Quantitative Investment Strategies

Disciplined, rules-based investing to meet a range of client goals for efficient, risk-adjusted return

September 2018

"We have been managing multifactor portfolios for over a decade, with demonstrable success. We believe that a systematic approach to investing, using quantitative techniques and leveraging the latest academic insights to efficiently combine factors, will generate attractive and persistent risk-adjusted returns relative to market-cap indexing."

Sean Phayre,
Global Head of Quantitative Investments

Our Quantitative Investment Strategies

From pure indexation to BETTER Beta, SMARTER Beta and DISCOVER Alpha strategies, we look to provide clients with a range of robust and fully-tested strategies to allow them to target the appropriate level of risk-adjusted return for their needs.

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Introduction

About Quantitative Investment Strategies

Our team of more than 30 dedicated quantitative investment professionals identify sources of excess risk-adjusted return to create a diverse range of systematic strategies.

Our Quantitative Investment Strategies (QIS) team manages assets across a diverse range of systematic products and solutions. Our strategies include traditional passive indexation (equity and fixed income), enhanced indexation, smart beta, active quant using artificial intelligence (AI), and structured products using derivatives.

Experienced specialist team

Our stable, cohesive and highly experienced investment team of over 30 investment professionals was formed in 2005 and is based in London, Edinburgh and Shanghai. Using proprietary, rules-based approaches we manage quantitative equity, fixed income and derivative portfolios across all markets, providing clients with products and solutions that are customized to their needs.

Understanding sources of return

Our investment process is grounded in academic research and investment theory. We identify sources of excess risk-adjusted returns, test them throughout the business cycle and use them in our quantitative portfolios in a systematic, cost-effective and risk-controlled manner. Our in-depth understanding of the individual sources of returns allows us to combine them into effective solutions, leaving us well placed to meet our clients' requirements.

Our quantitative products and customizable client solutions include:

- Indexation across equity and fixed income
- Enhanced indexation (BETTER[1] Beta)
- Smart beta (SMARTER[2] Beta)
- Active quant using AI (DISCOVER[3] Alpha)
- Structured products using derivatives

[1] BETTER = Beta, Enhanced market cap, Tight tracking error, Transparent, ESG Inside and RIPE factors.
[2] SMARTER = Systematic, Multifactor, Active Measures, Resilient, Transparent, ESG Inside and RIPE factors.
[3] DISCOVER = Dynamic factor timing, Innovative, Systematic, Collaboratively developed, Optimized portfolio construction, Versatile, ESG Inside and RIPE factors.

Our partnerships

Innovation through collaboration

Our open-innovation approach focuses on collaboration with world-class partners helping us to advance our investment thinking and ensuring that all our solutions draw on the highest-quality data and analytics.

We are partners with

SMARTER Beta calculation agent	Artificial intelligence (AI)	Environmental, Social and Governance (ESG) data partner	ESG academic partner
IHS Markit	MUFG MTEC	SUSTAINALYTICS	ssee UNIVERSITY OF OXFORD
We have appointed IHS Markit, a world leader in critical information and analytics, as the index calculation agent for our SMARTER Beta range of multifactor equity indices and the funds tracking them.	A wholly-owned subsidiary of MUFG Trust Bank, MTEC is Japan's first and most prestigious financial technology think tank. We have joined forces with MTEC to develop global equity active quantitative strategies employing AI.	Our environmental, social & governance (ESG) data partner, Sustainalytics, is an independent research, ratings and analysis firm. We use Sustainalytics data in all of our factor-based investing strategies.	We have produced ESG Smart Beta research in partnership with the University of Oxford's Smith School of Enterprise and the Environment (SSEE), a global center of excellence for research on climate change and sustainability.

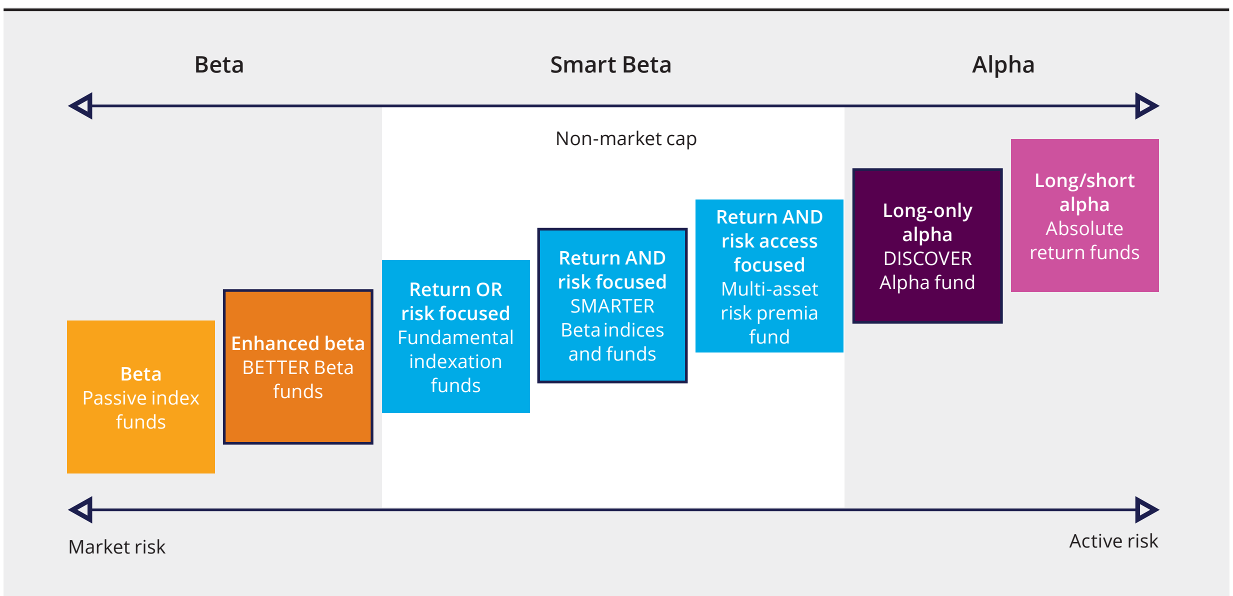
Meeting client needs

Covering the full spectrum of client needs

Our solutions vary from strategies seeking to deliver robust risk-adjusted excess returns to those built to deliver excess return systematically by taking higher levels of active risk.

To meet the needs of our clients, our quantitative investment strategies span the spectrum of market risk to active risk. Our beta strategies include market-cap indexation and BETTER Beta funds which use an enhanced indexation approach.

Smart beta non-market-cap solutions are provided by our SMARTER Beta range of multifactor equity indices and funds. Finally, our DISCOVER Alpha strategy employs artificial intelligence to systematically take active risk and generate alpha-based return.



Our approach

Experts in multifactor investing

For over a decade, we have been taking a factor-based approach to investing – enabling our clients to achieve attractive risk-adjusted return and mitigate the impact of market drawdowns on their portfolio performance.

We have been managing multifactor portfolios since 2007, with demonstrable success. We believe that a systematic approach to investing, using quantitative techniques and leveraging the latest academic insights to efficiently combine factors, will generate attractive and persistent risk-adjusted returns relative to market-cap indexing.

We believe that a multifactor approach helps to mitigate the effects of drawdowns relative to equivalent market-capitalization weighted indices. And in our view, exposure to RIPE (Robust, Intuitive, Persistent and Empirical) factors within equities provides potential to increase risk-adjusted excess returns by reaping the full benefits of factor diversification.

Our proprietary, rules-based approach to factor-investing has been developed over more than a decade and has been shaped by our multifactor mindset.

Harvesting RIPE factors

Factors are attributes or characteristics applied to a group of stocks that may help to explain their risk and return prospects. Factor premia are company characteristics that have been empirically proven to be persistent drivers of excess risk-adjusted returns.

Our proprietary, rules-based approach to factor-investing has been developed over more than a decade and has been shaped by our multifactor mindset. All of our factor-investing strategies harvest those factors that meet our RIPE – Robust, Intuitive, Persistent and Empirical – criteria. In equities, the resulting RIPE factors include value, quality, momentum, small size, low volatility and options volatility.

Why factors arise

These factors arise in financial markets due to behavioral and structural anomalies. From a behavioral (non risk-based) perspective, a mispricing arises because investors have mistaken beliefs, incomplete information, or non-rational preferences. From a structural (risk-based) perspective, the mispricing arises and persists because there are limits or costs to arbitrage that prevent it from being bid away.

Our RIPE factors

Value	Buying cheap companies and selling expensive ones.
Quality	Investing in prudently managed companies that maximize value creation and return capital to shareholders. Buying financially robust companies with strong balance sheets and increasing profitability.
Momentum	Investing based on improving trend (positive price momentum and improving earnings) and sentiment (positive changes in investors' perceptions).
Small size	Investing in small companies (based on market capitalization).
Low volatility	Buying companies displaying low volatility.
Options volatility	Capturing the spread between implied and realized volatility via index options.

ESG Inside

Investing responsibly for our clients

We look to embed environmental, social and governance (ESG) considerations into our investment process – delivering more value for our clients.

As a responsible investor, we incorporate ESG in all of our systematic investment strategies in such a way that it adds value for our clients. Our ESG Inside methodology excludes those companies producing controversial weapons (CW) and those experiencing 'category 5' (C5) severe controversies as rated by our ESG data partner, Sustainalytics. Where applicable, we also optimize portfolios on ESG scores.

We actively vote and engage with investee companies across all of our quantitative investment portfolios, using the resources of our centralized ESG team.

ESG Inside

Specifically excluded companies

Sustainalytics' Category 5 'severe controversies'

- Impact and risk are severe and irreversible
- The case is highly exceptional in the peer group
- Impact of the misconduct is on a broad range of stakeholders over a long duration and imposes a clear cost on society
- There are serious ongoing risks posed to the company
- The company is directly responsible for the misconduct
- The level of involvement is exceptional among peers in numerous respects
- Cases are recurring and have not been addressed adequately or at all
- The company has failed to demonstrate the ability to remediate the issue
- The company has refused to address the issue and/or has tried to conceal the wrongdoing and/or its involvement

Controversial weapons*

Cluster bombs
- Public companies that are involved in the production of cluster bombs and munitions, or the essential components of these products

Landmines
- Public companies that are involved in the production of anti-personnel landmines, anti-vehicle landmines, or the essential components of these products

Depleted uranium weapons
- Public companies that are involved in the production of depleted uranium weapons and armor

Chemical and biological weapons
- Public companies that are involved in the production of chemical and biological weapons, or the essential components of these products

* Source: Aberdeen Standard Investments and Sustainalytics.

Our strategies

Our factor-investing strategies

Drawing on our RIPE factors, we've developed a range of strategies that target different levels of excess return relative to market-cap indices.

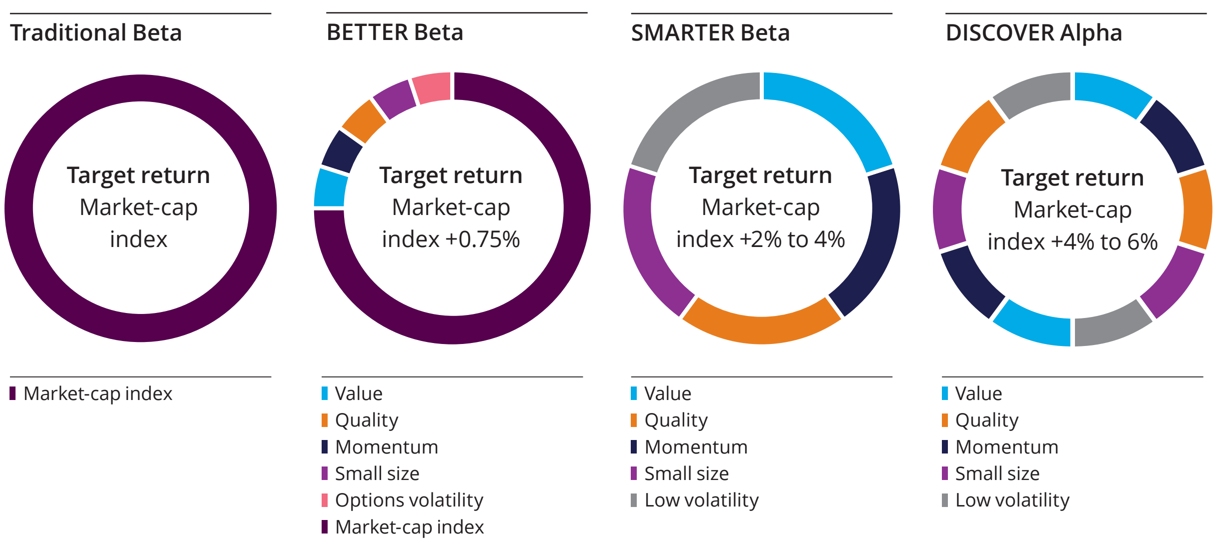
Each of these strategies employs RIPE factors and our ESG Inside methodology:

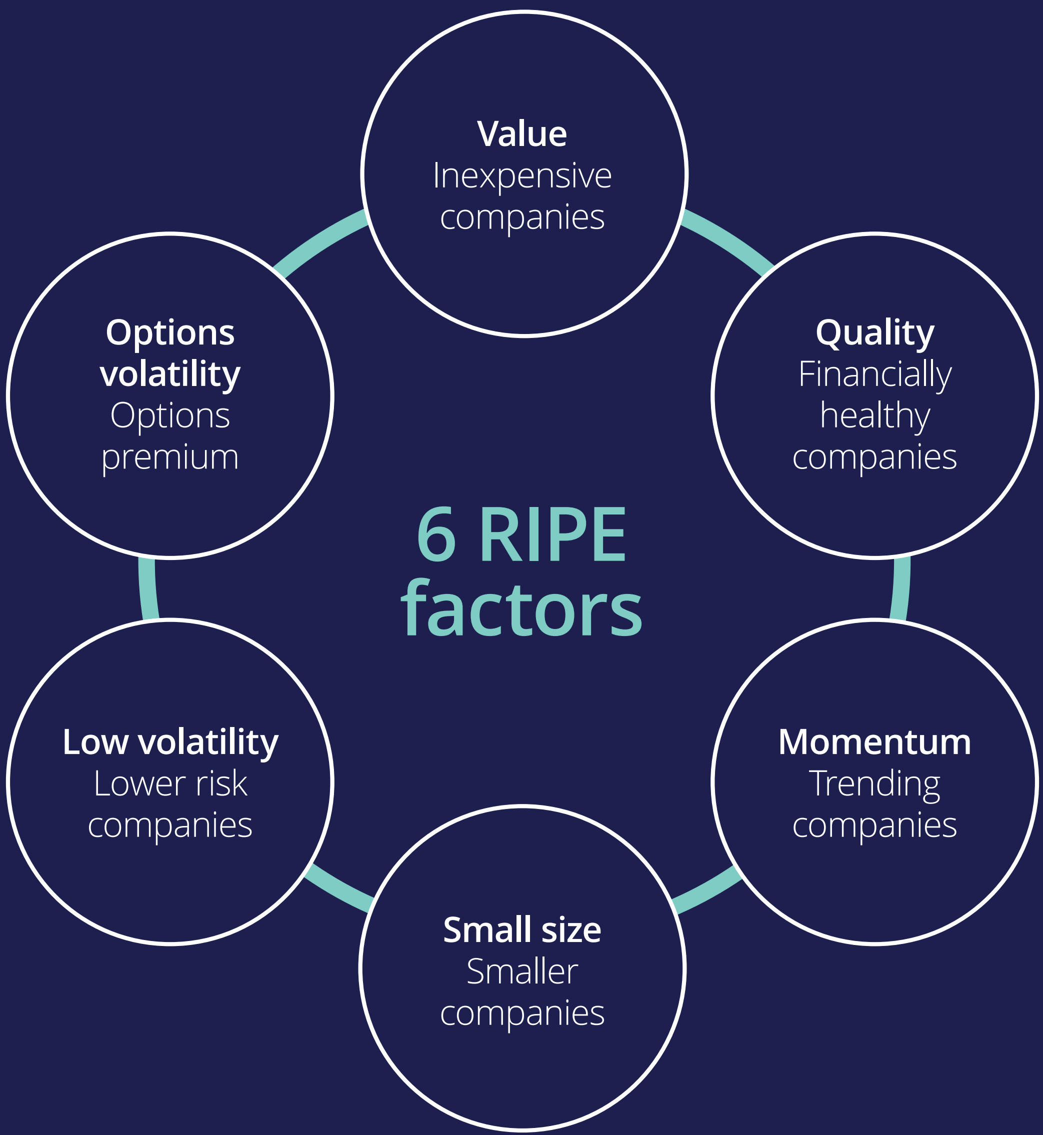
BETTER Beta:
Uses factor premia tilts to be better than the substitute market-cap index and acts as a substitute for market-cap indexing (passive management).

SMARTER Beta:
Uses factor premia to be smarter than the equivalent market-cap index and acts as a third approach to investing that combines the best of both passive management and active management.

DISCOVER Alpha:
Uses machine learning to discover alpha through dynamic factor timing and acts as a complement to active fundamental approaches (active management).

How our factor-based strategies compare to traditional beta




Value
Inexpensive companies
Quality
Financially healthy companies
Momentum
Trending companies
Small size
Smaller companies
Low volatility
Lower risk companies
Options volatility
Options premium
6 RIPE factors

By systematically harvesting the persistent drivers of excess return in markets, we can create quantitative investment strategies that enable clients to target outperformance of traditional market-cap indices in a repeatable and reliable way.”

Our strategies

Our factor-based strategies compared

Key differences between the three factor-investing strategies:

BETTER Beta **Enhanced indexation**	SMARTER Beta **Multifactor smart beta**	DISCOVER Alpha **Active quant using AI**
Investment approach	**Investment approach**	**Investment approach**
• A market-capitalization, 'multifactor' equity strategy, designed to maximize the information ratio[1]. • The starting universe is the constituent stocks of the applicable market-capitalization weighted index, which is then subjected to socially responsible investment (SRI) exclusions ('controversial weapons' only). • Factors are strategically weighted towards delivering consistent low-risk outperformance of the applicable market-capitalization weighted index.	• A non-market capitalization, systematic, 'multifactor' equity strategy, aiming to maximize the Sharpe ratio[2]. • Starting universe is a much broader range of stocks from the IHS Markit universe which is then subjected to SRI exclusions (both 'controversial weapons' and Sustainalytics' Category 5 'severe controversies'). • Targets multiple enhanced RIPE[3] factors – value, quality, momentum, small size and low volatility. • Factor contributions are broadly balanced and diversified across the five factor premia with the aim of delivering outperformance compared to the applicable market-capitalization weighted index.	• A non-market capitalization, systematic, 'multifactor' equity strategy, aiming to maximize the Sharpe ratio[2] through dynamic factor timing. • Starting universe is subject to SRI exclusions (both 'controversial weapons' and Sustainalytics' Category 5 'severe controversies'). • Targets multiple enhanced RIPE factors – value, quality, momentum, small size and low volatility. The factor designs differ from those used for BETTER and SMARTER Beta. • Factor weightings are timed dynamically, both inside and across the five factor premia, aiming to deliver outperformance relative to the applicable market-capitalization weighted index. • Artificial intelligence (AI), particularly machine learning, is used to analyze constantly evolving financial markets data and identify and recall patterns in markets. Based on those similar patterns, it dynamically times factor exposures with the aim of generating alpha.

[1] A measure of a stock or portfolio's risk-adjusted excess returns. Calculated as the return in excess of the benchmark index, divided by the relevant tracking error. The higher the information ratio, the more an investor is compensated for bearing relative risk.
[2] Sharpe ratio: also known as the 'reward-to-variability ratio', is a measure of a stock or portfolio's risk-adjusted performance relative to the risk-free rate. Calculated as the return in excess of cash (total return less risk-free return) divided by the standard deviation (or volatility) of the stock or portfolio's returns. The higher the Sharpe ratio, the more an investor is compensated for bearing absolute risk.
[3] RIPE = Robust, Intuitive, Persistent and Empirical.

Our strategies

Client benefits of our factor-investing strategies

We have devised our proprietary factor-investing strategies to be deliberately different from those of our competitors. As a result, our strategies offer clear tangible benefits to our clients.

D I S C O V E R

S M A R T E R

B E T T E R

1 All powered dynamic factor timing

2 Concentrated/ differentiated portfolios

3 Propriety investment approach

4 Diversified factor premia (RIPE factors)

5 Fully integrated ESG and active V&E*

6 Smarter factor design

7 Optimized portfolio construction

8 Monthly rebal-ances with limited turnover

* Voting and Engagement

"We cover the full spectrum of systematic products and customizable client solutions: from market-cap indexation to enhanced indexation, smart beta, active quant using artificial intelligence, and structured products using derivatives.

As responsible investors, and in recognition of the increasing importance of ESG to our clients, we have also fully integrated ESG inside all of our factor-investing strategies."

David Wickham,
Global Head of Quantitative Solutions

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