | 17.28% | 0.17 | -58.58% | | |
| UK Quality TR | BXIIKGTG | 31-Dec-04 | 10.68% | 14.21% | 0.57 | -44.17% | 3.92% | 104% |
| UK Benchmark | TUKXG | 31-Dec-04 | 6.76% | 13.67% | 0.31 | -44.79% | | |
| Japan Quality TR | BXIIKJTJ | 31-Aug-05 | 8.19% | 15.60% | 0.51 | -50.51% | 4.19% | 77% |
| Japan Benchmark | TPXD100 | 31-Aug-05 | 4.00% | 20.24% | 0.18 | -62.81% | | |

Source: Barclays as if 30th June 2015. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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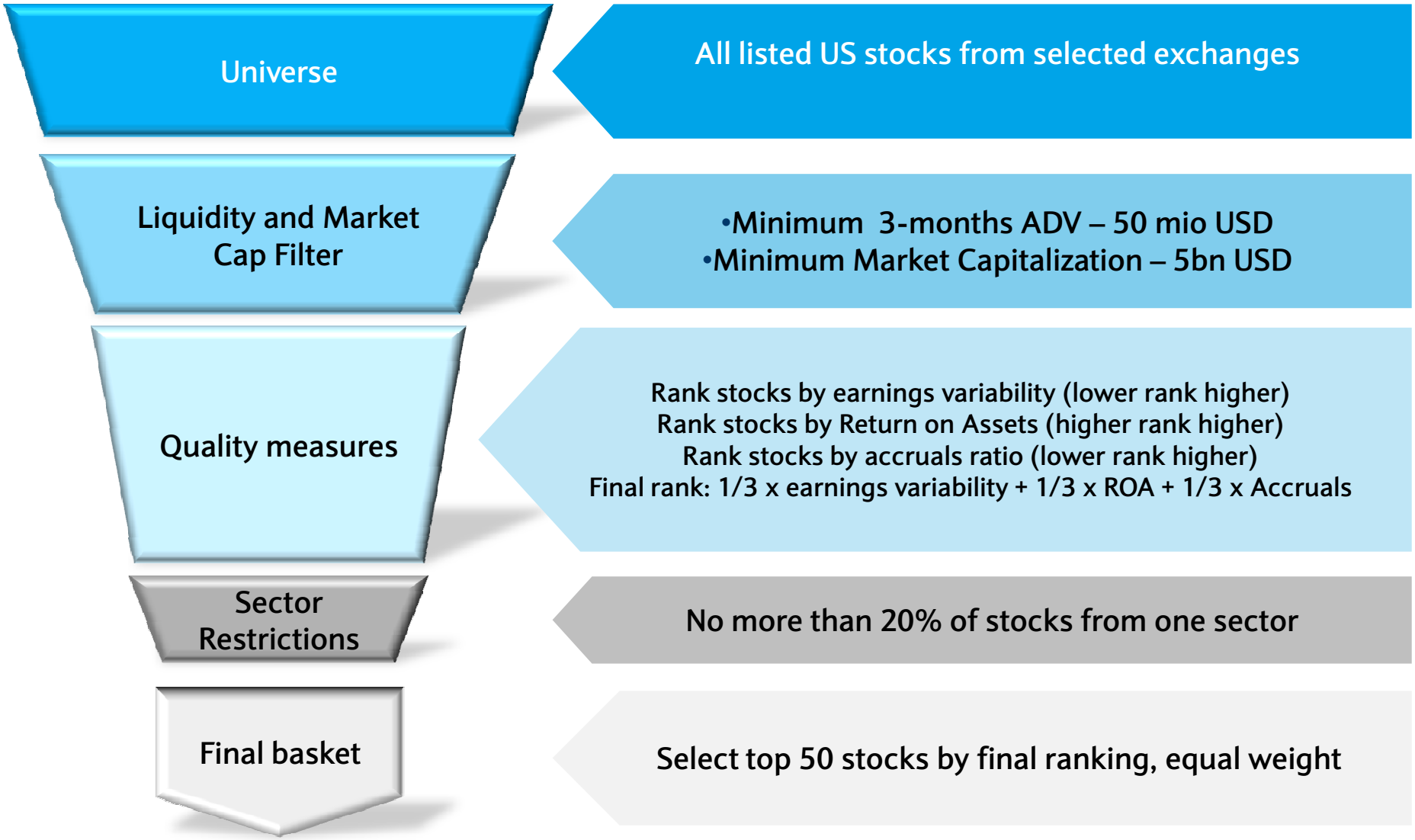
# Quality Indices – Mechanics – US Example



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# 3 Quality Factors

Three different quality criteria complementing each other aiming to select safe, profitable and well managed companies

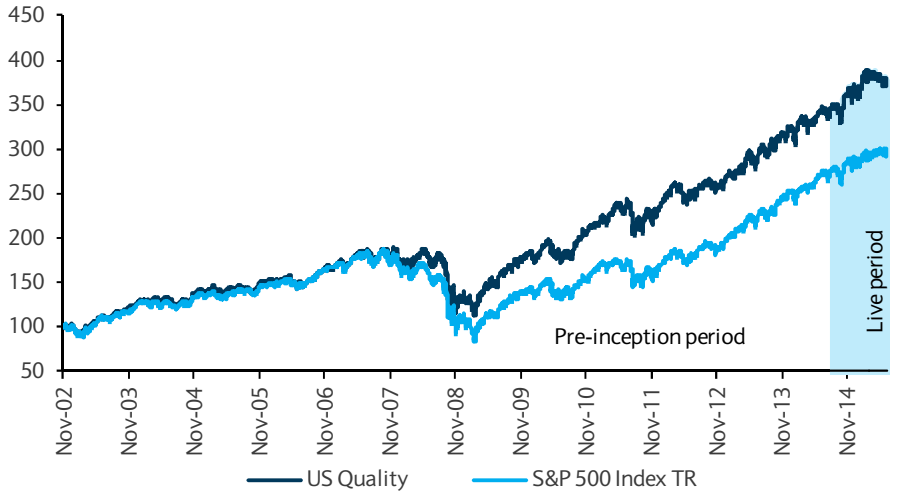
| | |
|---|---|
| Earnings variability | How stable are the earnings? |
| Return on Assets | How profitable is the business? |
| Accruals | Are the earnings based on real cash flow or potentially based on revenue recognition from accounting practices? |

# US Quality Index

## Overview

- Universe: all common US stocks from NYSE and NASDAQ exchanges
- Filters for liquidity based on minimum Market cap and 3m ADV
- Filters for minimum track record at time of selection
- 50 highest quality stocks are selected subject to sector restriction (max 20% per sector)
- Quarterly Rebalancing
- Equal Weighting
- Dividends are gross

## Simulated Index Evolution Since Index Base Date




| Key Information | |
|---|---|
| Featured Index | US Quality |
| Bloomberg Ticker | BXIIKUTU |
| Excess/Total Return | TR in USD |
| Live date | Sep-14 |
| Benchmark | S&P 500 Index TR |
| Average Annualised total Return* | 10.86% |
| Average Annualised Volatility* | 12.72% |
| Sharpe Ratio* | 0.74 |
| Currency | USD |

Source: Barclays. Pre-inception period: Index Base Date is November 2002. Index Live Date is September 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# US Quality Index – Simulated Past Performance Table

| Performance Measures* | 1 Year | 3 Years | 5 Years | Since Base |
|---|---|---|---|---|
| Average Annual Total Return | 8.42% | 13.82% | 16.40% | 10.86% |
| Average Annualised Volatility | 10.01% | 9.43% | 11.69% | 12.72% |
| Sortino Ratio | 2.93 | 3.83 | 3.25 | 1.32 |
| Sharpe Ratio | 0.83 | 1.46 | 1.39 | 0.74 |

| Monthly Returns and Drawdown | 1 Year | Since Base |
|---|---|---|
| Best 1 Month Total Return | 7.03% | 11.69% |
| Worst 1 Month Total Return | -2.43% | -14.09% |
| Percentage of Positive Months | 42% | 64% |
| Maximum Drawdown | -5.72% | -40.80% |

| Monthly and Annual Total Returns (light blue background denotes live data) | | | | | | | | | | | | | | Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year | Year |
| 2003 | -3.51% | -1.05% | 1.86% | 7.99% | 4.69% | 0.03% | 1.55% | 3.95% | -1.52% | 5.91% | 2.03% | 3.32% | 27.67% | 28.68% |
| 2004 | 1.54% | 0.98% | 0.21% | 0.16% | 0.99% | 1.56% | -4.43% | -0.32% | 0.60% | 2.37% | 5.28% | 3.34% | 12.69% | 10.88% |
| 2005 | -1.92% | 2.86% | -1.88% | -2.65% | 4.03% | -0.95% | 2.95% | -1.21% | -0.64% | -0.04% | 4.00% | 0.11% | 4.42% | 4.91% |
| 2006 | 3.17% | -1.23% | 1.42% | 0.93% | -3.25% | 0.78% | -1.28% | 2.65% | 2.89% | 3.50% | 2.05% | 0.04% | 12.05% | 15.79% |
| 2007 | 2.67% | -0.73% | 0.27% | 4.41% | 3.73% | -1.73% | -2.53% | 1.06% | 3.26% | 2.62% | -2.74% | -0.46% | 9.90% | 5.49% |
| 2008 | -4.74% | -2.01% | 0.35% | 4.98% | 3.65% | -7.56% | 0.90% | 3.52% | -7.67% | -14.09% | -5.95% | 0.52% | -26.18% | -37.00% |
| 2009 | -5.49% | -7.14% | 9.31% | 10.39% | 4.19% | 1.58% | 6.40% | 1.71% | 2.95% | -0.44% | 4.43% | 3.80% | 34.75% | 26.46% |
| 2010 | -3.74% | 2.80% | 5.71% | 2.36% | -6.25% | -4.96% | 4.95% | -3.31% | 11.69% | 3.45% | 1.79% | 3.77% | 18.15% | 15.06% |
| 2011 | 0.09% | 3.20% | 1.93% | 4.75% | 1.59% | -1.38% | -2.47% | -4.16% | -5.42% | 8.97% | 0.70% | 1.00% | 8.26% | 2.11% |
| 2012 | 4.11% | 3.99% | 3.64% | -0.14% | -6.41% | 3.08% | 0.10% | 2.35% | 1.90% | -1.72% | 0.53% | 0.18% | 11.70% | 16.00% |
| 2013 | 4.80% | -0.40% | 3.22% | 2.03% | 1.54% | -2.15% | 6.13% | -3.32% | 4.47% | 2.32% | 2.63% | 2.22% | 25.68% | 32.39% |
| 2014 | -4.11% | 6.47% | -0.41% | -0.09% | 1.40% | 1.68% | -1.57% | 3.91% | -0.90% | 2.57% | 3.60% | 0.02% | 12.83% | 13.69% |
| 2015 | -2.43% | 7.03% | -0.58% | -0.39% | -1.01% | -1.71% | | | | | | | 0.64% | 1.23% |

Source: Barclays. Pre-inception period: Index Base Date is November 2002. Index Live Date is September 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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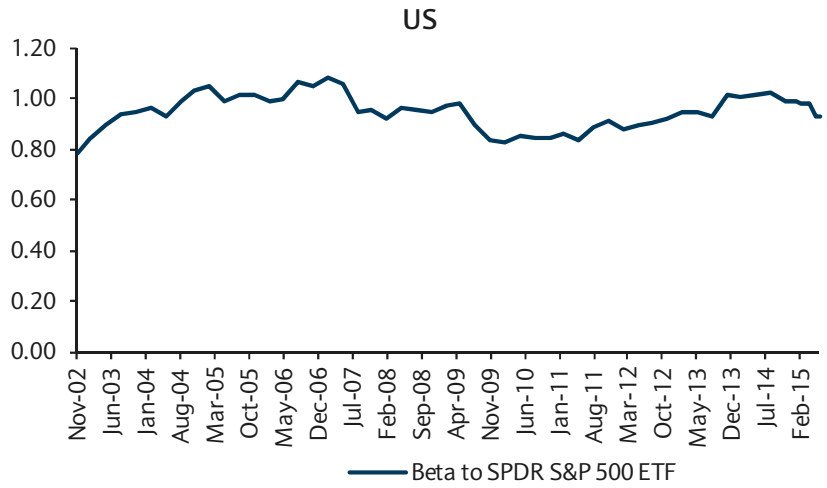
# US Market Hedged Quality Index

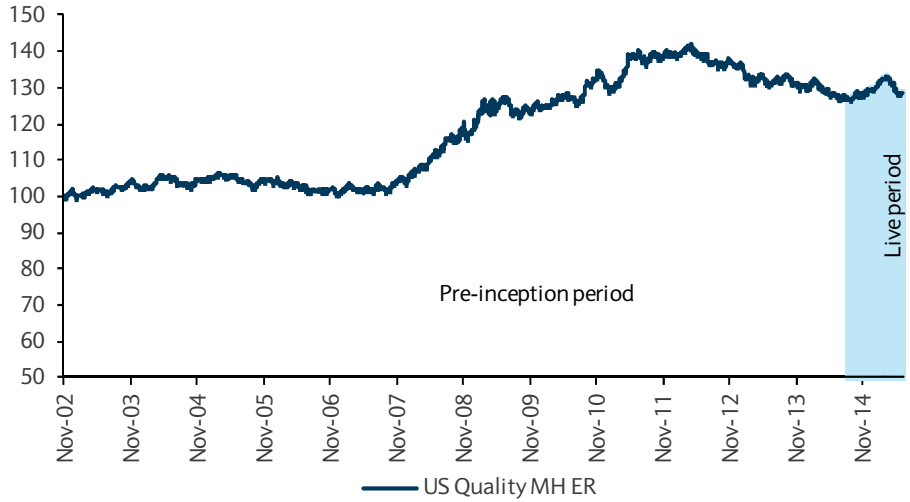
## Overview

- Market Hedged indices aim to provide investors access to the Quality risk premia
- Beta is calculated monthly by averaging the betas of each of the Momentum portfolio constituents against the benchmark
- The beta exposure is hedged monthly by shorting the benchmark index (Short index)
- Short Index: SPDR S&P 500 ETF (with Gross Dividends reinvested)
- Quarterly Rebalancing
- Dividends are gross

## Historical Beta over time




## Simulated Index Evolution Since Index Base Date




| Key Information | |
|---|---|
| Featured Index | US Quality MH ER |
| Bloomberg Ticker | BXIIKMUE |
| Excess/Total Return | ER in USD |
| Live date | Sep-14 |
| Benchmark | N/A |
| Average Annualised Excess Return* | 2.06% |
| Average Annualised Volatility* | 3.91% |
| Sharpe Ratio* | 0.53 |

Source: Barclays. Pre-inception period: Index Base Date is November 2002. Index Live Date is September 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# US Market Hedged Quality Index – Simulated Performance

| Performance Measures* | 1 Year | 3 Years | 5 Years | Since Base |
|---|---|---|---|---|
| Average Annual Excess Return | 0.88% | -2.43% | 0.25% | 2.06% |
| Average Annualised Volatility | 3.55% | 3.18% | 4.07% | 3.91% |
| Sortino Ratio | 0.35 | -1.17 | 0.12 | 1.10 |
| Sharpe Ratio | 0.25 | -0.77 | 0.06 | 0.53 |

| Monthly Returns and Drawdown | 1 Year | Since Base |
|---|---|---|
| Best 1 Month Excess Return | 1.53% | 4.21% |
| Worst 1 Month Excess Return | -2.28% | -2.28% |
| Percentage of Positive Months | 67% | 53% |
| Maximum Drawdown | -3.97% | -11.24% |

**Monthly and Annual Total Returns** (light blue background denotes live data)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | -1.41% | -0.05% | 1.13% | 1.15% | -0.29% | -1.00% | -0.06% | 2.18% | -0.50% | 0.80% | 0.95% | -1.44% | 1.39% |
| 2004 | -0.31% | -0.42% | 1.72% | 1.58% | -0.28% | -0.22% | -1.40% | -0.69% | -0.41% | 0.92% | 1.27% | 0.08% | 1.80% |
| 2005 | 0.42% | 0.62% | 0.01% | -0.62% | 0.66% | -1.08% | -0.89% | -0.24% | -1.48% | 2.41% | -0.44% | 0.37% | -0.31% |
| 2006 | 0.70% | -1.83% | -0.19% | -0.26% | -0.30% | 0.52% | -1.75% | 0.40% | 0.09% | 0.15% | 0.02% | -1.39% | -3.81% |
| 2007 | 1.10% | 1.57% | -0.95% | -0.39% | -0.00% | -0.08% | 0.78% | 0.02% | -0.55% | 1.38% | 0.85% | 0.51% | 4.29% |
| 2008 | 1.23% | 0.38% | 1.15% | 0.44% | 2.50% | 0.35% | 1.68% | 1.95% | 0.87% | 1.52% | -0.07% | -0.83% | 11.71% |
| 2009 | 2.72% | 2.84% | 1.30% | 0.63% | -1.24% | 1.56% | -0.89% | -1.96% | -0.13% | 1.30% | -0.99% | 2.14% | 7.38% |
| 2010 | -0.75% | 0.20% | 0.69% | 1.08% | 0.22% | -0.49% | -0.86% | 0.45% | 4.21% | 0.26% | 1.98% | -1.87% | 5.11% |
| 2011 | -1.99% | 0.20% | 1.98% | 2.17% | 2.65% | 0.03% | -0.62% | 0.08% | 0.65% | -0.52% | 0.80% | 0.14% | 5.61% |
| 2012 | -0.08% | -0.04% | 0.77% | 0.46% | -1.27% | -0.68% | -0.89% | -0.04% | -0.32% | 0.02% | -0.07% | -0.79% | -2.90% |
| 2013 | 0.08% | -1.68% | -0.35% | 0.14% | -0.61% | -0.75% | 0.93% | -0.53% | 1.44% | -1.89% | -0.29% | -0.40% | -3.88% |
| 2014 | -0.56% | 1.80% | -1.27% | -0.86% | -0.84% | -0.45% | -0.21% | -0.12% | 0.52% | 0.16% | 0.80% | 0.29% | -0.78% |
| 2015 | 0.44% | 1.53% | 0.96% | -1.35% | -2.28% | 0.19% | | | | | | | -0.56% |

Source: Barclays. Pre-inception period: Index Base Date is November 2002. Index Live Date is September 2014. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# QUALITY ROBUSTNESS TESTS

# Quality Factor Across Sectors

- Universe 1000 most liquid stocks, Market cap min 1bn
- Earnings variability, Return on Assets and Accruals combined
- 2 out of 9 sectors where the highest ranked quintile underperforms the lowest (Health Care and Utilities)
- 4 out of 9 sectors where the highest ranked quintile underperforms the sector benchmark (Energy, Healthcare, IT and Utilities)

| 11/2002 - 05/2014 | Consumer Discretionary | | | Consumer Staples | | |
|---|---|---|---|---|---|---|
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 14.18% | 7.12% | 10.44% | 12.68% | 8.89% | 9.80% |
| Vol | 23.47% | 41.67% | 24.13% | 12.01% | 23.69% | 12.49% |
| Return/Vol | 0.60 | 0.17 | 0.43 | 1.06 | 0.38 | 0.78 |
| | Energy | | | Financials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 14.66% | 18.71% | 14.49% | 6.07% | 6.03% | 2.03% |
| Vol | 30.48% | 41.45% | 22.66% | 23.59% | 33.13% | 31.40% |
| Return/Vol | 0.48 | 0.45 | 0.64 | 0.26 | 0.18 | 0.06 |
| | Health Care | | | Industrials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 9.66% | 16.24% | 8.73% | 10.47% | 15.04% | 10.44% |
| Vol | 18.84% | 25.71% | 16.02% | 21.53% | 35.11% | 23.31% |
| Return/Vol | 0.51 | 0.63 | 0.55 | 0.49 | 0.43 | 0.45 |
| | Information Technology | | | Materials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 10.40% | 11.06% | 9.71% | 14.90% | 12.87% | 11.09% |
| Vol | 26.79% | 37.11% | 24.28% | 22.73% | 39.80% | 27.29% |
| Return/Vol | 0.39 | 0.30 | 0.40 | 0.66 | 0.32 | 0.41 |
| | Utilities | | | | | |
| | Q1 | Q5 | Sector TR | | | |
| Return | 7.59% | 15.93% | 11.81% | | | |
| Vol | 16.64% | 25.26% | 16.04% | | | |
| Return/Vol | 0.46 | 0.63 | 0.74 | | | |

Source: Barclays, Volatilities are calculated based on quarterly observations. Observation period, November 2002 – May 2014. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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# LOW VOLATILITY FACTOR

# Low Volatility – Rationale/Academic Papers

- **Rationale – "Low volatility anomaly"**
  - Conventional economic theory asserts that stocks with higher risk (volatility or beta) will provide a higher risk premium or return[1]
  - However, extensive academic literature has documented that stocks with lower realized volatility have historically outperformed broad market indices with substantially lower risk
    - Blitz and van Vliet (2007) examined global stock returns over 1986-2006 and found not merely the absence of a risk premium, but a negative correlation between returns and increasing risk[2]
    - Baker, Bradley and Wurgler (2011) extended their analysis to cover the period of 1968-2008. Their study focused on the US stock market and found, once again, an inverse relationship between risk and return[3]

- **Why does it exist?[1]**
  - **Lottery effect:** preference for lottery-like payoffs
  - **Leverage constraints/ aversion**
  - **Tracking error constraint:** a low vol stock tilt introduces low beta and leads to large tracking error against broad benchmarks

[1]Source: Barclays Equity Research, "Special Report: Using the Volatility Anomaly in Systematic Option Strategies", October 2012
[2]Source: Blitz & van Vliet, "The Volatility Effect: Lower Risk without Lower Return", Journal of Portfolio Management, April 2007
[3]Source: Baker, Bradley & Wurgler, "Benchmarks as Limits to Arbitrage: Understanding the Low Volatility Anomaly", Financial Analysts Journal Jan/Feb 2011

# Low Volatility Equity Indices – Summary

- Geography: Four regions available (US, Eurozone, UK and Japan)
- Universe: all stocks from the respective region after applying liquidity filters
- Sector restrictions: max 20% from any single sector
- Available formats: Long-only indices in Total return, Excess return and Price return versions, market-hedged indices in Total return and Excess return versions

## Performance stats

| Index | Ticker | Start Date | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Return diff vs Benchmark | %age Vol vs Benchmark |
|---|---|---|---|---|---|---|---|---|
| US Low Volatility TR | BXIILUTU | 31-Dec-02 | 11.00% | 9.75% | 0.93 | -38.40% | 1.74% | 70% |
| US Benchmark | SPXT | 31-Dec-02 | 9.26% | 13.84% | 0.53 | -55.25% | | |
| EU Low Volatility TR | BXIILETE | 31-Oct-04 | 9.42% | 11.91% | 0.64 | -42.96% | 4.38% | 69% |
| EU Benchmark | SX5T | 31-Oct-04 | 5.04% | 17.17% | 0.17 | -58.58% | | |
| UK Low Volatility TR | BXIILGTG | 31-Oct-04 | 11.58% | 10.96% | 0.81 | -30.99% | 4.48% | 81% |
| UK Benchmark | TUKXG | 31-Oct-04 | 7.10% | 13.58% | 0.36 | -44.79% | | |
| Japan Low Volatility TR | BXIILJTJ | 31-Jul-05 | 7.28% | 12.70% | 0.55 | -47.29% | 2.68% | 63% |
| Japan Benchmark | TPXD100 | 31-Jul-05 | 4.60% | 20.24% | 0.13 | -62.81% | | |

Source: Barclays as if 30th June 2015. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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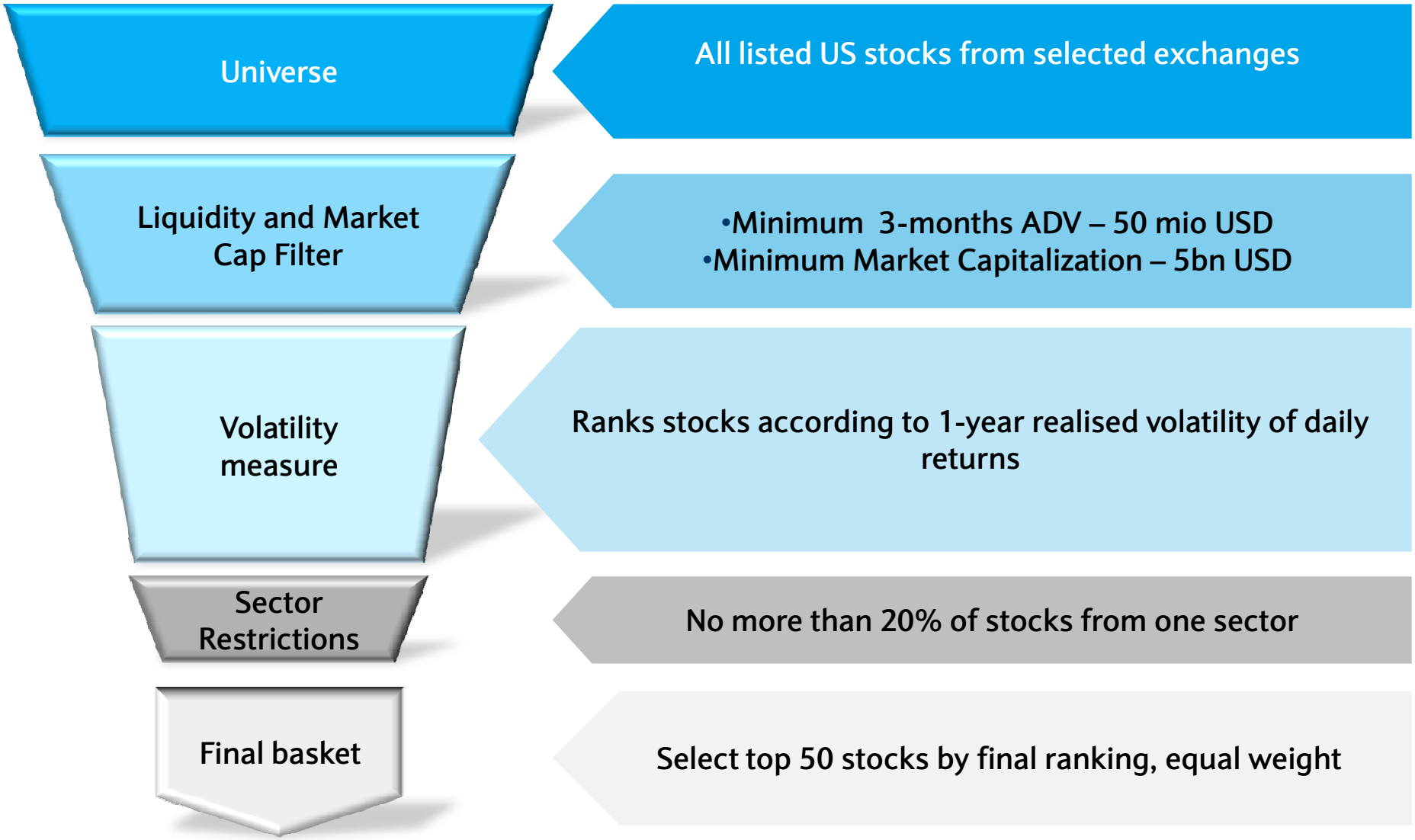
# Low Volatility Equity Indices – Mechanics – US Example



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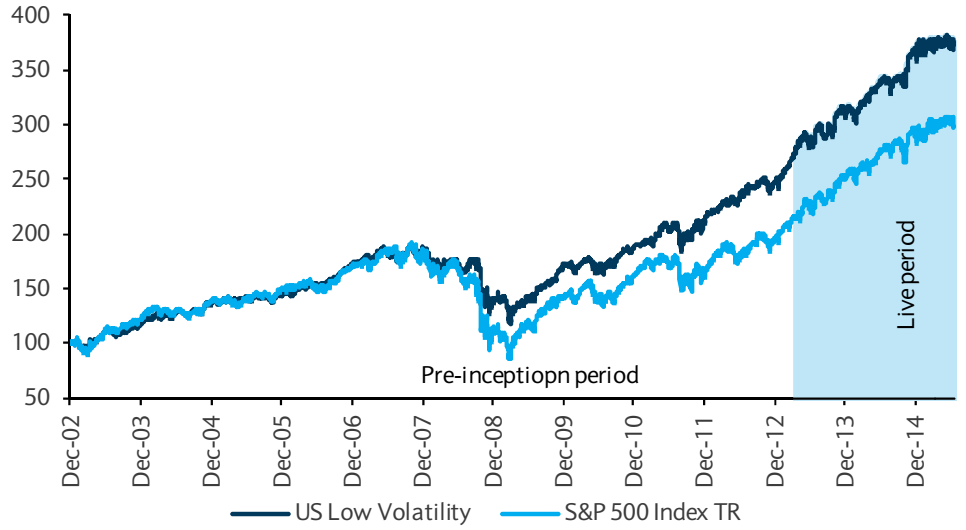
# US Low Volatility Index

## Overview

- Universe: all common US stocks from NYSE and NASDAQ exchanges
- Filters for liquidity based on minimum Market cap and 3m ADV
- Filters for minimum track record at time of selection
- 50 lowest volatility stocks are selected subject to sector restriction (max 20% per sector)
- Monthly Rebalancing
- Equal Weighting
- Dividends are gross

## Simulated/Live Index Evolution Since Index Base Date




| Key Information | |
|---|---|
| Featured Index | US Low Volatility |
| Bloomberg Ticker | BXIILUTU Index |
| Excess/Total Return | TR in USD |
| Live date | Apr 2013 |
| Benchmark | S&P 500 Index TR |
| Average Annualised total Return* | 10.99% |
| Average Annualised Volatility* | 9.72% |
| Sharpe Ratio* | 0.98 |
| Currency | USD |

Source: Barclays. Pre-inception period: Index Base Date is December 2002. Index Live Date is April 2013. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# US Low Volatility Index – Performance Table

| Performance Measures* | 1 Year | 3 Years | 5 Years | Since Base |
|---|---|---|---|---|
| Average Annual Total Return | 7.55% | 15.59% | 17.57% | 10.99% |
| Average Annualised Volatility | 8.55% | 8.45% | 8.38% | 9.72% |
| Sortino Ratio | 2.03 | 4.34 | 5.46 | 1.60 |
| Sharpe Ratio | 0.87 | 1.83 | 2.08 | 0.98 |

| Monthly Returns and Drawdown | 1 Year | Since Base |
|---|---|---|
| Best 1 Month Total Return | 4.40% | 6.78% |
| Worst 1 Month Total Return | -3.32% | -13.00% |
| Percentage of Positive Months | 50% | 67% |
| Maximum Drawdown | -4.22% | -38.40% |

| Monthly and Annual Total Returns (light blue background denotes live data) | | | | | | | | | | | | | | Benchmark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year | Year |
| 2003 | -1.86% | -1.04% | 2.11% | 4.43% | 5.00% | 0.14% | -0.66% | 1.38% | -0.26% | 4.61% | 1.09% | 5.52% | 22.05% | 28.68% |
| 2004 | -0.24% | 2.72% | -0.18% | 0.87% | 1.19% | 1.80% | -2.46% | 2.18% | 0.08% | 0.76% | 3.60% | 2.94% | 13.93% | 10.88% |
| 2005 | -1.16% | 1.68% | -0.59% | 0.33% | 1.12% | -0.65% | 2.00% | -1.07% | 0.62% | -1.04% | 2.11% | 0.37% | 3.72% | 4.91% |
| 2006 | 0.14% | 2.58% | 1.19% | 1.94% | -0.22% | 0.43% | 1.98% | 2.10% | 1.70% | 3.17% | 1.19% | 2.79% | 20.68% | 15.79% |
| 2007 | 0.64% | 0.44% | 1.06% | 3.00% | 2.01% | -3.36% | -3.14% | 3.21% | 2.96% | 0.81% | -1.15% | -0.91% | 5.42% | 5.49% |
| 2008 | -5.36% | -1.02% | -0.13% | 0.88% | 1.79% | -6.24% | 2.41% | 3.21% | -3.29% | -13.00% | -3.73% | 1.60% | -21.65% | -37.00% |
| 2009 | -2.73% | -10.09% | 4.27% | 3.23% | 2.45% | 3.17% | 4.60% | 1.51% | 2.45% | 0.80% | 6.78% | 2.34% | 19.21% | 26.46% |
| 2010 | -2.67% | 1.37% | 3.47% | 0.64% | -5.20% | -1.69% | 4.34% | -0.14% | 5.46% | 2.11% | -1.02% | 4.63% | 11.25% | 15.06% |
| 2011 | -0.46% | 2.48% | 1.34% | 4.24% | 1.91% | -1.01% | -2.74% | -0.26% | -1.97% | 5.62% | 1.35% | 3.74% | 14.81% | 2.11% |
| 2012 | 0.34% | 2.03% | 2.62% | 1.53% | -1.65% | 3.92% | 2.07% | -0.52% | 1.77% | -0.12% | -0.10% | -0.40% | 11.96% | 16.00% |
| 2013 | 4.87% | 3.29% | 4.98% | 3.24% | -2.08% | 1.10% | 4.42% | -3.51% | 2.20% | 5.21% | 2.07% | 0.65% | 29.35% | 32.39% |
| 2014 | -3.35% | 3.67% | 2.53% | 2.17% | 1.23% | 1.73% | -3.32% | 3.49% | -0.29% | 4.40% | 3.06% | 0.52% | 16.63% | 13.69% |
| 2015 | -1.31% | 3.16% | -0.69% | -0.72% | 1.48% | -2.16% | | | | | | | -0.32% | 1.23% |

Source: Barclays. Pre-inception period: Index Base Date is December 2002. Index Live Date is April 2013. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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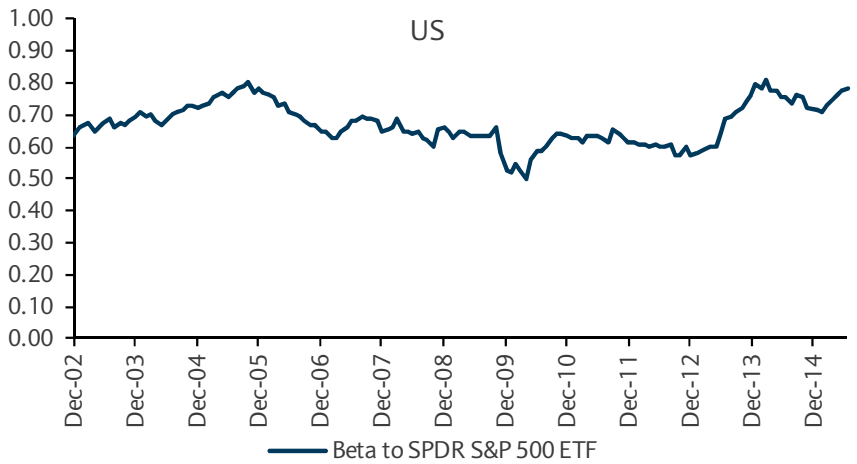
# US Market Hedged Low Volatility Index

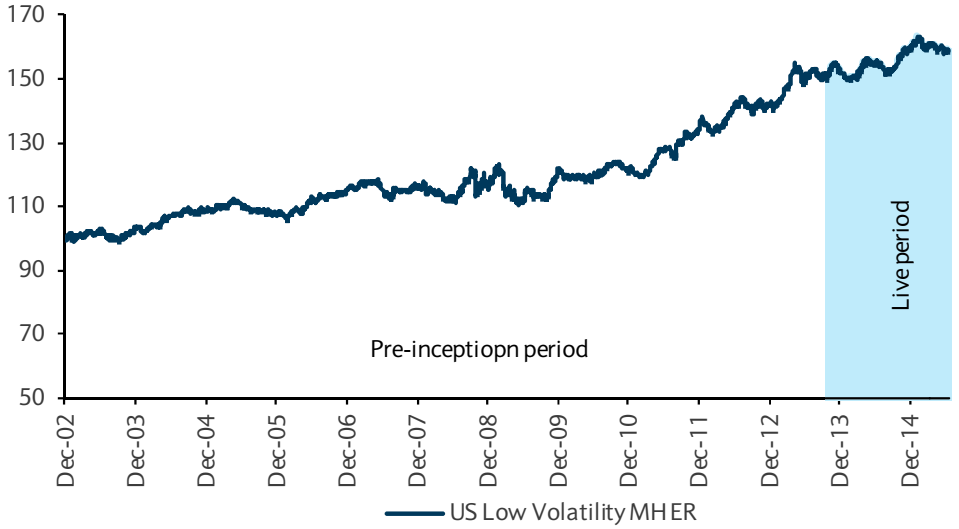
## Overview

- Market Hedged indices aim to provide investors access to the Low Volatility risk premia
- Beta is calculated monthly by averaging the betas of each of the Momentum portfolio constituents against the benchmark
- The beta exposure is hedged monthly by shorting the benchmark index (Short index)
- Short Index: SPDR S&P 500 ETF (with Gross Dividends reinvested)
- Monthly Rebalancing
- Dividends are gross

### Historical Beta over time




## Simulated/Live Index Evolution Since Index Base Date




| Key Information | |
|---|---|
| Featured Index | US Low Volatility MH ER |
| Bloomberg Ticker | BXIILMUE Index |
| Excess/Total Return | ER in USD |
| Live date | Oct 2013 |
| Benchmark | N/A |
| Average Annualised Excess Return* | 3.68% |
| Average Annualised Volatility* | 5.01% |
| Sharpe Ratio* | 0.74 |

Source: Barclays. Pre-inception period: Index Base Date is December 2002. Index Live Date is October 2013. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# US Market Hedged Low Volatility Index – Performance

| Performance Measures* | 1 Year | 3 Years | 5 Years | Since Base |
|---|---|---|---|---|
| Average Annual Excess Return | 2.03% | 3.76% | 5.82% | 3.68% |
| Average Annualised Volatility | 4.42% | 5.10% | 5.33% | 5.01% |
| Sortino Ratio | 0.77 | 1.34 | 2.22 | 1.38 |
| Sharpe Ratio | 0.46 | 0.74 | 1.09 | 0.74 |

| Monthly Returns and Drawdown | 1 Year | Since Base |
|---|---|---|
| Best 1 Month Excess Return | 2.42% | 3.42% |
| Worst 1 Month Excess Return | -2.35% | -3.60% |
| Percentage of Positive Months | 67% | 60% |
| Maximum Drawdown | -3.20% | -10.20% |

**Monthly and Annual Total Returns** (light blue background denotes live data)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | -0.09% | -0.22% | 1.49% | -0.87% | 1.26% | -0.62% | -1.87% | 0.04% | 0.43% | 0.95% | 0.29% | 1.98% | 2.75% |
| 2004 | -1.65% | 1.66% | 0.91% | 1.82% | 0.25% | 0.47% | -0.21% | 1.84% | -0.70% | -0.34% | 0.55% | 0.57% | 5.23% |
| 2005 | 0.43% | 0.09% | 0.73% | 1.76% | -1.38% | -0.85% | -0.95% | -0.38% | -0.07% | 0.75% | -1.45% | 0.49% | -0.88% |
| 2006 | -1.82% | 2.03% | -0.13% | 0.98% | 1.88% | 0.09% | 1.53% | 0.43% | -0.25% | 0.85% | -0.24% | 1.71% | 7.22% |
| 2007 | -0.51% | 1.55% | 0.15% | 0.03% | -0.37% | -2.50% | -1.20% | 2.10% | 0.08% | -0.26% | 1.35% | -0.50% | -0.17% |
| 2008 | -1.59% | 0.64% | 0.23% | -2.34% | 0.81% | -1.00% | 2.73% | 2.19% | 2.29% | -2.83% | 0.86% | 0.65% | 2.48% |
| 2009 | 2.89% | -3.60% | -0.99% | -3.43% | -1.18% | 3.07% | -0.19% | -0.96% | 0.25% | 1.98% | 2.86% | 1.22% | 1.63% |
| 2010 | -0.91% | -0.38% | 0.22% | -0.25% | -0.89% | 1.39% | 0.37% | 2.55% | 0.22% | -0.32% | -1.04% | 0.34% | 1.24% |
| 2011 | -1.91% | 0.26% | 1.37% | 2.29% | 2.71% | -0.01% | -1.34% | 3.42% | 2.23% | -1.08% | 1.54% | 3.15% | 13.17% |
| 2012 | -2.44% | -0.63% | 0.64% | 1.94% | 1.92% | 1.40% | 1.41% | -2.10% | 0.29% | 0.98% | -0.52% | -1.00% | 1.78% |
| 2013 | 1.92% | 2.56% | 2.75% | 2.00% | -3.37% | 2.06% | 0.83% | -1.46% | -0.05% | 1.93% | -0.13% | -1.31% | 7.81% |
| 2014 | -0.65% | 0.13% | 1.86% | 1.64% | -0.51% | 0.10% | -2.35% | 0.56% | 0.76% | 2.42% | 1.09% | 0.72% | 5.83% |
| 2015 | 0.79% | -0.85% | 0.48% | -1.46% | 0.51% | -0.58% | | | | | | | -1.12% |

Source: Barclays. Pre-inception period: Index Base Date is December 2002. Index Live Date is October 2013. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. For Institutional Investors Only, Not For Distribution To Retail Customers.



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# LOW VOLATILITY ROBUSTNESS TESTS

# Low Volatility Factor Across Sectors

- Universe 1000 most liquid stocks, Market cap min 1bn
- 1y realized Volatility used as Factor
- Highest ranked quintile outperforms across all sectors
- 1 out of 9 sectors where the highest ranked quintile underperforms the sector benchmark (Utilities)

| 12/2002 - 07/2014 | Consumer Discretionary | | | Consumer Staples | | |
|---|---|---|---|---|---|---|
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 9.68% | 13.91% | 10.74% | 10.56% | 15.02% | 10.09% |
| Vol | 19.95% | 37.57% | 23.26% | 11.54% | 25.70% | 12.50% |
| Return/Vol | 0.49 | 0.37 | 0.46 | 0.91 | 0.58 | 0.81 |
| | Energy | | | Financials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 17.78% | 15.85% | 14.59% | 8.47% | -1.14% | 2.29% |
| Vol | 28.28% | 42.68% | 24.23% | 18.20% | 49.68% | 32.84% |
| Return/Vol | 0.63 | 0.37 | 0.60 | 0.47 | - 0.02 | 0.07 |
| | Health Care | | | Industrials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 12.77% | 15.83% | 9.26% | 11.40% | 9.50% | 10.12% |
| Vol | 15.11% | 30.95% | 16.33% | 18.41% | 39.23% | 23.53% |
| Return/Vol | 0.84 | 0.51 | 0.57 | 0.62 | 0.24 | 0.43 |
| | Information Technology | | | Materials | | |
| | Q1 | Q5 | Sector TR | Q1 | Q5 | Sector TR |
| Return | 9.17% | 5.49% | 9.83% | 12.34% | 14.53% | 10.80% |
| Vol | 19.01% | 36.82% | 21.83% | 19.34% | 42.50% | 24.87% |
| Return/Vol | 0.48 | 0.15 | 0.45 | 0.64 | 0.34 | 0.43 |
| | Utilities | | | | | |
| | Q1 | Q5 | Sector TR | | | |
| Return | 9.84% | 10.65% | 12.06% | | | |
| Vol | 15.54% | 35.70% | 18.80% | | | |
| Return/Vol | 0.63 | 0.30 | 0.64 | | | |

Source: Barclays, Volatilities are calculated based on quarterly observations. Observation period, November 2002 – May 2014. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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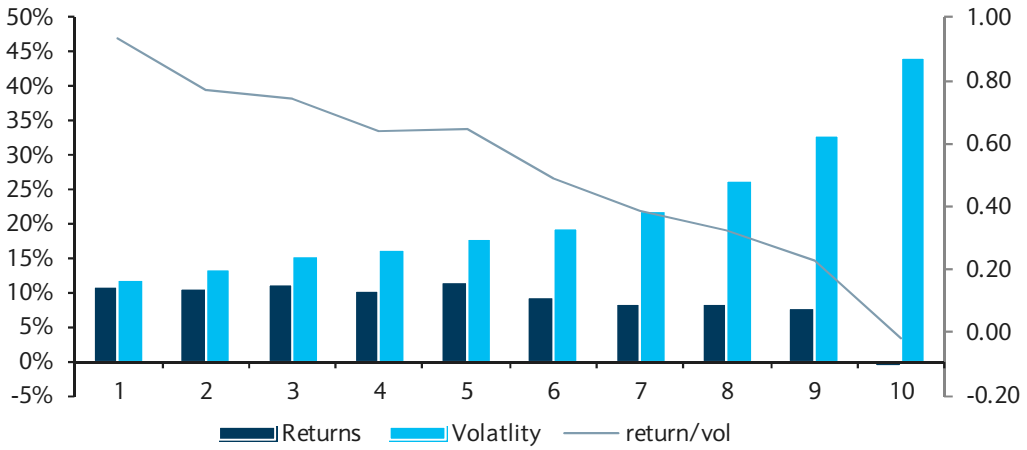
# Global Low Volatility Properties

- **Universe:** Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the UK and the US
- ADV >=25mio USD, Market cap >=1bn USD
- Simple ranking by 1y realised volatility
- Strong monotonic pattern

## Volatility ranked deciles (Dec 95 – Mar 14)




## Performance stats (Dec 95 – Mar 14)

| | Decile 1 | Decile 2 | Decile 3 | Decile 4 | Decile 5 | Decile 6 | Decile 7 | Decile 8 | Decile 9 | Decile 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Returns | 10.97% | 10.46% | 11.33% | 10.37% | 11.48% | 9.45% | 8.48% | 8.45% | 7.64% | -0.66% |
| Volatlity | 11.72% | 13.54% | 15.24% | 16.26% | 17.84% | 19.37% | 22.01% | 26.25% | 32.84% | 44.29% |
| return/vol | 0.94 | 0.77 | 0.74 | 0.64 | 0.64 | 0.49 | 0.39 | 0.32 | 0.23 | -0.01 |

Source: Barclays. Simulated past performance is based on backtested data. Strategy levels are not calculated by BRAIS and are indicative only. Performance is based on the proposed methodology which is subject to change. Performance does reflect all costs/fees incorporated in the Strategy formula, but do no reflect additional fees that may apply to a strategy swap transaction. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. All data is simulated.



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# FACTOR COMBINATIONS

# Combining Equity Risk Factors

## Passive Implementation:

- Equal weighted method
- Risk parity approach (inverse volatility weighting)
- Rotating strategy (using trending signal)
  - Select 2 best performing global factors
  - Select 2 best performing factor per region
- Multi-Factor Global Strategy

## Active Implementation:

- Relative factor attractiveness through time
- Active tilts on factors, regions

# Correlations - US Factor Indices and S&P 500

- Correlations among Market Hedged Indices are lower compared to long only
- Market Hedged Indices correlations are slightly negative/low correlated to the S&P 500

| | US Value Long only | US Momentum Long only | US Low Vol Long only | US Quality Long only | S&P 500 TR | US Value Market hedged | US Momentum Market hedged | US Low Vol Market hedged | US Quality Market Hedged |
|---|---|---|---|---|---|---|---|---|---|
| US Value Long only | 100% | 72% | 82% | 92% | 94% | 54% | -15% | -7% | -12% |
| US Momentum Long only | | 100% | 64% | 79% | 80% | 9% | 47% | -17% | -3% |
| US Low Vol Long only | | | 100% | 83% | 86% | 24% | -21% | 43% | -12% |
| US Quality Long only | | | | 100% | 96% | 29% | -7% | -7% | 14% |
| S&P 500 TR | | | | | 100% | 25% | -12% | -8% | -15% |
| US Value Market hedged | | | | | | 100% | -18% | 2% | 9% |
| US Momentum Market hedged | | | | | | | 100% | -20% | 15% |
| US Low Vol Market hedged | | | | | | | | 100% | 5% |
| US Quality Market Hedged | | | | | | | | | 100% |

Source: Barclays, correlations are calculated on monthly returns, observation period 31st Jan 03 to 30th Jun 2015. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information. Correlation data incorporates both live and simulated performance data. For Institutional Investors Only, Not For Distribution To Retail Customers.



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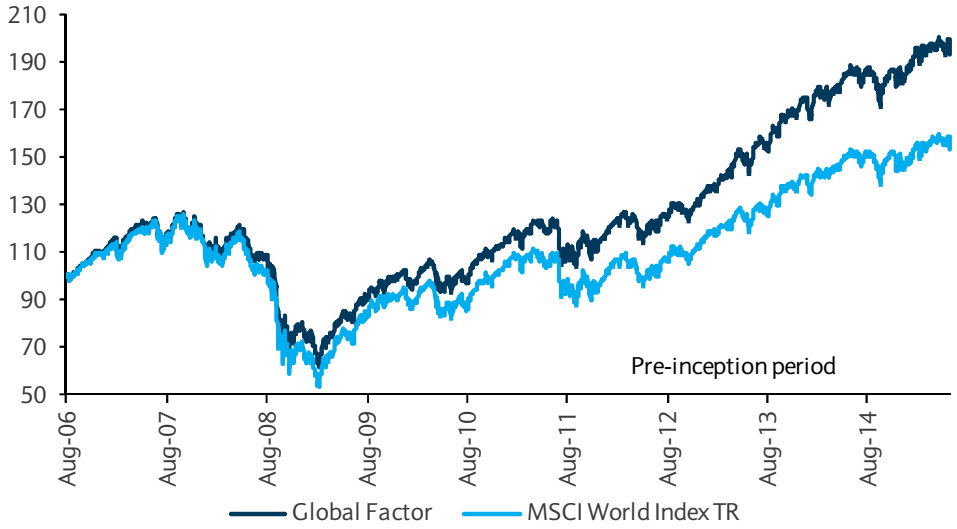
# Equal Weight - Global Factor Strategy

- Simple combination
- Step 1: combine US, Eurozone, UK and Japan
- Quarterly rebalancing, Compo FX
- Weighting is proxied by the Index market cap

| US net * (60%) | Eurozone (15%) | UK (15%) | Japan (10%) |
|---|---|---|---|

- Step 2: equal weight 4 factors

## Simulated past performance Aug 2006 – Jun 2015




## Performance stats – Global Factor strategies

| Strategy | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Tracking error | Infromation Ratio |
|---|---|---|---|---|---|---|
| Global Factor Net | 7.75% | 14.51% | 0.46 | -51.11% | 3.46% | 0.80 |
| Global Value Net | 6.93% | 18.47% | 0.32 | -62.52% | 5.14% | 0.38 |
| Global Momentum Net | 7.01% | 16.94% | 0.35 | -55.78% | 7.59% | 0.27 |
| Global Quality Net | 8.47% | 14.62% | 0.50 | -47.35% | 3.77% | 0.92 |
| Global Low Vol | 7.72% | 11.11% | 0.60 | -40.91% | 8.24% | 0.33 |
| MSCI World Net | 4.99% | 16.75% | 0.23 | -57.82% | | |

*Source: Barclays. Please note that US net strategies are a proxy calculation by applying a 30% withholding tax rate to the US gross indices to make them comparable with the MSCI Global net Index. All other components are Indices calculated by BRAIS.

Source: Barclays. Simulated past performance is based on backtested data. Strategy levels are not calculated by BRAIS and are indicative only. Performance is based on the proposed methodology which is subject to change. Performance does reflect all costs/fees incorporated in the Strategy formula, but do no reflect additional fees that may apply to a strategy swap transaction. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance.



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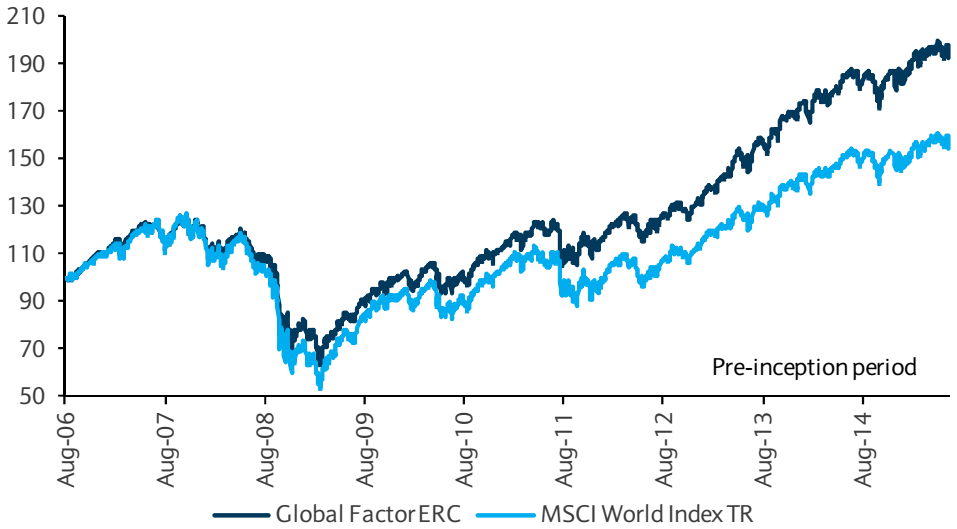
# Risk Parity Approach – Global Factor Strategy

- Simple combination
- Step 1: combine US, Eurozone, UK and Japan
- Quarterly rebalancing, Compo FX
- Weighting is proxied by the Index market cap

| US net * (60%) | Eurozone (15%) | UK (15%) | Japan (10%) |
|---|---|---|---|

- Step 2: inverse volatility weighting of 4 factors

## Simulated past performance Aug 2006 – Jun 2015




## Average allocations over time

| Value | Momentum | Low vol | Quality |
|---|---|---|---|
| 22.4% | 20.5% | 32.5% | 24.7% |

## Performance stats – Global Factor strategies

| Strategy | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Tracking error | Infromation Ratio |
|---|---|---|---|---|---|---|
| Global Factor Net EW | 7.75% | 14.51% | 0.46 | -51.11% | 3.46% | 0.80 |
| Global Factor Net RP | 7.63% | 13.99% | 0.47 | -49.76% | 3.95% | 0.67 |
| MSCI World Net | 4.99% | 16.75% | 0.23 | -57.82% | | |

*Source: Barclays. Please note that US net strategies are a proxy calculation by applying a 30% withholding tax rate to the US gross indices to make them comparable with the MSCI Global net Index. All other components are Indices calculated by BRAIS.

Source: Barclays. Simulated past performance is based on backtested data. Strategy levels are not calculated by BRAIS and are indicative only. Performance is based on the proposed methodology which is subject to change. Performance does reflect all costs/fees incorporated in the Strategy formula, but do no reflect additional fees that may apply to a strategy swap transaction. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance.



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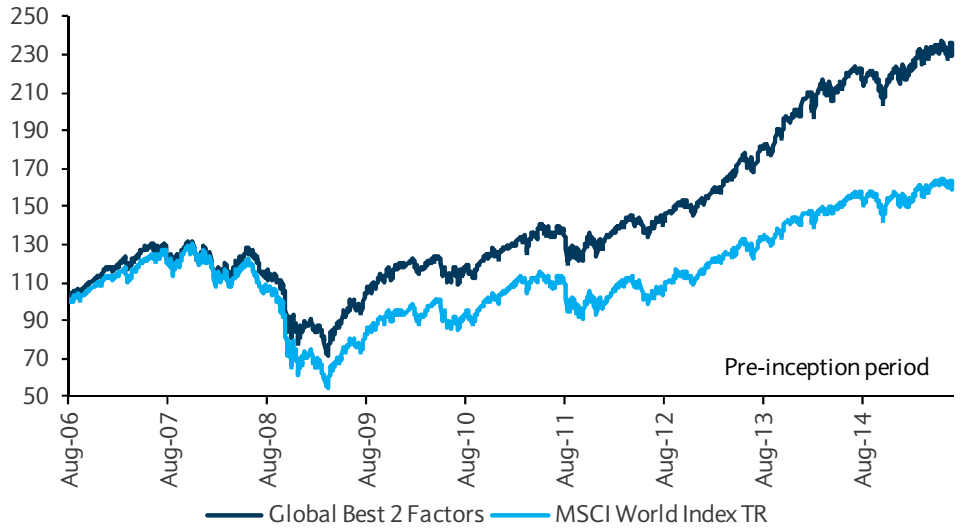
# Trend Overlay – Global Factor Strategy – Best 2 factors

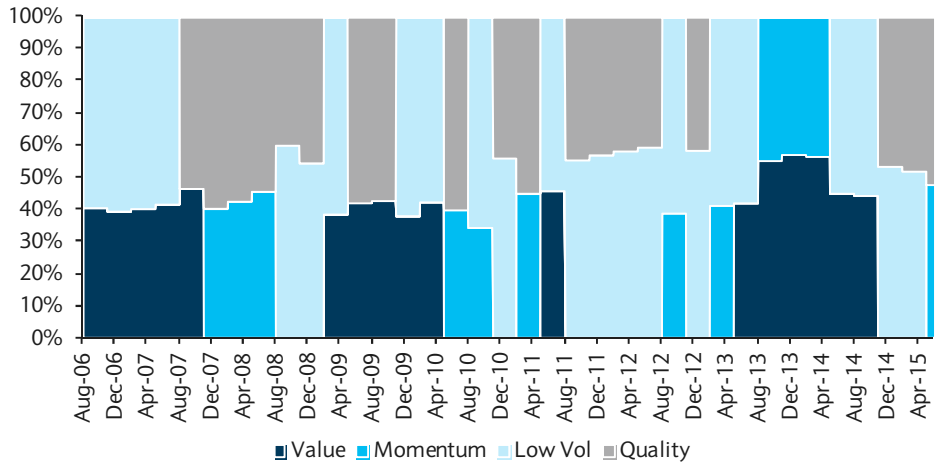
- Universe: 4 Global Factors (each of them the regional weighting is proxied by market cap)
- Trend overlay, various papers have used this approach, popular overlay e.g. in Multi-Asset Indices
- Select 2 global indices out of 4 with highest Sharpe ratio, quarterly rebalancing (Sharpe ratio calculated based on last 6months)
- Inverse volatility weighting among the 2 selected Factors

## Simulated past performance Aug 2006 – Jun 2015




## Average allocations over time (Aug 2006 – Jun 2015)

| | Value | Momentum | Low Vol | Quality |
|---|---|---|---|---|
| Average Allocation | 22% | 14% | 39% | 26% |




## Performance stats – Global Factor strategies

| Strategy | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Tracking error | Infromation Ratio |
|---|---|---|---|---|---|---|
| Select Best 2 Factors | 9.10% | 13.27% | 0.60 | -45.64% | 5.31% | 0.77 |
| MSCI World Net | 4.99% | 16.75% | 0.23 | -57.82% | | |

Source: Barclays. Simulated past performance is based on backtested data. Strategy levels are not calculated by BRAIS and are indicative only. Performance is based on the proposed methodology which is subject to change. Performance does reflect all costs/fees incorporated in the Strategy formula, but do no reflect additional fees that may apply to a strategy swap transaction. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance.



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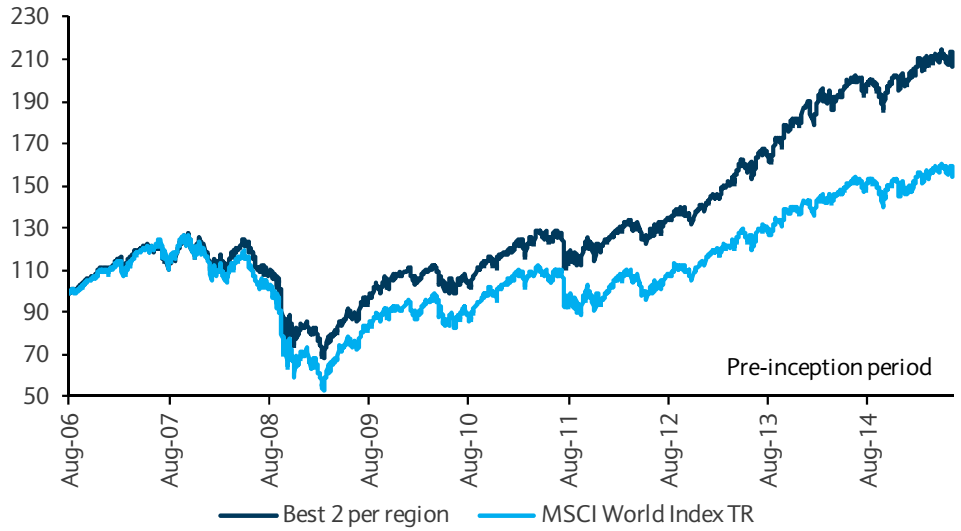
# Trend Overlay – Best 2 Factors Per Region

- Step 1:
- Select 2 best performing indices per region out of 4 with highest Sharpe ratio, quarterly rebalancing (Sharpe ratio calculated based on last 6months)
- Inverse volatility weighting among the 2 selected Factors
- Step 2:
- Combine regions (market cap weighted)

## Simulated past performance Aug 2006 – Jun 2015




## Performance stats – Global Factor strategies

| Strategy | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Tracking error | Infromation Ratio |
|---|---|---|---|---|---|---|
| Select Best 2 Factors per region | 8.47% | 13.34% | 0.55 | -46.53% | 5.10% | 0.68 |
| MSCI World Net | 4.99% | 16.75% | 0.23 | -57.82% | | |

Source: Barclays. Simulated past performance is based on backtested data. Strategy levels are not calculated by BRAIS and are indicative only. Performance is based on the proposed methodology which is subject to change. Performance does reflect all costs/fees incorporated in the Strategy formula, but do no reflect additional fees that may apply to a strategy swap transaction. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance..



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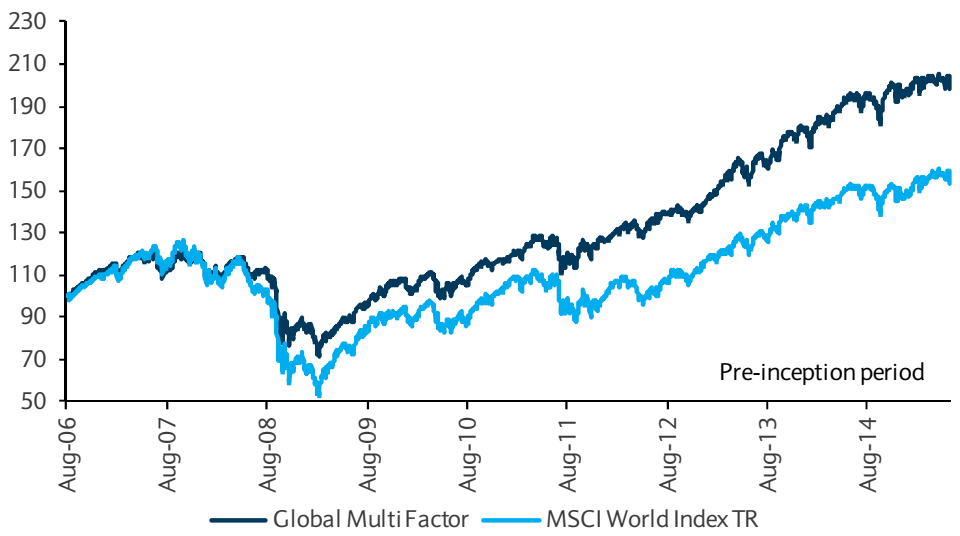
# Global Factors - Global Multi Factor

- Global stocks universe
- Selects stocks based on combined factor rank
- 100 stocks, equally weighted
- Quarterly rebalancing
- Global Factor Strategy with higher returns and lower volatility compared to MSCI World, better to combined 4 factor regions but with higher tracking error

## Simulated past performance Aug 06 – Jun 2015




| Regions | Avg exposure (%) |
|---|---|
| US | 61% |
| Canada | 4% |
| Japan | 2% |
| UK | 10% |
| Europe ex UK | 18% |
| APAC ex J | 5% |
| others | 0.2% |

## Performance stats – Global Factor strategies

| Strategy | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Tracking error | Information Ratio |
|---|---|---|---|---|---|---|
| Global Factor Net | 7.75% | 14.51% | 0.46 | -51.11% | 3.46% | 0.80 |
| Global Multi Factor | 8.06% | 12.39% | 0.56 | -41.74% | 6.97% | 0.44 |
| MSCI World Net | 4.99% | 16.75% | 0.23 | -57.82% | | |

Source: Barclays. Simulated past performance is based on backtested data. Strategy levels are not calculated by BRAIS and are indicative only. Performance is based on the proposed methodology which is subject to change. Performance does reflect all costs/fees incorporated in the Strategy formula, but do no reflect additional fees that may apply to a strategy swap transaction. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance.



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# Summary of Factor Combinations

- Simple factor combination has historically improved risk-adjusted returns
- Adding a trend overlay can be an attractive alternative
- Multi-factor combination with low drawdowns and high risk-adjusted returns

## Simulated past performance Aug 2006 – Jun 2015

| | Strategy | Avg Annual Total Return | Avg Annualised Vol | Sharpe ratio | Max drawdown | Tracking error | Information Ratio |
|---|---|---|---|---|---|---|---|
| Factor combinations | Global Factor Net EW | 7.75% | 14.51% | 0.46 | -51.11% | 3.46% | 0.80 |
| | Global Factor RP | 7.63% | 13.99% | 0.47 | -49.76% | 3.95% | 0.67 |
| | Select Best 2 Factors | 9.10% | 13.27% | 0.60 | -45.64% | 5.31% | 0.77 |
| | Select Best 2 Factors per region | 8.47% | 13.34% | 0.55 | -46.53% | 5.10% | 0.68 |
| | Global Multi Factor | 8.06% | 12.39% | 0.56 | -41.74% | 6.97% | 0.44 |
| Benchmark | MSCI World Net | 4.99% | 16.75% | 0.23 | -57.82% | | |
| Single Factor | Global Value Net | 6.93% | 18.47% | 0.32 | -62.52% | 5.14% | 0.38 |
| | Global Momentum Net | 7.01% | 16.94% | 0.35 | -55.78% | 7.59% | 0.27 |
| | Global Quality Net | 8.47% | 14.62% | 0.50 | -47.35% | 3.77% | 0.92 |
| | Global Low Vol | 7.72% | 11.11% | 0.60 | -40.91% | 8.24% | 0.33 |

Source: Barclays. Simulated past performance is based on backtested data. Strategy levels are not calculated by BRAIS and are indicative only. Performance is based on the proposed methodology which is subject to change. Performance does reflect all costs/fees incorporated in the Strategy formula, but do no reflect additional fees that may apply to a strategy swap transaction. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance.



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# APPENDIX

# Long Only Tickers

Long only (beta)

| | | | | BBG Tickers | | | | |
|---|---|---|---|---|---|---|---|---|
| Region | Index Currency | Return Type | Gross/Net Dividends | Value | Momentum | Low Vol | Quality | Value Mid Cap |
| US | USD | TR | Gross | BXIIVUTU | BXIIMUTU | BXIILUTU | BXIIKUTU | BXIIVUTM |
| | | ER | Gross | BXIIVUEU | BXIIMUEU | BXIILUEU | BXIIKUEU | BXIIVUEM |
| | | PR | Gross | BXIIVUPU | BXIIMUPU | BXIILUPU | BXIIKUPU | BXIIVUPM |
| UK | GBP | TR | Net | BXIIVGTG | BXIIMGTG | BXIILGTG | BXIIKGTG | |
| | | ER | Net | BXIIVGEG | BXIIMGEG | BXIILGEG | BXIIKGEG | |
| | | PR | Net | BXIIVGPG | BXIIMGPG | BXIILGPG | BXIIKGPG | |
| Japan | JPY | TR | Net | BXIIVJTJ | BXIIMJTJ | BXIILJTJ | BXIIKJTJ | |
| | | ER | Net | BXIIVJEJ | BXIIMJEJ | BXIILJEJ | BXIIKJEJ | |
| | | PR | Net | BXIIVJPJ | BXIIMJPJ | BXIILJPJ | BXIIKJPJ | |
| Eurozone | EUR | TR | Net | BXIIVETE | BXIIMETE | BXIILETE | BXIIKETE | |
| | | ER | Net | BXIIVEEE | BXIIMEEE | BXIILEEE | BXIIKEEE | |
| | | PR | Net | BXIIVEPE | BXIIMEPE | BXIILEPE | BXIIKEPE | |

# Market Hedged Tickers

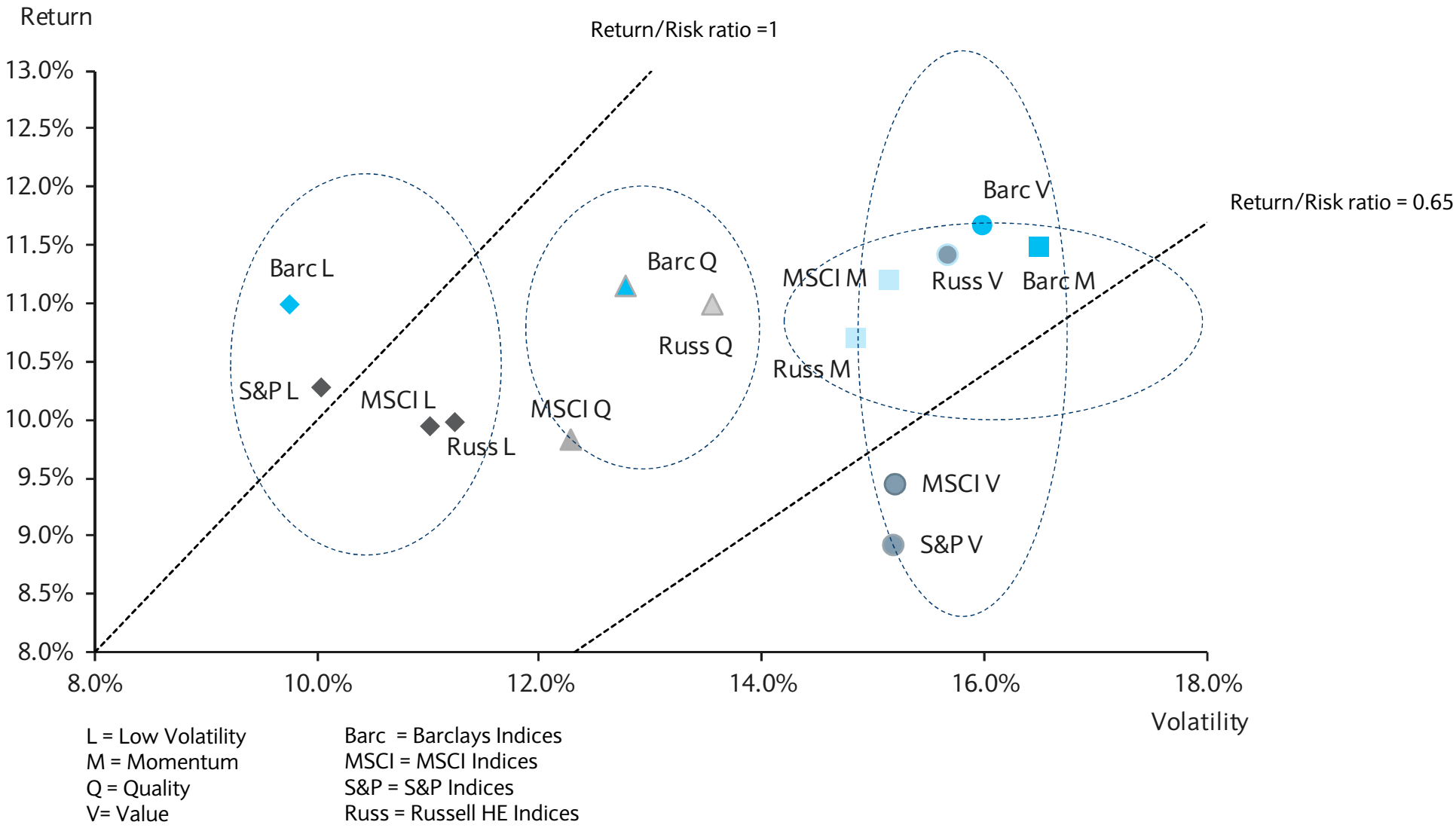
Market hedged

| | | | | BBG Tickers | | | | |
|---|---|---|---|---|---|---|---|---|
| Region | Index Currency | Return Type | Gross/Net Dividends | Value | Momentum | Low Vol | Quality | Value Mid Cap |
| US | USD | TR | Gross | BXIIVMUT | BXIIMMUT | BXIILMUT | BXIIKMUT | BXIIVMMT |
| | | ER | Gross | BXIIVMUE | BXIIMMUE | BXIILMUE | BXIIKMUE | BXIIVMME |
| UK | GBP | TR | Net | BXIIVMGT | BXIIMMGT | BXIILMGT | BXIIKMGT | |
| | | ER | Net | BXIVMGE | BXIMMGE | BXILMGE | BXIKMGE | |
| Japan | JPY | TR | Net | BXIIVMJT | BXIIMMJT | BXIILMJT | BXIIKMJT | |
| | | ER | Net | BXIIVMJE | BXIIMMJE | BXIILMJE | BXIIKMJE | |
| Eurozone | EUR | TR | Net | BXIIVMET | BXIIMMET | BXIILMET | TBD | |
| | | ER | Net | BXIIVMEE | BXIIMMEE | BXIILMEE | TBD | |

# Liquidity, Market Cap Criteria and Number of Stocks

| Region | CCY | Market cap (in ccy) | Liquidity (3m ADV in ccy) | Names |
|---|---|---|---|---|
| US | USD | 5bn | 50 mio | 50 |
| UK | GBP | 1bn | 10 mio | 30 |
| Japan | JPY | 100 bn | 1 bn | 30 |
| Eurozone | EUR | 2 bn | 20 mio | 30 |
| US Mid cap | USD | 2 - 10 bn | 10 mio - 100 mio | 100 |

# Comparison – Simulated Past Performance Chart




L = Low Volatility
M = Momentum
Q = Quality
V= Value

Barc = Barclays Indices
MSCI = MSCI Indices
S&P = S&P Indices
Russ = Russell HE Indices

Source: Barclays, Bloomberg, Period Dec 02 – Jun 15, Volatilities are calculated based on monthly returns. Any data on past performance, modelling or back-testing contained herein is no indication as to future performance. Barclays Indices are net of transaction costs but don't include fees.



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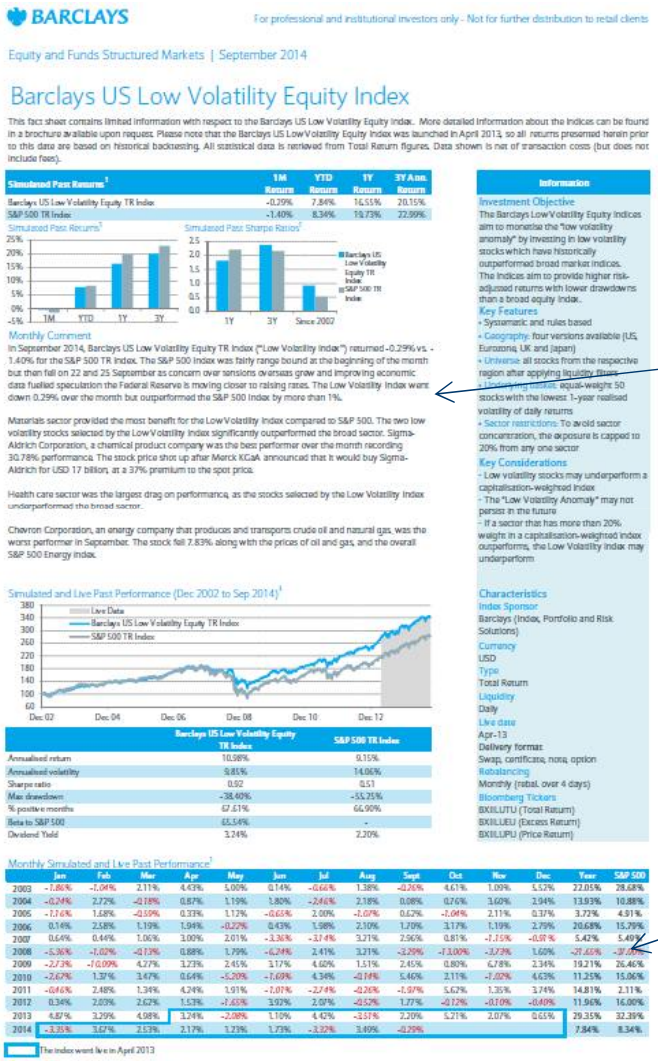
# Monthly updates – US Low Volatility example

- Barclays provides detailed monthly updates with detailed performance statistics and commentary



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## Barclays US Low Volatility Equity Index

This fact sheet contains limited information with respect to the Barclays US Low Volatility Equity Index. More detailed information about the indices can be found in a brochure available upon request. Please note that the Barclays US Low Volatility Equity Index was launched in April 2013, so all returns presented herein prior to this date are based on historical backtesting. All statistical data is retrieved from Total Return figures. Data shown is net of transaction costs (but does not include fees).

| Simulated Past Returns[1] | 1M Return | YTD Return | 1Y Return | 3Y Ann. Return |
|---|---|---|---|---|
| Barclays US Low Volatility Equity TR Index | -0.29% | 7.84% | 14.55% | 20.15% |
| S&P 500 TR Index | -1.40% | 8.34% | 19.73% | 22.99% |

Simulated Past Returns[1]



Simulated Past Sharpe Ratios[1]




### Monthly Comment

In September 2014, Barclays US Low Volatility Equity TR Index ("Low Volatility Index") returned -0.29% vs. -1.40% for the S&P 500 TR Index. The S&P 500 Index was fairly range bound at the beginning of the month but then fell on 22 and 25 September as concern over tensions overseas grew and improving economic data fuelled speculation the Federal Reserve is moving closer to raising rates. The Low Volatility Index went down 0.29% over the month but outperformed the S&P 500 Index by more than 1%.

Materials sector provided the most benefit for the Low Volatility Index compared to S&P 500. The two low volatility stocks selected by the Low Volatility Index significantly outperformed the broad sector. Sigma-Aldrich Corporation, a chemical product company was the best performer over the month recording 30.78% performance. The stock price shot up after Merck KGaA announced that it would buy Sigma-Aldrich for USD 17 billion, at a 37% premium to the spot price.

Health care sector was the largest drag on performance, as the stocks selected by the Low Volatility Index underperformed the broad sector.

Chevron Corporation, an energy company that produces and transports crude oil and natural gas, was the worst performer in September. The stock fell 7.83% along with the prices of oil and gas, and the overall S&P 500 Energy Index.

### Information

**Investment Objective**

The Barclays Low Volatility Equity Indices aim to monetise the "low volatility anomaly" by investing in low volatility stocks which have historically outperformed broad market indices. The indices aim to provide higher risk-adjusted returns with lower drawdowns than a broad equity index.

**Key Features**

- Systematic and rules based
- Geography: four versions available (US, Eurozone, UK and Japan)
- Universe: all stocks from the respective region after applying liquidity filters
- Liquidity screens: equal-weight 50 stocks with the lowest 1-year realised volatility of daily returns
- Sector restrictions: To avoid sector concentration, the exposure is capped to 20% from any one sector

**Key Considerations**

- Low volatility stocks may underperform a capitalisation-weighted index
- The "Low Volatility Anomaly" may not persist in the future
- If a sector that has more than 20% weight in a capitalisation-weighted index outperforms, the Low Volatility Index may underperform

**Characteristics**

Index Sponsor: Barclays (Index, Portfolio and Risk Solutions)
Currency: USD
Type: Total Return
Liquidity: Daily
Live date: Apr-13
Delivery format: Swap, certificate, note, option
Rebalancing: Monthly (rebal. over 4 days)
Bloomberg Tickers: BXILUTU (Total Return), BXILUEU (Excess Return), BXILUPU (Price Return)

Simulated and Live Past Performance (Dec 2002 to Sep 2014)[1]




| | Barclays US Low Volatility Equity TR Index | S&P 500 TR Index |
|---|---|---|
| Annualised return | 10.98% | 9.15% |
| Annualised volatility | 9.81% | 14.06% |
| Sharpe ratio | 0.92 | 0.61 |
| Max drawdown | -38.40% | -55.25% |
| % positive months | 67.61% | 66.90% |
| Beta to S&P 500 | 65.54% | - |
| Dividend Yield | 3.24% | 2.20% |

Monthly Simulated and Live Past Performance[1]

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Year | S&P 500 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2003 | -1.86% | -1.04% | 2.11% | 4.43% | 5.00% | 0.14% | -0.66% | 1.38% | -0.26% | 4.61% | 1.09% | 5.52% | 22.05% | 28.68% |
| 2004 | -0.24% | 2.72% | -0.18% | 0.87% | 1.19% | 1.80% | -2.46% | 2.18% | 0.08% | 0.76% | 3.69% | 2.94% | 13.93% | 10.88% |
| 2005 | -1.76% | 1.68% | -0.59% | 0.33% | 1.12% | -0.65% | 2.00% | -1.69% | 0.62% | -1.04% | 2.11% | 0.37% | 3.72% | 4.91% |
| 2006 | 0.14% | 2.58% | 1.19% | 1.94% | -0.22% | 0.43% | 1.98% | 2.10% | 1.70% | 3.17% | 1.19% | 2.79% | 20.68% | 15.79% |
| 2007 | 0.64% | 0.44% | 1.06% | 3.00% | 2.01% | -3.36% | -3.74% | 3.71% | 2.96% | 0.81% | -1.15% | -0.91% | 5.42% | 5.49% |
| 2008 | -5.36% | -1.02% | -0.13% | 0.88% | 1.79% | -6.24% | 2.41% | 3.21% | -3.29% | -13.00% | -3.73% | 1.60% | -21.65% | -37.00% |
| 2009 | -2.73% | -10.09% | 4.27% | 3.23% | 2.45% | 3.17% | 4.60% | 1.51% | 2.45% | 0.80% | 6.78% | 2.34% | 19.21% | 26.46% |
| 2010 | -2.67% | 1.37% | 3.47% | 0.64% | -5.20% | -1.69% | 4.34% | -0.14% | 5.46% | 2.11% | -1.02% | 4.63% | 11.25% | 15.06% |
| 2011 | -0.46% | 2.48% | 1.34% | 4.24% | 1.91% | -2.07% | -2.74% | -0.26% | -1.93% | 5.62% | 1.35% | 3.74% | 14.81% | 2.11% |
| 2012 | 0.34% | 2.03% | 2.62% | 1.53% | -1.65% | 3.92% | 2.09% | -0.52% | 1.27% | -0.12% | +0.10% | +0.49% | 11.96% | 16.00% |
| 2013 | 4.87% | 3.29% | 4.08% | 3.24% | -2.08% | 1.10% | 4.42% | -3.51% | 2.20% | 5.21% | 2.07% | 0.65% | 29.35% | 32.39% |
| 2014 | +3.35% | 3.67% | 2.53% | 2.17% | 1.73% | 1.73% | -3.32% | 3.49% | -0.29% | | | | 7.84% | 8.34% |

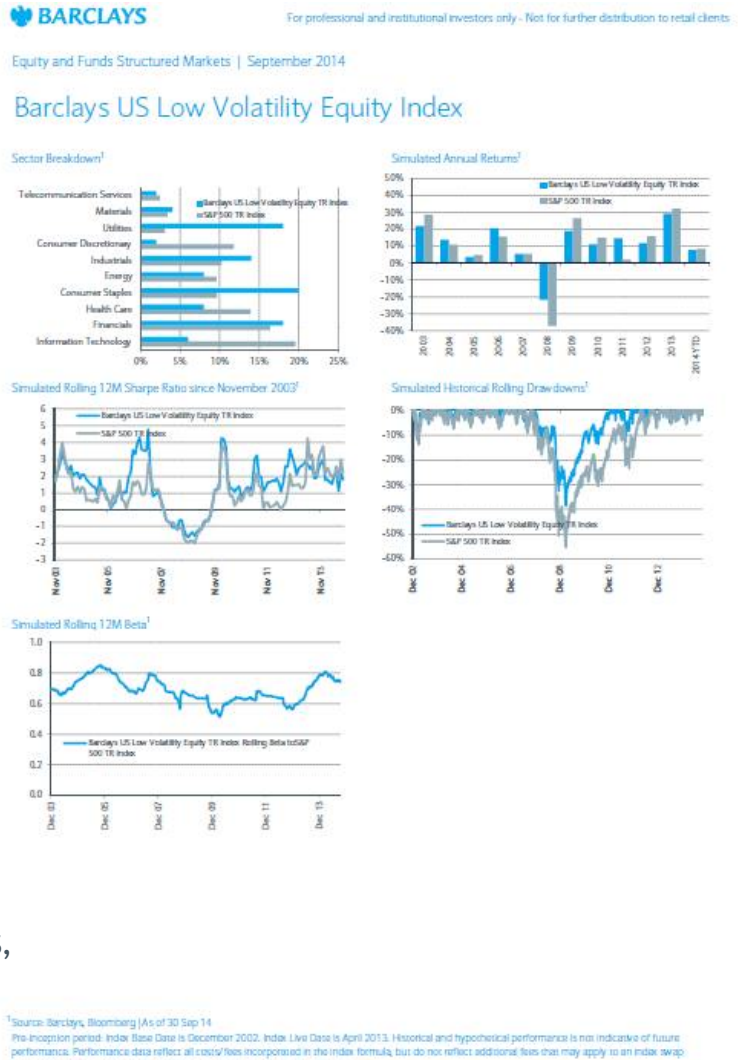
The index went live in April 2013

[1]Source: Barclays, Bloomberg | As of 30 Sep 14

Pre-inception period: Index Base Date is December 2002, Index Live Date is April 2013. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information.

Monthly commentary

Detailed performance statistics (returns, sectors, drawdowns, betas)



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## Barclays US Low Volatility Equity Index

Sector Breakdown[1]




Simulated Annual Returns[1]




Simulated Rolling 12M Sharpe Ratio since November 2003[1]




Simulated Historical Rolling Drawdowns[1]




Simulated Rolling 12M Beta[1]




[1]Source: Barclays, Bloomberg | As of 30 Sep 14

Pre-inception period: Index Base Date is December 2002, Index Live Date is April 2013. Historical and hypothetical performance is not indicative of future performance. Performance data reflect all costs/fees incorporated in the index formula, but do not reflect additional fees that may apply to an index swap transaction. See Historical Index Performance Disclaimer for further information.



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# Pre-inception index assumptions

The hypothetical historical performance information is an illustration of how the Index, based upon such variable index composition, would have performed during the period beginning on the Index Base Date until and excluding the Backtest End Date. The illustrative hypothetical performance information should not be relied upon in reaching an investment decision. This data does not reflect actual performance, nor was a contemporaneous investment model run of the Index. For the simulation of the hypothetical historical performance, the Index Sponsor relied on the following assumptions:

(a) For the total return Index Level calculation for long only indices, Prices of Index Constituents used are the adjusted prices published by Bloomberg. "Adjusted price" here means the price of the Share was adjusted for all types of cash dividends (both Normal Cash Dividends and Abnormal Cash Dividends, as defined by Bloomberg on the DPDF page) for immediate reinvestment and capital changes to reflect any spin-offs, stock splits/consolidations, stock dividends/bonus, rights offering/entitlement.

(b) For the price return Index Level calculation, Prices of Index Constituents used are the adjusted prices published by Bloomberg. "Adjusted price" here means the price of the Share was only adjusted for Abnormal Cash Dividends, as defined by Bloomberg on the DPDF page (not Normal Cash Dividends, as defined by Bloomberg on the DPDF page) for immediate reinvestment and capital changes to reflect any spin-offs, stock splits/consolidations, stock dividends/bonus, rights offering/entitlement.

(c) In calculation of adjusted prices, Bloomberg uses net dividend amounts if they are provided in company announcements. If in the market where company declares gross only, Bloomberg will calculate the adjusted prices using gross dividend amount (For example, most Eastern Europe, US).

(d) In the backtest, the price of a delisted Index Constituent will remain constant being the price as of the day of delisting and will be rebalanced out of the Index over 4 Rebalancing Dates in the following Rebalancing Period.

(e) Regulatory Filter (applicable for all indices) and Acquisition Filters (applicable for Momentum and Low Volatility) are not applied during the historical selection.

(f) Fundamental data values (applicable for Value and Quality indices) have been lagged to avoid having look-ahead bias. Data used in the US Index has been lagged by 50 calendar days, UK by 65 calendar days, Japan by 45 calendar days and Eurozone by 75 calendar days.

# Historical Index Performance Disclaimer

The following communication includes historical performance data related to select indices developed and published by Barclays Bank PLC ("Barclays"). This disclaimer is intended to highlight the risks inherent in assessing such performance data.

Historical index performance can be assessed with respect to the index inception date:

### Pre-inception index performance

Pre-inception index performance refers to the period prior to the index inception date (defined as the period from the "Index Base Date" to the "Index Live Date"). This performance is hypothetical and back-tested using criteria applied retroactively. It benefits from hindsight and knowledge of factors that may have favorably affected the performance and cannot account for all financial risk that may affect the actual performance of the index. It is in Barclays' interest to demonstrate favorable pre-inception index performance. The actual performance of the index may vary significantly from the pre-inception index performance. You should not rely on hypothetical index performance information.

### Post-inception index performance

Post-inception index performance refers to the period after the index inception date (defined as the period from the "Index Live Date" to the date of this presentation, unless otherwise stated). This performance is actual historical performance of the index. Historical performance is not indicative of future performance.

All index performance data included in this communication are accompanied by a footnote specifying the relevant Index Base Date and Index Live Date. The Index Live date is defined as the date on which the index rules were established and the index was first published. Actual historical performance is highlighted in blue. Hypothetical performance is not highlighted.

Historical index performance is provided for a period of at least 10 years, unless the instruments underlying the index were only available or sufficiently liquid for a lesser period. In that case, historical index performance is provided from the time when the instruments underlying the index were available or sufficiently liquid. Performance, volatility, Sharpe ratio and correlation data are calculated using monthly returns and maximum drawdown data are calculated using daily returns.

The index methodology is available for review upon request, subject to the execution of a non-disclosure agreement.

Barclays or an affiliate of Barclays prepared the provided performance information (including the hypothetical performance information), may be the index sponsor and potentially is the counterparty to a transaction referencing the index.

The performance data reflect all costs, charges and fees that are incorporated into the Index formula. The performance data, however, do not reflect any additional fees that may be paid by a counterparty to a transaction referencing the index, and which may be agreed between Barclays and the counterparty.

# Risk Factors

| | |
|---|---|
| **NO GOVERNMENT OR OTHER PROTECTION** | THIS PRODUCT IS NOT PROTECTED BY THE FINANCIAL SERVICES COMPENSATION SCHEME or any other government or private protection scheme. |
| **NO SECURITY** | THIS PRODUCT IS NOT SECURED. |
| **CREDIT RISK** | INVESTORS WILL BE EXPOSED TO BARCLAYS' CREDIT RISK. If Barclays becomes insolvent it will not be able to make income or principal payments under the Product and in such event the Product may return zero. A decline in Barclays' credit quality is likely to reduce the market value of the Product and therefore the price an investor may receive for the Product if they sell it in the market. |
| **CREDIT RATINGS** | CREDIT RATINGS MAY BE LOWERED OR WITHDRAWN WITHOUT NOTICE. A rating is not a recommendation as to Barclays' credit quality or an evaluation of the risks, returns or suitability of the Product. |
| **VOLATILITY** | THE PERFORMANCE OF THIS PRODUCT MAY CHANGE UNPREDICTABLY. This unpredictable change is known as "volatility" and may be influenced by the performance of any underlying asset as well as external factors including financial, political and economic events and other market conditions. |
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