



Efficiently harvesting factor premiums

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Robeco Quant Explore
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Summarizing 50 years of academic finance research

➤ **Factor premiums** are a key determinant of stock returns

➤ **Factor premiums** explain the performance of mutual funds

➤ **Factor premiums** should be part of the strategic asset allocation, next to traditional asset class risk premiums



Improving upon generic factor strategies

1. Applying better factor definitions
2. Applying more effective portfolio construction
3. Applying more efficient rebalancing
4. Never forget about other factors



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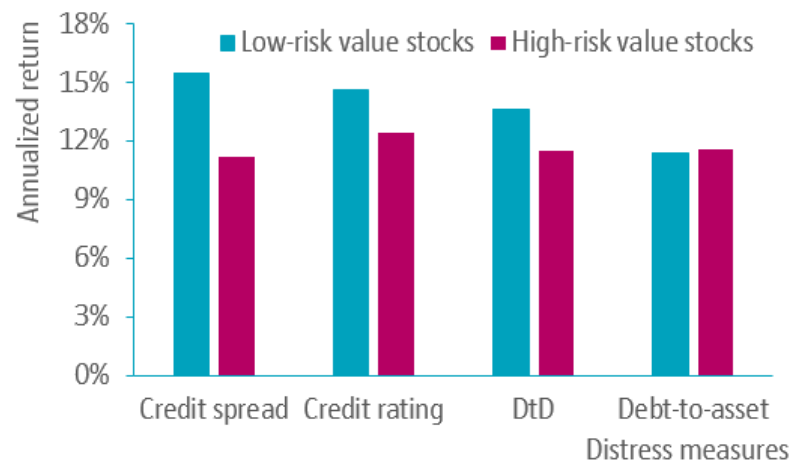


Value: avoid stocks with high bankruptcy risk

Value investing works, but why?

- > Academics: value premium is a compensation for investing in distressed stocks
- > Robeco research: distressed value stocks have lower returns than safe ones!

Relation return, value and distress risk*



Relation excess return and distress risk**



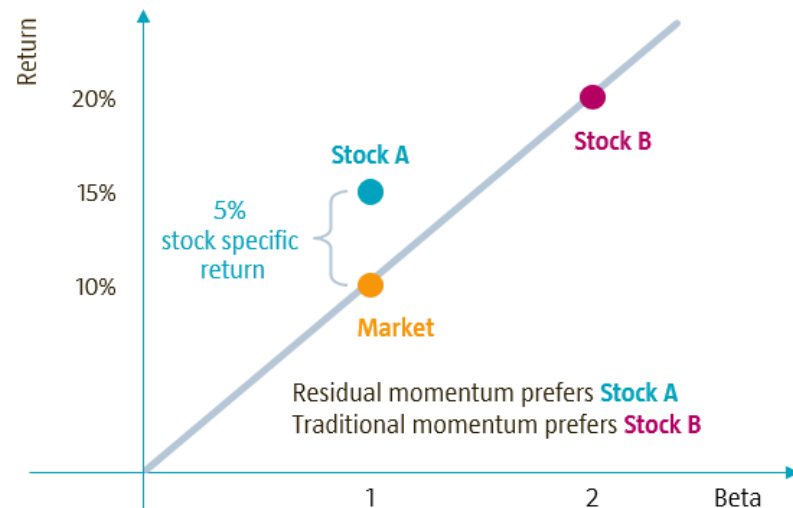
Robeco value: identify and avoid financially distressed companies

Momentum: avoid unrewarded systematic risks

How to harvest the momentum premium without suffering big losses?

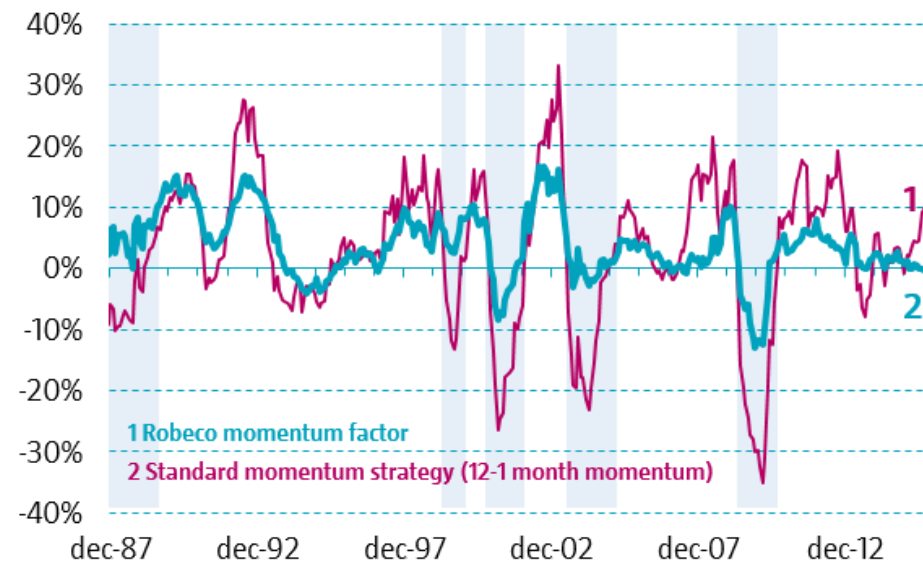
- > Generic momentum is exposed to other risk factors (beta, size, value)
- > Example: in an uptrend a typical momentum stock has a high beta

Example: Residual Momentum uses stock specific returns instead of total returns



* Blitz, Huij & Martens, "Residual Momentum", Journal of Empirical Finance, 2011.

1-Year Rolling Returns Momentum Basket 1986-2015



Robeco momentum: 'strip out' unrewarded momentum risks

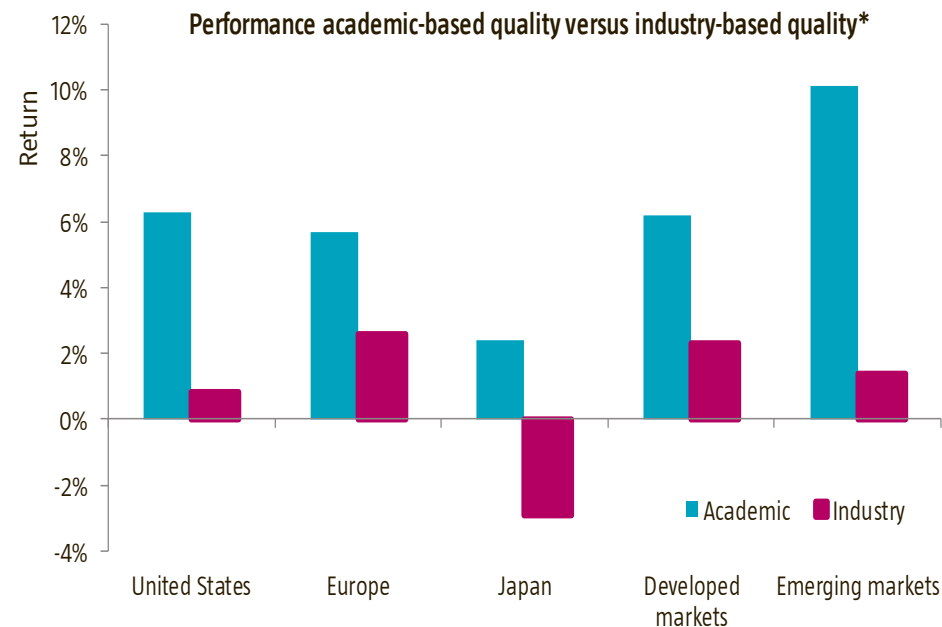
Quality: some factors work, others don't

Academic evidence for quality factors

- > Asset growth (Coopers et al, 2008) or net stock issuance (Pontiff and Woodgate, 2008)
- > Accruals (Sloan, 1996)
- > Gross profitability (Novy-Marx, 2013)

But quality indices use different metrics

- > ROE, margins, ROE growth, leverage, earnings variability, ...
- > These factors are much less effective



Source: Kyosev, Hanauer, Huij & Lansdorp, "Quality investing – industry versus academic definitions", working paper.

Robeco quality: only use quality factors supported by the evidence

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Stock weights in a factor portfolio

> **Market-cap weights**

> Widely used in academia

> High capacity

> But low effective breadth:
mega-caps dominate everything



Stock weights in a factor portfolio

> Market-cap weights

> **Equal weights**



> Simple

> High factor exposure

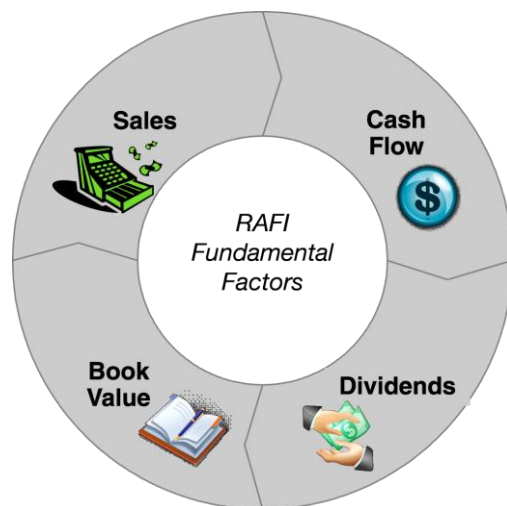
> But low capacity:
large positions in illiquid stocks

Stock weights in a factor portfolio

> Market-cap weights

> Equal weights

> **Fundamental weights**



> Elegant idea

> Exposure to the value premium

> But factor exposure is low:
every stock is still in the portfolio

Stock weights in a factor portfolio

> Market-cap weights

> Equal weights

> Fundamental weights

> **Magical formula weights**

Strategy	Objective	Unconstrained closed-form solution	Required parameter(s)	Optimality conditions
Maximum Deconcentration	Maximise effective number of stocks	$w^* = \frac{1}{N} \mathbf{1}$	None	$\mu_i = \mu \forall i$ $\sigma_i = \sigma \forall i$ $\rho_{ij} = \rho \forall i$
Diversified Risk Weighted	Equalise risk contributions under "Constant Correlation" assumption	$w^* = \frac{\text{diag}(\sigma^{-1})}{\mathbf{1}' \text{diag}(\sigma^{-1})}$	σ_i	$\lambda_i = \lambda \forall i$ $\rho_{ij} = \rho \forall i$
Maximum Decorrelation	Minimise the portfolio volatility under the assumption of identical volatility across all stocks.	$w^* = \frac{\Omega^{-1} \mathbf{1}}{\mathbf{1}' \Omega^{-1} \mathbf{1}}$	ρ_{ij}	$\mu_i = \mu \forall i$ $\sigma_i = \sigma \forall i$
Efficient Minimum Volatility	Minimise portfolio volatility	$w^* = \frac{\Sigma^{-1} \mathbf{1}}{\mathbf{1}' \Sigma^{-1} \mathbf{1}}$	σ_i, ρ_{ij}	$\mu_i = \mu \forall i$
Efficient Maximum Sharpe Ratio	Maximise portfolio Sharpe ratio	$w^* = \frac{\Sigma^{-1} \mu}{\mathbf{1}' \Sigma^{-1} \mu}$	$\mu_i, \sigma_i, \rho_{ij}$	Optimal by construction

> There are theories behind it

> But implicitly tilts every portfolio towards low-risk stocks

Stock weights in a factor portfolio

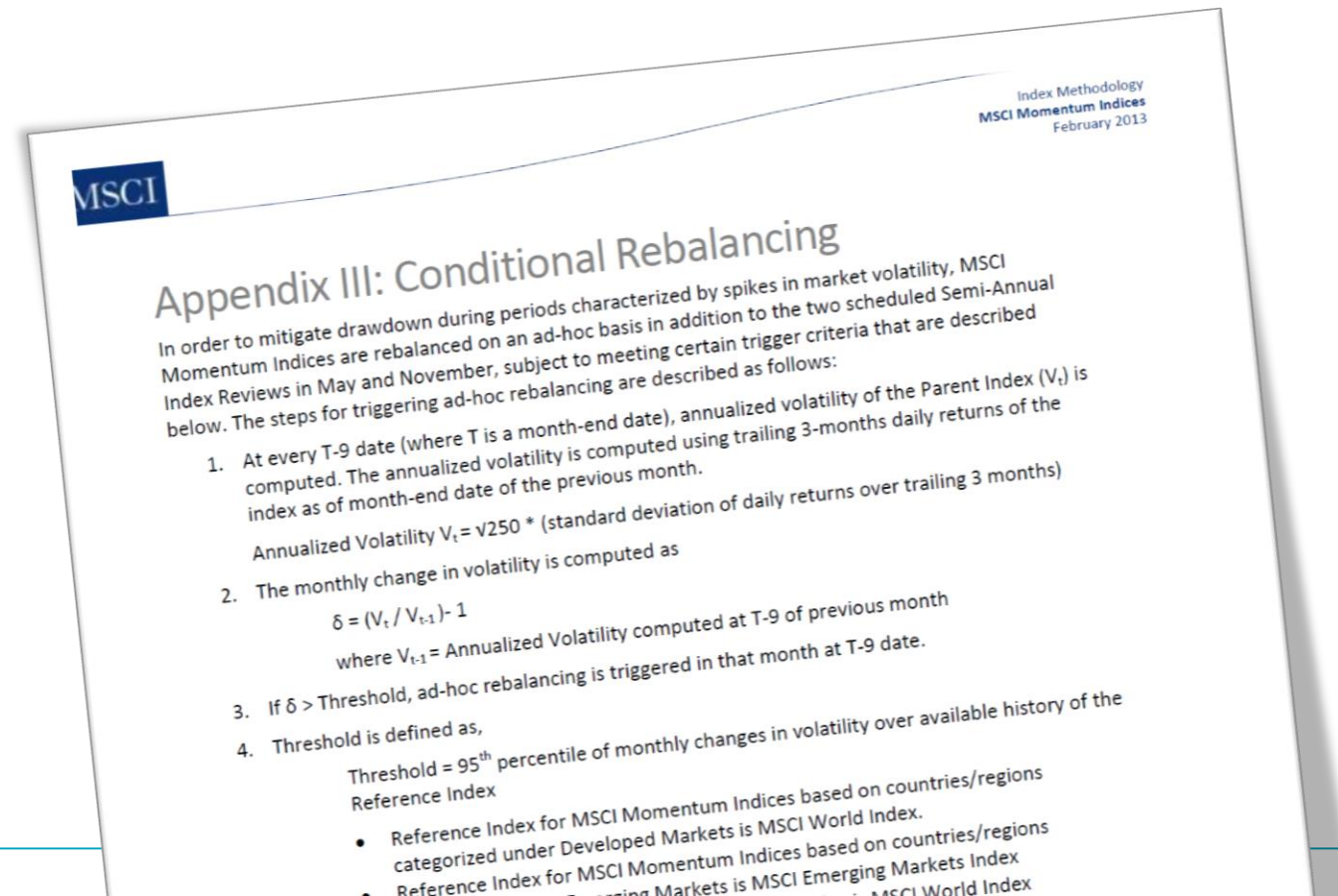
- > Market-cap weights
- > Equal weights
- > Fundamental weights
- > Magical formula weights
- > **Best practice weights**
- > Blend market cap and equal weights
- > Highly diversified: limit stock-specific risk and maximize factor exposure
- > Risk limits on market beta, countries, sectors, off-benchmark, etc.
- > Best of all worlds

Robeco portfolio construction: best practice approach

And always try to avoid data mining

MSCI Momentum index has ad-hoc 'conditional rebalancing' rule:

Historically kicks in only once.....conveniently, just when needed



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Efficient rebalancing

- Do not replace stocks with stocks that only have slightly better characteristics
 - make a careful trade-off between expected alpha and transaction costs
- Do not rebalance with a fixed schedule
 - use block-trade opportunities and cash-flows to improve the portfolio
- Do not concentrate the entire rebalancing on just a few days in the year
 - make maximum use of the liquidity that is available throughout the year

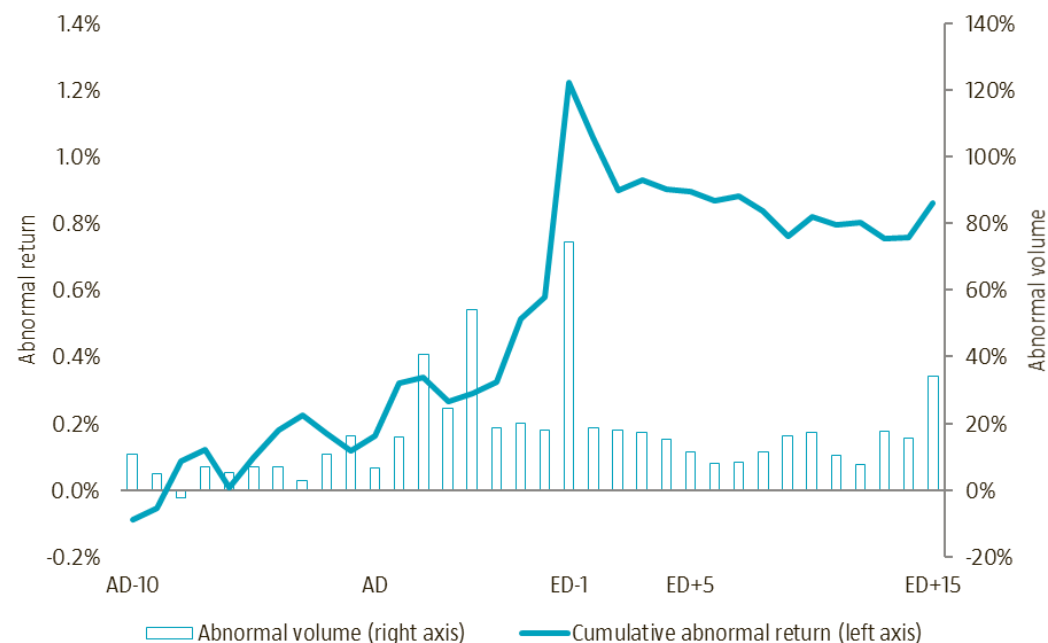
Robeco rebalancing: maximize factor exposure and minimize costs

Factor indices are vulnerable to index arbitrage

Full transparency also has a flip side: vulnerability to arbitrage

- Our research shows significant disadvantageous price effects around rebalancing dates of factor indices

Event study: Abnormal volume and returns of MSCI MinVol index around rebalancing



Source: Joop Huij and Georgi Kyosev, "Price Response to Factor Index Additions and Deletions", Working paper, 2016. Results are calculated for MSCI Minimum Volatility USD indexes, returns are in USD. The graphs show the average cumulative outperformance and abnormal volume of new over all constituents in the MSCI Minimum Volatility indexes during Sep-2010 – Dec-2015. AD is announcement day, ED is effective day

Improving upon generic factor strategies

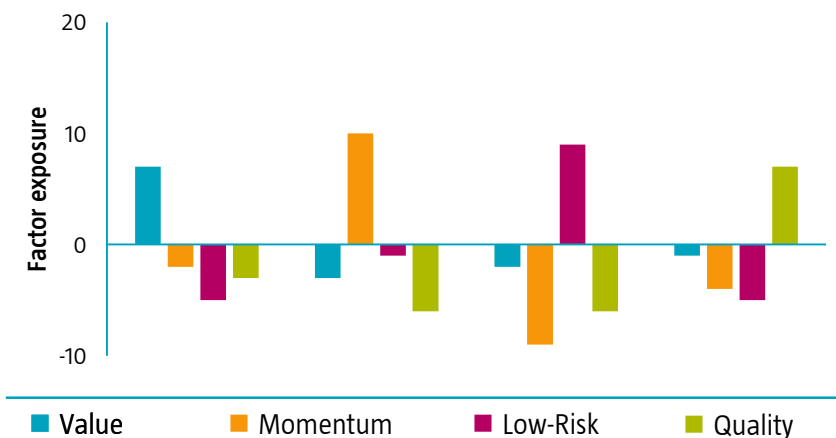
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Single-factor indices often go against other factors

- > Indices designed to give a high exposure to one particular factor are typically blind to all other factors
- > As a result, they frequently have negative exposures to these other factors
- > This leads to lower expected returns....
- > ...and sub-optimal multi-factor portfolios when combined

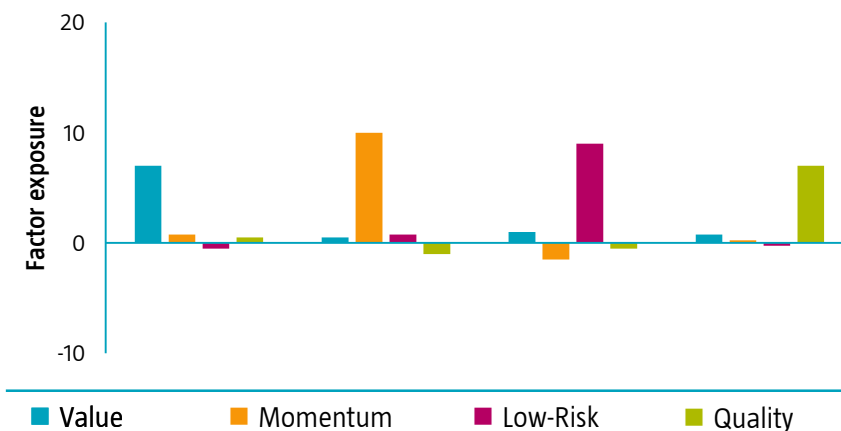
Exposures of mixed portfolio with generic single factor sleeves



We try to prevent going against other factors

- > Also when focusing on a single factor, we try to prevent selecting stocks with bad other factor characteristics
- > By being more selective this does not need to go at the expense of exposure to the target factor
- > This results in higher expected returns...
- > ...and superior multi-factor portfolios when combined

Exposures of partially integrated portfolio with enhanced factors



Conclusion

1. Apply the most powerful factor definitions and avoid unrewarded risks
2. Apply best practices in portfolio construction
3. Apply smart rebalancing rules
4. Never forget about other factors



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