

MSCI 

Factor Analytics

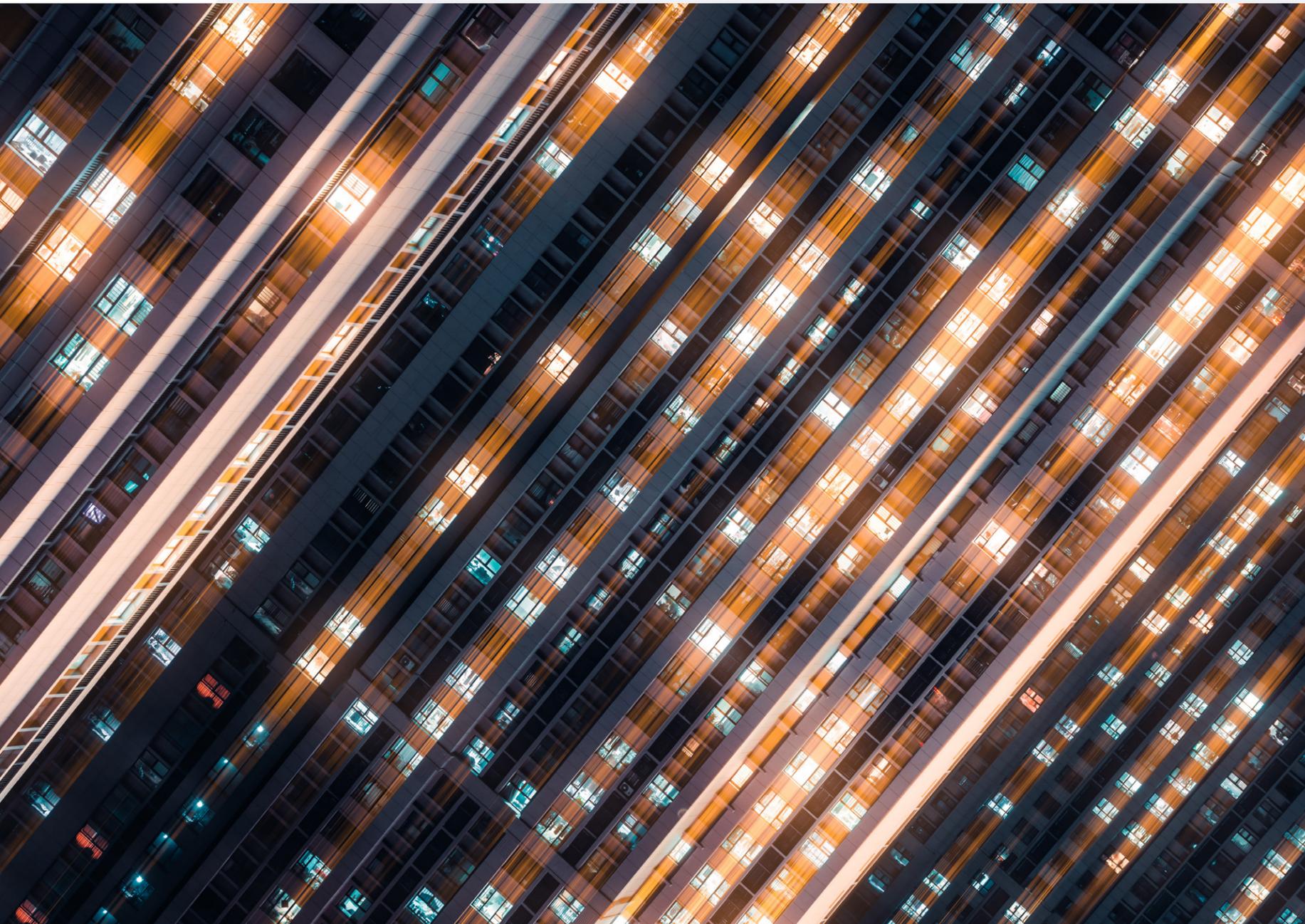


Elements of performance™

Factors by MSCI



Factors are the building blocks of many portfolios – the elements capable of turning data points into actionable insights.

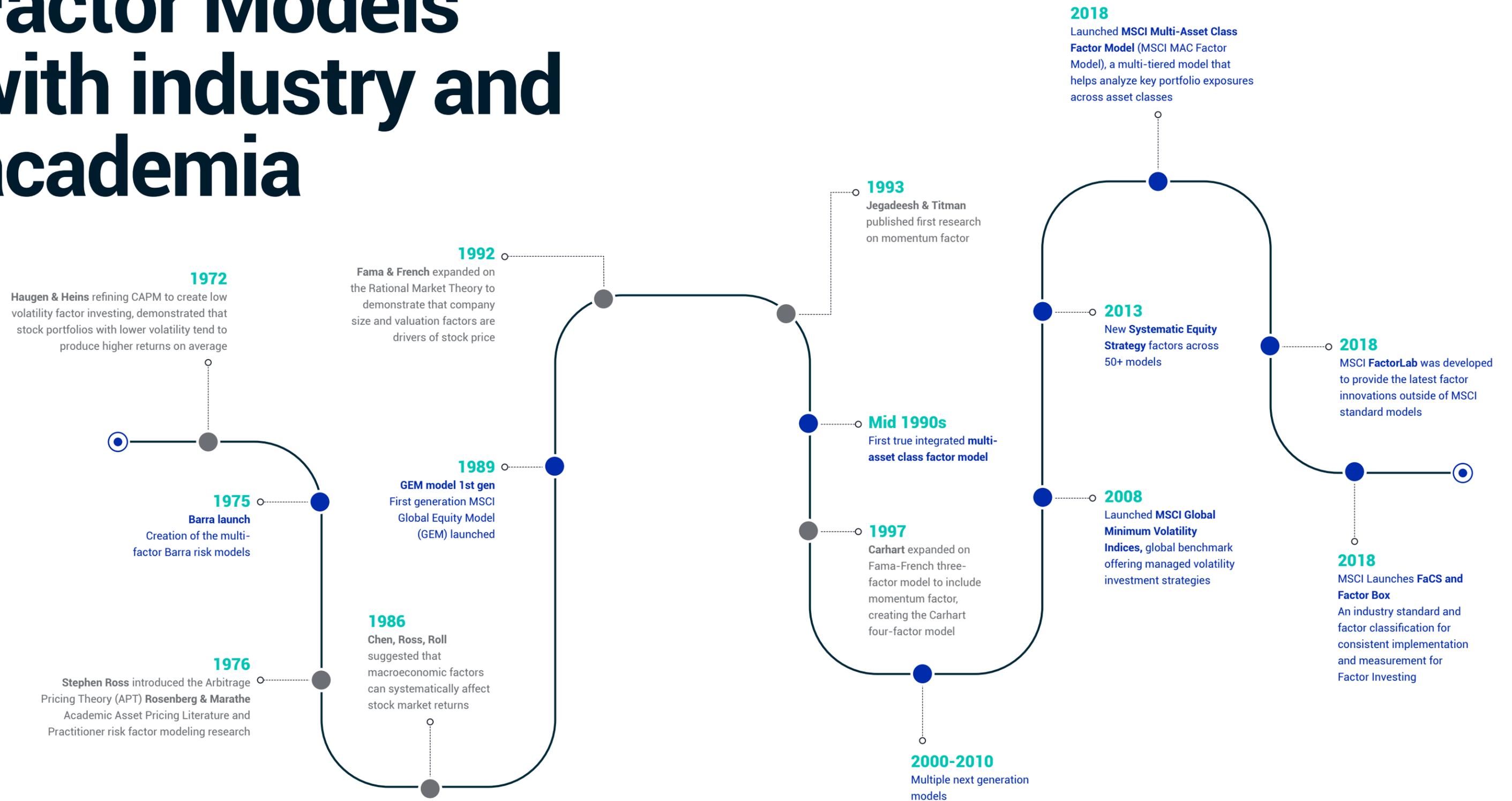


Factor Analytics by MSCI

MSCI is a leader in providing tools to help clients build and manage better portfolios, implement strategies and measure performance. As a leader in the application of factors for more than 40 years, MSCI, beginning with Barra has invented a common language to explain risk and return through the lens of factors.

With the advancement in data and technology, MSCI has simplified complex data into actionable insights to be used by a broader audience. MSCI has developed Factor Models in consultation with the world's largest investors and has research backed by four decades of factor data. Our Factor Models have evolved in tandem with the industry and have their roots in academic literature.

Evolution of MSCI's Factor Models with industry and academia

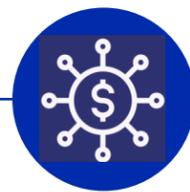




MSCI Factor Analytics is a leader that helps clients throughout the investment process



Asset Managers



Asset Owners



Banks



Hedge Funds

Asset Managers

We provide leading research, data and tools to help asset managers build and manage their portfolios. Our models help asset managers understand factor exposures which enables them to position their fund more effectively and build a differentiated portfolio.

Need / Challenges

To better educate financial advisors about factor exposures, our client, one of the largest mutual fund organizations in the U.S., required a robust infrastructure to power an easy-to-understand advisor tool. They were looking for a solution that seamlessly integrated into its external Financial Advisory Services website.

MSCI solution

MSCI developed a custom application for this large mutual fund organization comprised of client defined factor exposures and optimized for the client's advisor-facing factor investing tool.

Outcome

- » MSCI factor applications provided transparency and insight into the factor exposures of their investment products
- » Client was able to utilize our MSCI factor applications to incorporate the necessary technology they needed to seamlessly differentiate their products to financial advisors.
- » Provided the ability to compare portfolios and find alternatives better suited for their clients' goals

Banks

As our banking clients need much faster moving metrics to stay ahead of the key drivers of risk and return, MSCI continuously innovates to offer our banking clients the latest factor models with new content and research.

Need / Challenges

Leading sell-side bank wanted to incorporate market standard factor baskets for the bank's hedge fund clients to take directional bets on hedge portfolios through basket swaps. They specifically wanted a long-short construct with neutrality to all other factors and the ability to rebalance frequently enough to account for market movement.

MSCI solution

Our Managed Services helped client implement tools to allow them to create factor replicating portfolios with auto-rebalance on a monthly basis. MSCI, helped client implement optimization inputs for a pre-specified number of custom factor baskets (Momentum, Value, etc.).

Outcome

- » This joint effort allowed the client to create a new product for a key growth client segment that allows their clients to gain more precise hedge exposure to MSCI factors.
- » Ability to serve additional clients segments with this new capability.

Hedge Funds

Our factor models help hedge funds seeking to create alpha by employing different strategies. Our ground-breaking factor research and indexes help fund managers seeking to maintain optimal exposure to a diverse set of factors.

Need / Challenges

Our hedge fund client was looking for a factor provider that stays at the forefront of research and innovation in factors. Specifically, they sought to drive performance, access insight into risk and return, and understand exposures better.

MSCI solution

We successfully demonstrated MSCI's continuous innovation in factors that give the client full access to our factor research and development.

Outcome

- » The client creates their own models, generates alpha signals, and communicates to investors their competitive advantage using MSCI factor data and solutions.

Asset Owners

The complexity in fund selection makes it very difficult for Asset Owners to make informed decisions. We offer solutions to help Asset Owners understand investment portfolios in a very simple way, assess fund performance and compensate managers.

Need / Challenges

One of the leading U.S. institutional Asset Owners wanted to further enhance their due diligence and manager selection

MSCI solution

MSCI factor tools provided insights into the drivers of risk and return. With MSCI Factor Indexes, the client was able to measure investment exposures in a systematic and transparent manner

Outcome

- » More informed manager selection and performance while controlling for risk.



MSCI Equity Models

MSCI Equity Models provide institutional investors with tools for investigating sources of factor alpha, understanding returns, and measuring risk due to factors. MSCI offers more than 70 models across 75,000+ securities, 45 Industry factors and 87 countries.



MSCI Barra Equity Factor Models

MSCI Barra Equity Models leverage MSCI's experience in developing and maintaining global equity multi-factor models and indexes, which are utilized by institutional fund managers worldwide.

Single Country, Regional, and Global Models

MSCI Equity Models provide a foundation for investment decision support tools via a broad range of insightful analytics for Single country, Regional and Global Models. These models are built on decades of experience in constructing equity models and market-leading benchmarks.

Models for Multiple Investment Horizons

MSCI Equity Models are available in different factor structures designed to align to individual investment horizons and goals. Long-term models are designed with a focus on portfolio construction & reporting and Trading models are constructed for short-term trading, hedging, and daily risk monitoring.

Barra® global model

Global Equity Model

Barra® Intergrated Model

Barra® regional models

Europe Equity Models

Europe Stochastic Factor Model

Asia Pacific Equity Models

Emerging Markets Equity Model

North America Stochastic Factor Model

Barra® single country equity models

Americas

US Total Market Equity Model Suite
US Sector Equity Models
US Small Cap Equity Model
US Trading Equity Models
Canada Equity Model
Brazil Equity Model
Mexico Equity Model

Europe, Middle East & Africa

South Africa Equity Model
United Kingdom Equity Model
United Kingdom Trading Equity Model

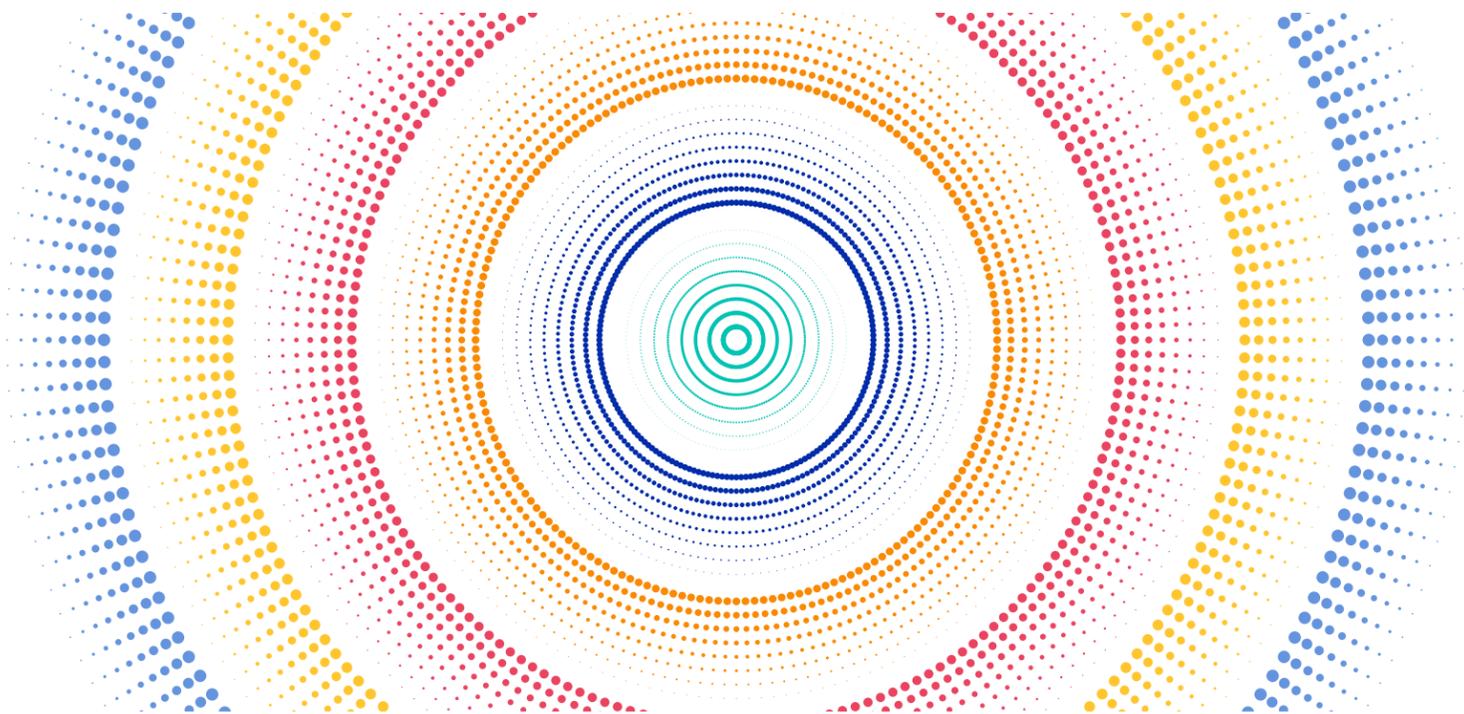
Asia Pacific

Australia Equity Model
China Equity Model
China International Equity Model
Hong Kong Equity Model
India Equity Model
Indonesia Equity Model
Korea Equity Model
Malaysia Equity Model
New Zealand Equity Model
Singapore Equity Model
Taiwan Equity Model
Thailand Equity Model

Features of MSCI Equity Models

- » Enhanced style factors based on **Systematic Equity Strategies (SES)** include multiple new **Quality** factors
- » Factors based on MSCI data such as **ESG** or **Economic Exposure**
- » **Multi-industry and country exposures** for deeper insight into a firm's business segments
- » **Point-in-Time** fundamental data address look-ahead bias in back-tests and enable more timely updates
- » **Daily history back to** at least the mid-1990s for most markets and back to the 1970s for the U.S.
- » Latest modeling methodologies aimed at **improving risk forecasting accuracy, portfolio construction, asset beta estimation and more precise attribution of stock returns**

MSCI Equity Models



Captures systematic characteristics across asset classes

Many investors recognize a spectrum between traditional alpha and beta, with a variety of systematic strategies in the middle. Systematic strategy factors like Value and Momentum have been common in equities for decades. More recently, many investors have recognized the importance of systematic strategies in a wide range of asset classes. Many strategies that originated in equities have counterparts in other asset classes.

- » **Introduce systematic strategy factors beyond equities**
- » **Multi-asset class systematic strategy**
Factors distinguish factor betas from alpha and traditional beta



Multi-Asset Class Factor Models

Factors have brought disruptive change to the asset management industry. First established to define common characteristics among stock, factors now take many forms and span many asset classes. The MSCI MAC Factor Model:

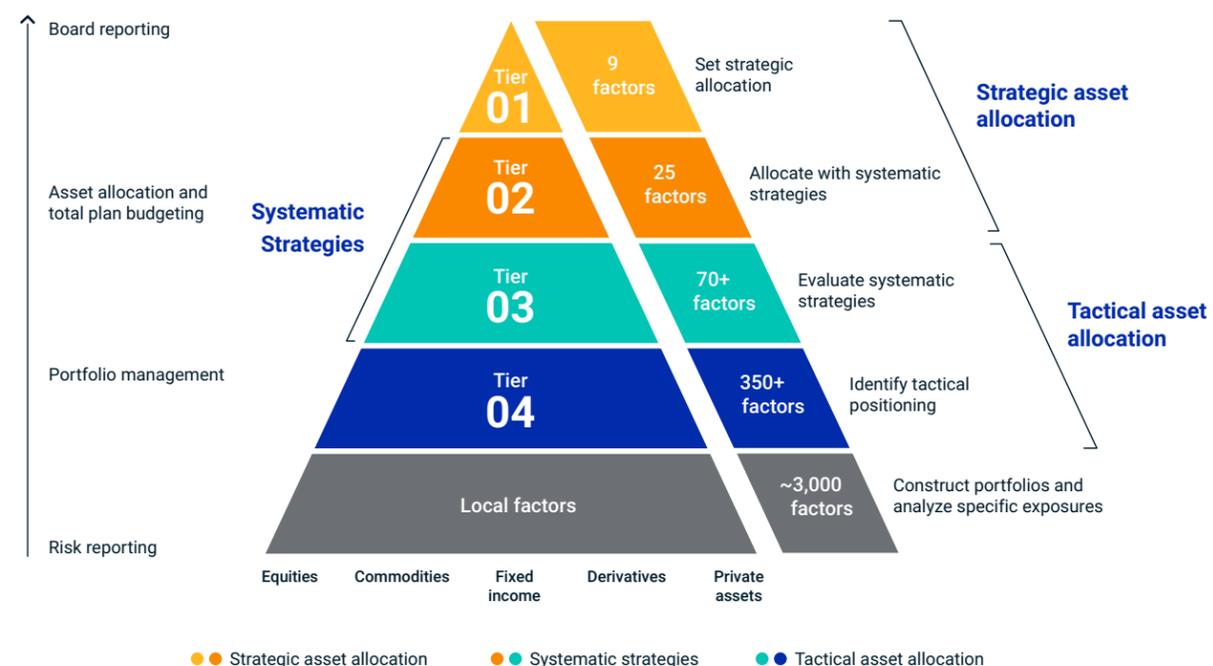
Supports factor-based asset allocation

Traditional asset allocation has viewed the markets in terms of asset-class buckets: equity, fixed income, and alternatives. Factor-based asset allocation moves the strategic allocation decisions away from asset-class buckets to factors that both cut across and split apart traditional asset class. As portfolios transition from traditional asset class allocation to a factor-based allocation process, MSCI's MAC Factor Model can help investors focus on factor exposures across asset classes in a consistent manner.

- » **Provides high-to-low granularity in looking at Systematic Strategy Factors through an integrated and consistent framework**
- » **Provides further insight and control into multi or single asset class investing**

The MSCI Multi-Asset Class (MAC) Factor Model

The MSCI Multi-Asset Class Factor Model provides further insight and control into multi or single asset class investing. The integration between tiers helps bridge the gap from construction to communication between the board, CIO, and portfolio managers using a common language.



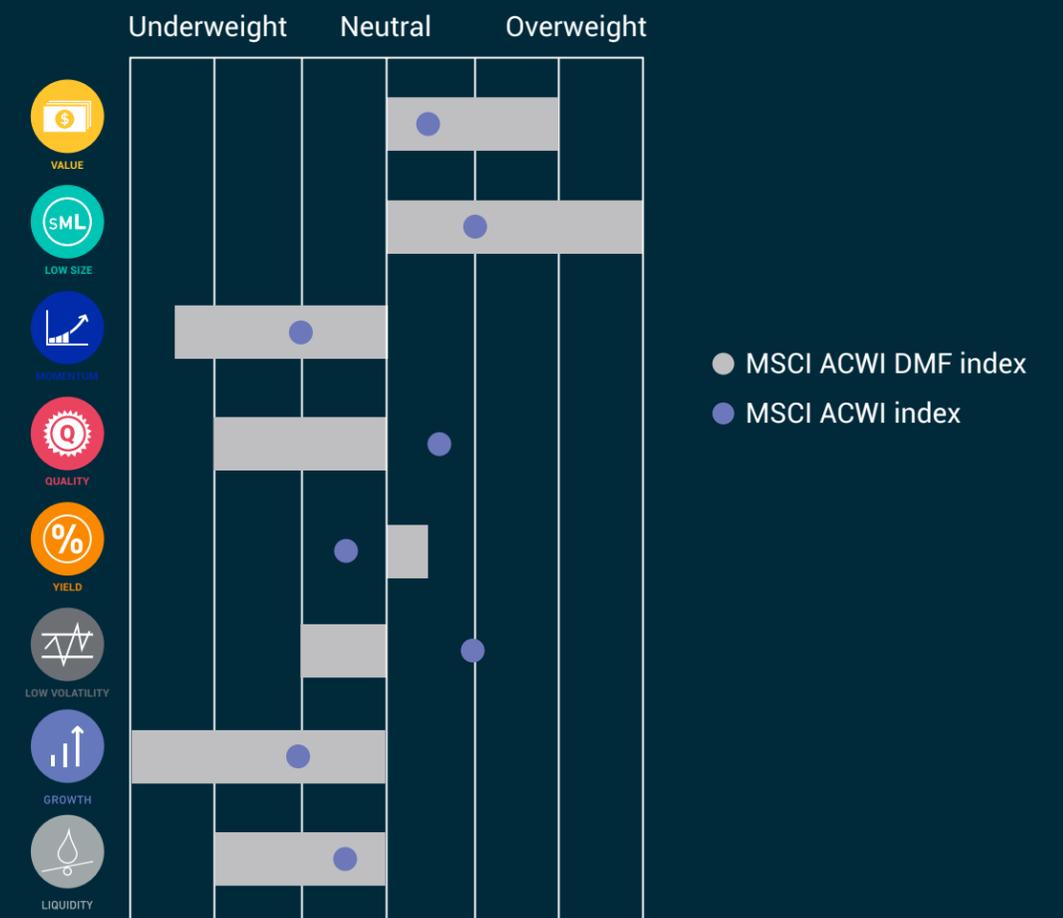
MSCI FaCS™ and Factor Box

MSCI FaCS™ creates a common language and definitions around factors to be used by a broader audience including asset owners, managers, advisors, consultants, and investors. Investment managers can use the framework to analyze and report factor characteristics, while investors and consultants can use the data to compare funds using common factor standard definitions.



Turn confusion into clarity

This standard comes to life through an innovative way of looking at factors-MSCI Factor Box. The Factor Box provides a visualization designed to easily compare factor exposures between funds and benchmarks. It includes factors which have historically demonstrated excess market returns over the long run. The Factor Box helps clients evaluate and implement factors, while easily comparing funds with a simple visualization.





MSCI FactorLab

MSCI believes in staying ahead of the curve and researches factors to help clients gain a competitive edge. MSCI continues this factor innovation to identify underutilized and alternative data and algorithms to provide unique information not contained in classic factors. MSCI FactorLab provides the latest factor innovation outside of MSCI's standard models that can be integrated quickly. MSCI FactorLab provides further transparency and access to our curated factor research. It provides access to new, research-enhanced data sets for use cases ranging from alpha research to building custom-risk factors.

Key benefits of FactorLab include:

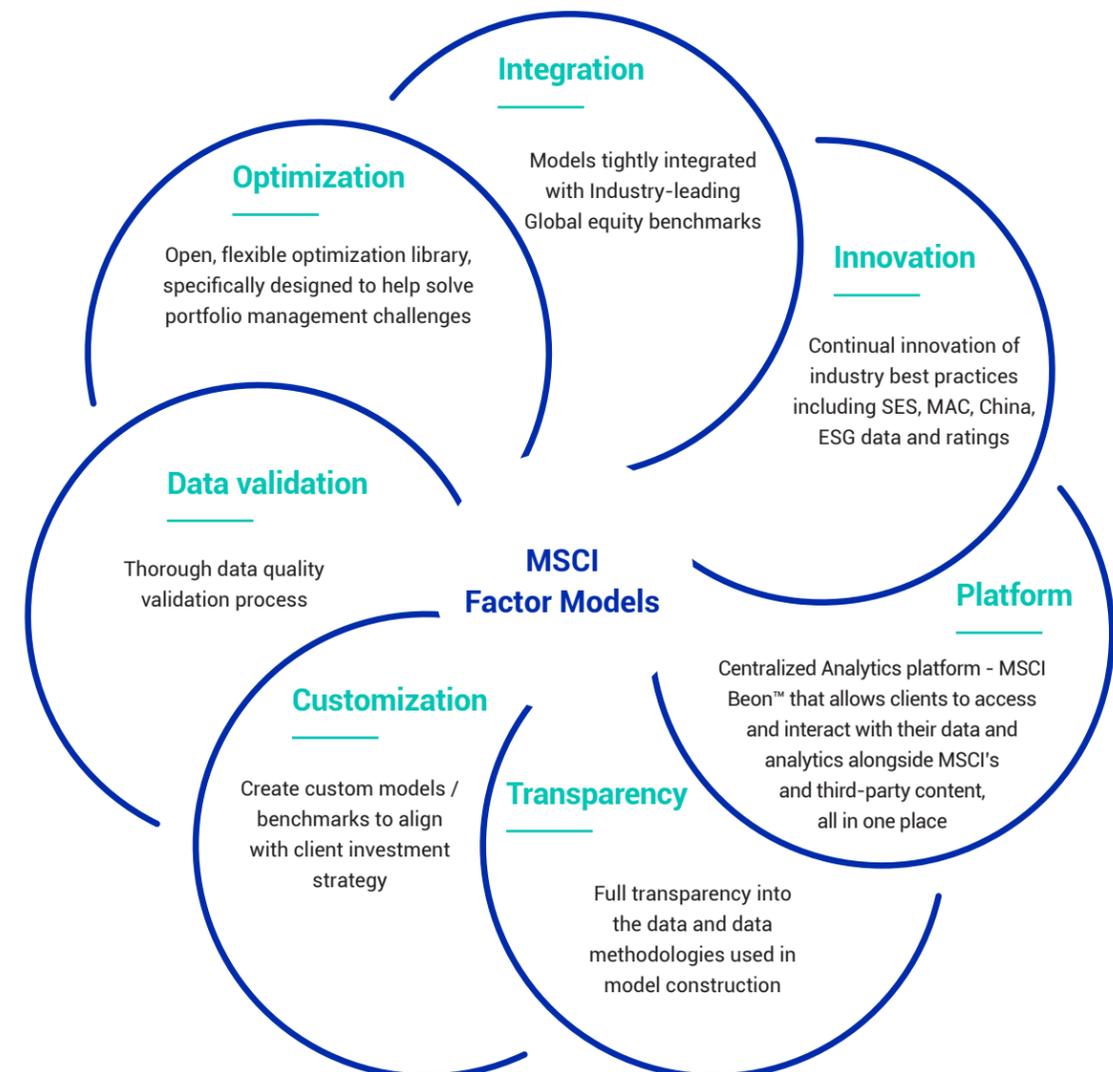
- » **Faster access to new research and datasets**
- » **Alternative factor research gives more insight into factor performance that can be translated into alpha generation**
- » **Facilitate creation of custom models and internal analytics**
- » **The format of FactorLab is the same as other MSCI products and therefore can be integrated at a low cost**

Features of FactorLab:

- » Daily financial metrics on over 77,000 equities covering 87 countries
- » Asset-level signals include raw and standardized exposures
- » Same data used to build models and updated as markets evolve

MSCI empowers our clients to

make better investment decisions



Factor framework

by Key MSCI Equity model



VOLATILITY

- Beta**
 - Historical Beta
- Residual Volatility**
 - Hist Sigma
 - Daily Std Dev
 - Cumulative Range
 - Implied Volatility
 - 1 month Call
 - Implied Volatility
 - 3 month Call
 - Implied Volatility
 - 1 month Put
 - Implied Volatility
 - 3 month Put
- Downside Risk**
 - Lower Partial Moment
 - Idiosyncratic Hybrid Tail
 - Covariance Risk
 - Hybrid Tail
 - Covariance Risk
 - Mean Lower Partial Moment
 - CAPM Beta
 - Idiosyncratic Lower Partial Moment
- Downside Beta**
 - Lower Partial Moment



QUALITY

- Leverage**
 - Debt to Assets
 - Book Leverage
 - Mkt Leverage
- Profitability**
 - Asset Turnover
 - Profitability
 - Profit Margin
 - Return on Assets
 - Return on Equity
- Earnings Variability**
 - Variation in Sales
 - Variation in Earnings
 - Variation in Cash Flow
 - Variation in Fwd EPS
- Earnings Quality**
 - Cash Earning/Earnings
 - Accruals - B/S Statement
 - Accruals - C/F Statement
 - Variability in Sales
 - Variability in Earnings
 - Variability in Cash-Flows
 - Standard Deviation of Analyst Prediction to Price
- Investment Quality**
 - Asset Growth
 - Capex Growth
 - Issuance Growth
 - Capital Expenditure
 - Management forecast bias
 - Composite Issuance



MOMENTUM

- Momentum**
 - Rel Strength
 - Historical Alpha
- 1-Day Reversal**
 - 1-Day Reversal
- Industry Momentum**
 - Industry Momentum
- Prospect**
 - Skewness
 - Maximum Drawdown
 - Lottery
- Regional Momentum**
 - Regional Momentum
- Short-Term Reversal**
 - Short-Term Reversal
- Seasonality**
 - Quarterly Seasonality
 - Annual Seasonality



VALUE

- Book-to-Price**
 - Book-to-Price
- Earnings Yield**
 - Reported E/P
 - Forecasted E/P
 - Cash E/P
 - EBIDTA E/P
- Long-Term Reversal**
 - LT Rel Strength
 - LT Hist Alpha
- Other**
 - Sales-to-Price
 - Cash-Flow-to-Price
 - Structural Valuation



SENTIMENT

- Analyst Sentiment**
 - Revision Ratio
 - Change in Analyst-Predicted E/P
 - Change in Analyst-Predicted EPS
 - Net Profit Forecast Revisions
 - Analyst Rating Change
- News Sentiment**
 - Positive Composite Sentiment
 - Positive Event Sentiment
 - Composite Sentiment Dispersion
 - At-the-money Skew
 - Net profit forecasts revisions
 - Analyst rating change
- Market Sentiment**
 - At-the-Money Skew
 - Short Interest



YIELD

- Dividend Yield**
 - Reported D/P
 - Forecast D/P



SIZE

- Size**
 - Log of Market Cap
- Mid Cap**
 - Cube of Size



GROWTH

- Growth**
 - Sales Growth
 - Earnings Growth
 - Forecast LTG



LIQUIDITY

- Liquidity**
 - 1m Turnover
 - 3m Turnover
 - 12m Turnover
 - 12m ATVR
 - Modified Amihud Measure
 - Pastor-Stambaugh Measure



MACRO

- Foreign sensitivity**
 - Foreign Sales to Total Sales
 - US market sensitivity
 - Developed market sensitivity
 - Currency Sensitivity
- Long-Term Reversal**
 - Interest Rate
 - Oil Sensitivity
 - Gold Sensitivity



Learn more about Factor Investing at
www.msci.com/factor-investing

About MSCI Inc.

MSCI is a leading provider of critical decision support tools and services for the global investment community. With over 45 years of expertise in research, data and technology, we power better investment decisions by enabling clients to understand and analyze key drivers of risk and return and confidently build more effective portfolios. We create industry-leading research-enhanced solutions that clients use to gain insight into and improve transparency across the investment process.

To learn more, please visit www.msci.com.

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