

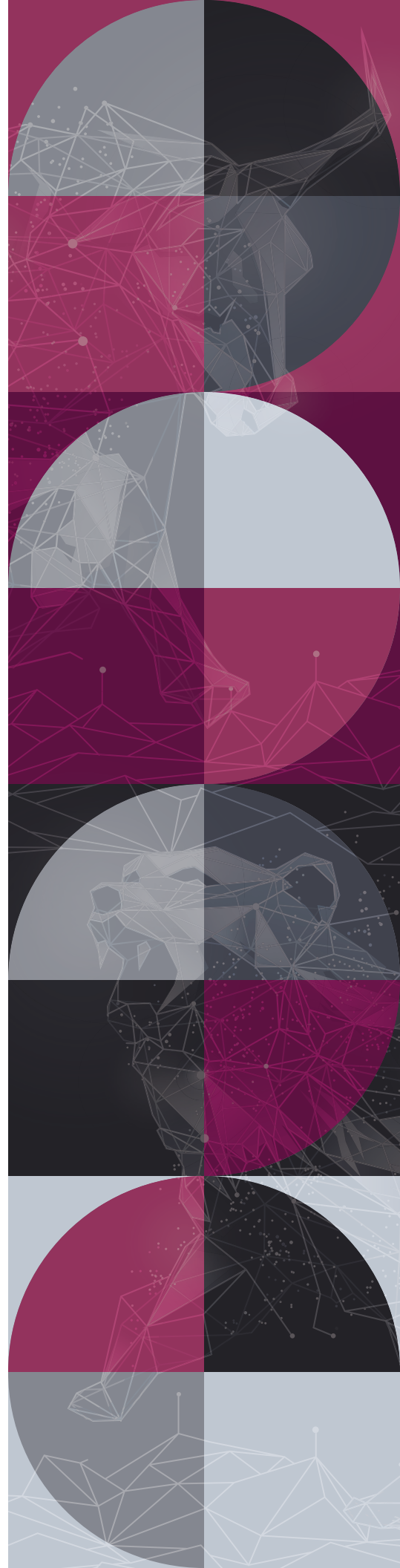
Q WEALTH ASSET MANAGEMENT
FOUNDATION SERIES

FACTOR- BASED INVESTING

PART TWO:
IMPLEMENTING FACTOR
INVESTING IN THE REAL
WORLD

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INTRODUCTION

Factor investing is conceptually elegant. Academic research has identified characteristics — Value, Momentum, Quality, Size, Yield, and Low Volatility, that have historically generated excess returns over long periods of time. The theory is well-established. The implementation is where things become more complicated.

In practice, capturing factor returns consistently requires far more than screening stocks on a single metric. Real-world portfolios face constraints that academic research often fails to fully capture, including liquidity, turnover, taxes, transaction costs, market impact, and crowding. A strategy that appears compelling in a backtest can look very different once those frictions are applied. As factor investing has become increasingly mainstream, the gap between factor exposure and factor engineering has become one of the most important distinctions in modern portfolio management.

This paper examines how factors behave in real-world portfolios — how they perform across market cycles, where naïve implementation breaks down, and why institutional investors increasingly use multi-factor approaches not only for return generation, but also for diversification and risk management. The goal is not to revisit the theory, but to focus on what ultimately determines whether factor investing delivers in practice.

From Theory To Implementation: The evolution from academic factor research to institutional portfolio construction

Academic research has identified a range of factor premiums. The challenge is capturing those premiums in real-world portfolios—where markets are inefficient, costs are real, and implementation decisions drive outcomes.



Factor research identifies the opportunity. Portfolio construction determines how much of it investors ultimately capture.

1. FROM THEORY TO PORTFOLIO CONSTRUCTION

Translating factor research into real-world portfolios is significantly more complex than it appears on paper. Academic research is developed under highly controlled assumptions that rarely account for real-world constraints — liquidity, turnover, taxes, transaction costs, market impact, and implementation capacity. As factor investing evolved from theory into institutional practice, investors increasingly recognized the gap between academic factors and investable factors.

Foundational research by Eugene Fama and Kenneth French on Size and Value, along with later work by Mark Carhart on Momentum, established factor investing as one of the cornerstones of modern portfolio theory. Research from MSCI, AQR Capital Management, and Research Affiliates further expanded both the academic and practical understanding of systematic factor investing. But as that body of work moved from journals into portfolios, a critical distinction emerged.

Academic Theory	Real-World Portfolio Construction
Backtested factor premiums	Investable factor exposures
Frictionless trading assumptions	Transaction costs & market impact
Static factor screens	Dynamic portfolio engineering
Pure factor exposure	Diversification & risk controls
Theoretical returns	Realized after-cost returns
Academic research	Institutional implementation

Successful factor investing depends not only on identifying factors, but implementing them efficiently within real-world portfolio constraints.

Academic Factors vs. Investable Factors

Academic factors are designed primarily to demonstrate the existence of a persistent return premium. Investable factors, however, must be implementable efficiently and at scale within the constraints of real-world portfolios.

Research by Robert Novy-Marx and others has shown that many factor premiums weaken materially once implementation costs are incorporated. Similarly, research from MSCI and AQR Capital Management has demonstrated that turnover, liquidity constraints, and trading costs can significantly erode realized factor returns, particularly in higher-turnover strategies such as Momentum.

For example, an academic Value portfolio may include deeply illiquid securities that would be difficult for large institutional investors to own in practice. Likewise, Momentum strategies may appear attractive in backtests but require excessive trading activity that reduces realized returns after costs. As a result, implementation efficiency has become a critical component of factor investing.



1. FROM THEORY TO PORTFOLIO CONSTRUCTION

Institutional-Grade Implementation

Institutional investors increasingly approach factor investing not simply as a screening exercise, but as a portfolio engineering process. Research from AQR Capital Management, MSCI and Northern Trust Asset Management has emphasized that diversification, turnover management, liquidity controls, and implementation efficiency are often critical determinants of realized factor performance.

Rather than maximizing exposure to a single characteristic in isolation, institutional portfolios often seek to balance multiple objectives simultaneously:

Objective	Why It Matters in Factor Investing
Factor Purity	Maximize intended factor exposure while minimizing unintended risks
Diversification	Reduce concentration risk across securities, industries, and sub-factors
Liquidity	Ensure portfolios can be traded efficiently without excessive market impact
Turnover Control	Limit unnecessary trading and implementation costs
Transaction Cost Minimization	Reduce the impact of commissions, spreads, and market impact
Sector Neutrality	Prevent factor portfolios from becoming unintended sector bets
Risk Management	Control exposures to market, style, and drawdown risks
Tax Efficiency	Improve after-tax outcomes through efficient implementation
Implementation Scalability	Ensure strategies remain effective as assets under management grow

In many cases, portfolio construction becomes just as important as the factor itself.

A poorly constructed Value strategy may become concentrated in distressed or highly leveraged businesses. A Momentum strategy may become overcrowded or excessively turnover-heavy. Even Low Volatility portfolios can unintentionally become concentrated in interest-rate-sensitive sectors if not carefully managed.

As factor investing has evolved, the focus has increasingly shifted from simply identifying factors toward engineering portfolios capable of delivering those exposures efficiently, consistently, and at scale.

In other words, successful factor investing is not simply about finding factors — it is about implementing them intelligently.

While factor investing is supported by decades of academic research, implementing factors effectively in real-world portfolios is considerably more complex than simply screening stocks based on a single characteristic. As factor investing has become increasingly mainstream, many “smart beta” products have emerged that provide basic rules-based exposure without fully accounting for implementation risks, unintended exposures, or portfolio construction challenges.

2. THE HIDDEN RISKS OF NAÏVE FACTOR INVESTING

This highlights an important distinction between **factor exposure** and **factor engineering**. Naïve factor investing often seeks to maximize exposure to a single metric in isolation, while institutional approaches increasingly focus on balancing factor exposure with diversification, liquidity, turnover management, and risk controls.

Unintended Exposures and Sector Concentration

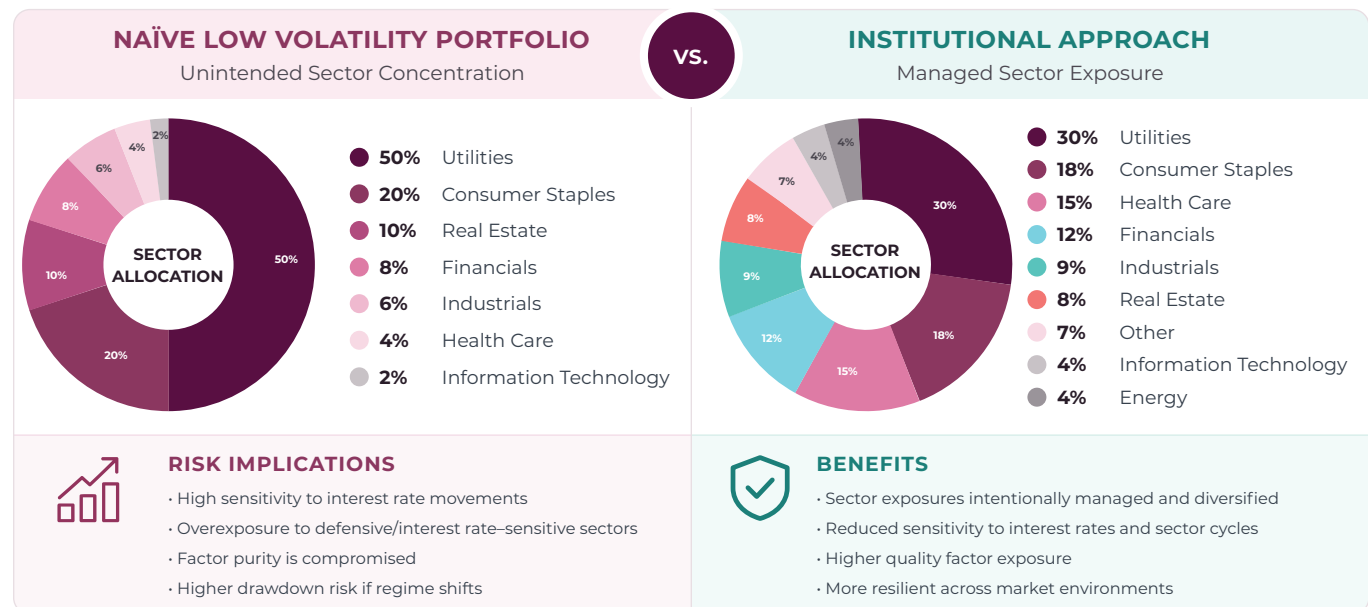
One of the most common risks in simplistic factor construction is unintended concentration risk.

For example:

- Value portfolios can become heavily concentrated in cyclical sectors such as financials or energy.
- Low Volatility portfolios may unintentionally become dominated by utilities or REITs.
- Quality strategies may become concentrated in large-cap technology companies.

Research from MSCI and academic work by Robert Novy-Marx has shown that unmanaged sector exposures can often explain a meaningful portion of factor portfolio returns.

Example: Low Volatility Portfolio



Factor signals identify stocks.

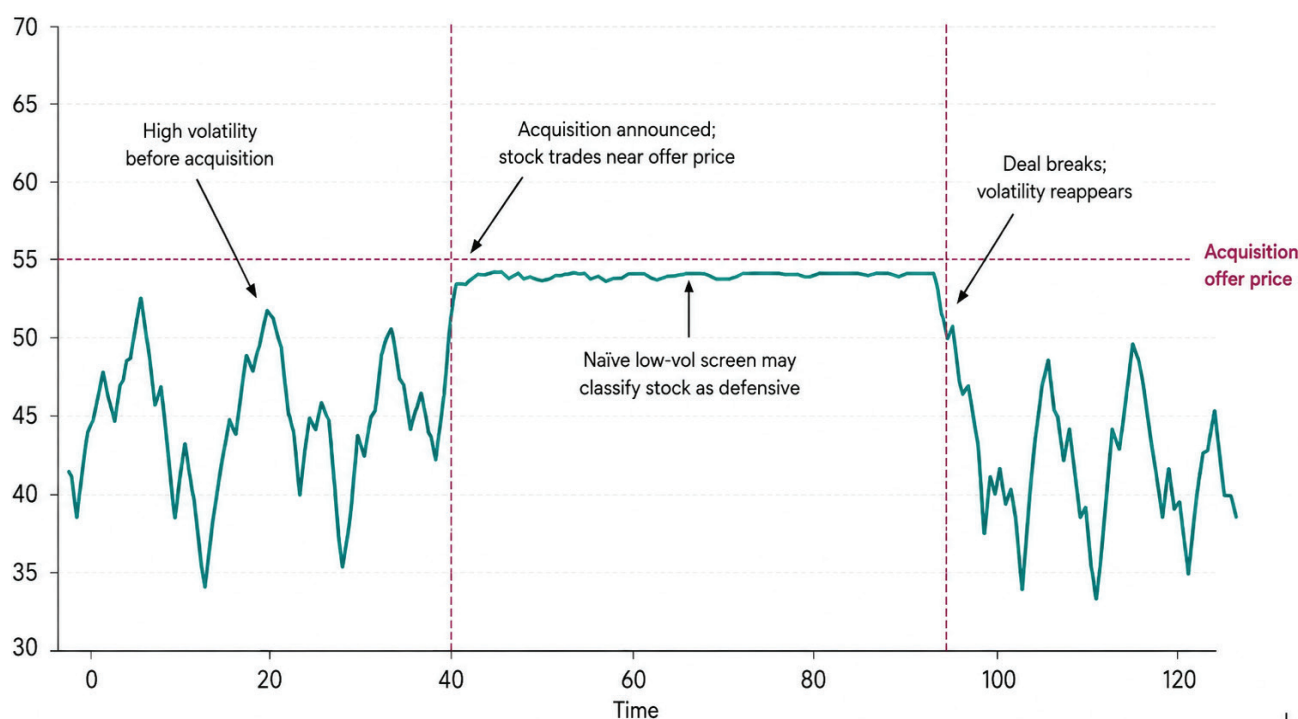
Portfolio construction determines the risk you ultimately take.

The Problem With Naïve Data

Another limitation of simplistic factor models is their reliance on backward-looking statistical data. For example, a company involved in a pending acquisition may exhibit unusually low observed volatility as its share price converges toward the takeover price. A naïve low volatility screen may therefore classify the stock as “defensive” and include it in a low volatility portfolio.

However, if the acquisition fails, the stock may rapidly revert to trading on fundamentals, resulting in a sharp increase in volatility and downside risk. What appeared statistically stable was actually an event-driven situation rather than a genuinely low-risk business. This illustrates an important challenge in factor investing: historical factor signals do not always capture underlying economic reality.

Stock ABC: When Naïve Low Volatility Signals Can Mislead



For illustrative purposes only. Hypothetical example.

Turnover, Liquidity, and Crowding Risk

Academic factor research often assumes frictionless trading environments. In practice, transaction costs, liquidity constraints, and turnover can materially reduce realized returns.

Momentum strategies are particularly vulnerable due to their naturally high turnover characteristics. Research from AQR Capital Management has repeatedly emphasized that implementation efficiency and trading costs are critical determinants of realized factor performance. Similarly, deep value and small-cap strategies may appear attractive in backtests but become difficult to implement at scale without materially impacting market prices.

As factor strategies have grown in popularity, crowding risk has also become increasingly important. During periods of market stress or regime change, crowded factor exposures can unwind rapidly, leading to sharp drawdowns. Research by Cliff Asness and Robert Arnott has highlighted how crowding and valuation conditions can influence future factor returns.

2. THE HIDDEN RISKS OF NAÏVE FACTOR INVESTING

When “Smart Beta” Becomes Concentrated Beta

Not all “smart beta” products provide diversified or sophisticated factor exposure. In some cases, “smart beta” portfolios are simply concentrated tilts toward narrow segments of the market presented under a factor label. A low volatility strategy may effectively become a utilities portfolio, while a quality strategy may become dominated by mega-cap technology stocks.

This distinction matters because successful factor investing is not simply about maximizing exposure to a factor — it is about capturing factor premiums efficiently while managing unintended risks, implementation constraints, and portfolio concentrations.

3. UNDERSTANDING THE CORE EQUITY FACTORS

Early factor investing strategies often focused on isolating a single factor in an effort to maximize exposure to a specific return premium. Over time, however, institutional investors recognized that individual factors can experience extended periods of outperformance and underperformance depending on the prevailing market and economic environment.

As a result, many investors shifted toward multi-factor approaches designed to improve diversification, reduce cyclicity, and deliver more consistent outcomes across market cycles. Because different factors tend to perform differently across varying environments, combining complementary factors may help reduce dependence on any single source of return.

■ Value

Value investing focuses on companies that appear inexpensive relative to their fundamentals, typically measured using metrics such as price-to-earnings, price-to-book, or free cash flow yields. Historically, Value strategies have tended to perform relatively well during periods of economic recovery, rising interest rates, or reflationary environments. Seminal research by Eugene Fama and Kenneth French established Value as one of the foundational factors in modern asset pricing research.

■ Momentum

Momentum investing seeks to identify securities with strong recent price performance under the premise that market trends can persist over intermediate time horizons. Momentum has historically performed well during sustained market trends, although it can experience sharp reversals during abrupt market inflection points. Research by Mark Carhart helped establish Momentum as one of the most persistent and robust factor premia observed across global markets.

3. UNDERSTANDING THE CORE EQUITY FACTORS

■ Quality

Quality strategies focus on companies with strong fundamentals, including high profitability, stable earnings, strong balance sheets, and efficient capital allocation. Quality has historically demonstrated resilience during periods of economic slowdown or financial stress, when investors tend to favour financially durable businesses. Research by Robert Novy-Marx significantly expanded academic understanding of profitability and quality-related factor premiums.

■ Low Volatility

Low Volatility investing targets stocks that have historically exhibited lower price fluctuations relative to the broader market. Contrary to traditional finance theory, research has shown that lower volatility stocks have historically generated competitive long-term returns with reduced drawdowns and lower overall portfolio volatility — often referred to as the “Low Volatility Anomaly.” Low Volatility strategies have historically performed relatively well during risk-off environments and periods of elevated uncertainty.

■ Yield

Yield investing focuses on companies offering attractive and sustainable dividend income. Higher-yielding equities have historically provided an important source of total return, although unusually high yields may also signal financial stress or elevated dividend-cut risk. Research by Fama and French (1988) demonstrated a relationship between dividend yields and expected stock returns.

■ Size

The Size factor refers to the historical tendency for smaller capitalization companies to outperform larger companies over long periods of time. Smaller companies have historically benefited from higher growth potential and greater sensitivity to improving economic conditions, although they can also carry higher volatility and liquidity risk. The Size premium was first formally documented in the research of Eugene Fama and Kenneth French.

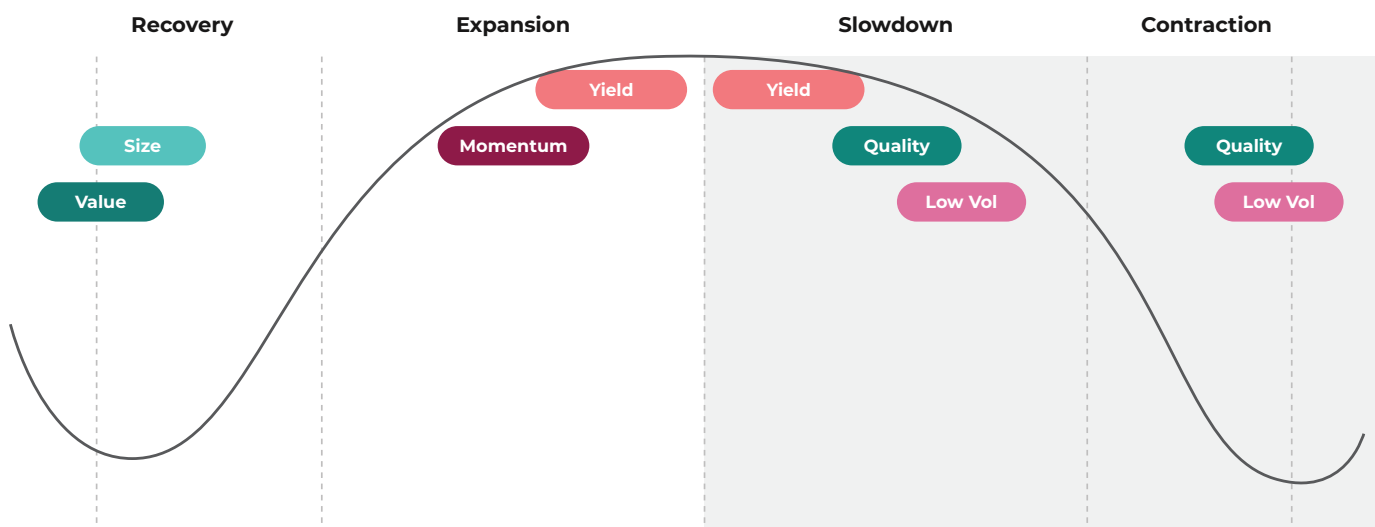
Factor	Core Characteristics	Historically Favoured Environment	Key Research
Value	Companies trading inexpensively relative to fundamentals such as earnings, book value, or cash flow	Economic recovery, rising rates, reflationary environments	Eugene Fama & Kenneth French
Momentum	Securities with strong recent price performance and persistent market leadership	Sustained market trends and expansionary environments	Mark Carhart
Quality	Companies with strong profitability, stable earnings, and healthy balance sheets	Slow growth, market stress, defensive environments	Robert Novy-Marx
Low Volatility	Stocks with historically lower price fluctuations and reduced drawdowns	Risk-off periods, elevated uncertainty, economic contraction	Andrew Ang, Robert Hodrick, Yuhang Xing & Xiaoyan Zhang
Yield	Companies with higher dividend or shareholder yield characteristics	Lower growth, income-oriented, defensive environments	Rob Arnott, Cliff Asness, Eugene Fama and Kenneth French
Size	Smaller capitalization companies with higher growth sensitivity	Early-cycle recovery and improving economic conditions	Eugene Fama & Kenneth French

4. FACTORS ACROSS MARKET CYCLES

One of the defining characteristics of factor investing is that factor performance is not static across time. Different market and economic environments tend to reward different types of companies, causing leadership among factors to rotate throughout the business cycle.

Research from MSCI, AQR Capital Management, and academic work from researchers such as Eugene Fama and Kenneth French has shown that factor returns are often influenced by broader economic, liquidity, inflation, and risk conditions.

Illustrative Factor performance across business cycles



For illustrative purposes only, every business cycle will vary

Market Environment	Factors That Have Historically Tended to Lead
Early Economic Recovery	Size, Value
Economic Expansion	Momentum, Yield
Late Cycle Slowdown	Yield, Quality, Low Volatility
Risk-Off / Recessionary Environment	Low Volatility, Quality

For example, Value and Size factors have historically performed relatively well during periods of economic recovery, while Quality and Low Volatility strategies have often demonstrated resilience during slower growth or risk-off environments. Momentum has historically performed well during sustained market trends where leadership remains persistent over time.

Importantly, these relationships are not deterministic. Factors are probabilistic rather than predictive, and no factor consistently outperforms across all market environments. Research by Cliff Asness and Robert Arnott has highlighted that even well-established factors can experience prolonged periods of underperformance. Value, for example, materially lagged Growth during much of the post-Global Financial Crisis period, while Momentum strategies can experience sharp reversals during abrupt market inflection points.

As a result, many institutional investors focus less on attempting to predict the next winning factor and more on building diversified exposure across multiple complementary factors. Rather than relying on any single market outcome, multi-factor investing seeks to diversify across different economic environments and sources of return simultaneously. In many ways, the objective of modern factor investing is not to identify the “best” factor, but to construct portfolios by selecting the most efficient implementation of each factor and combining them in a way that allows portfolios to remain resilient across a wide range of market conditions over time.

5. ECONOMIC REGIMES AND FACTOR BEHAVIOUR

While factors often exhibit cyclical behaviour across traditional market and economic cycles, modern macroeconomic regimes do not always evolve in clean or predictable ways. In particular, inflation, liquidity, and monetary policy conditions can persist independently of broader economic growth trends, creating more fragmented market environments than traditional business cycle models would suggest.

The post-Global Financial Crisis period, for example, was largely defined by structurally low inflation, falling interest rates, and abundant liquidity — conditions that strongly favoured Growth-oriented and long-duration assets for much of the following decade. More recently, the inflation and rate shock that emerged in 2022 demonstrated how rapidly factor leadership can shift when macroeconomic regimes change, even if broader economic growth remains relatively

resilient. As a result, institutional investors increasingly analyze factor behaviour not only through the lens of traditional economic cycles, but also through broader macroeconomic regimes driven by growth, inflation, liquidity, and policy conditions.

The accompanying MSCI framework segments the market across two key variables:

- economic growth (expansion or contraction)
- inflation (rising or falling)

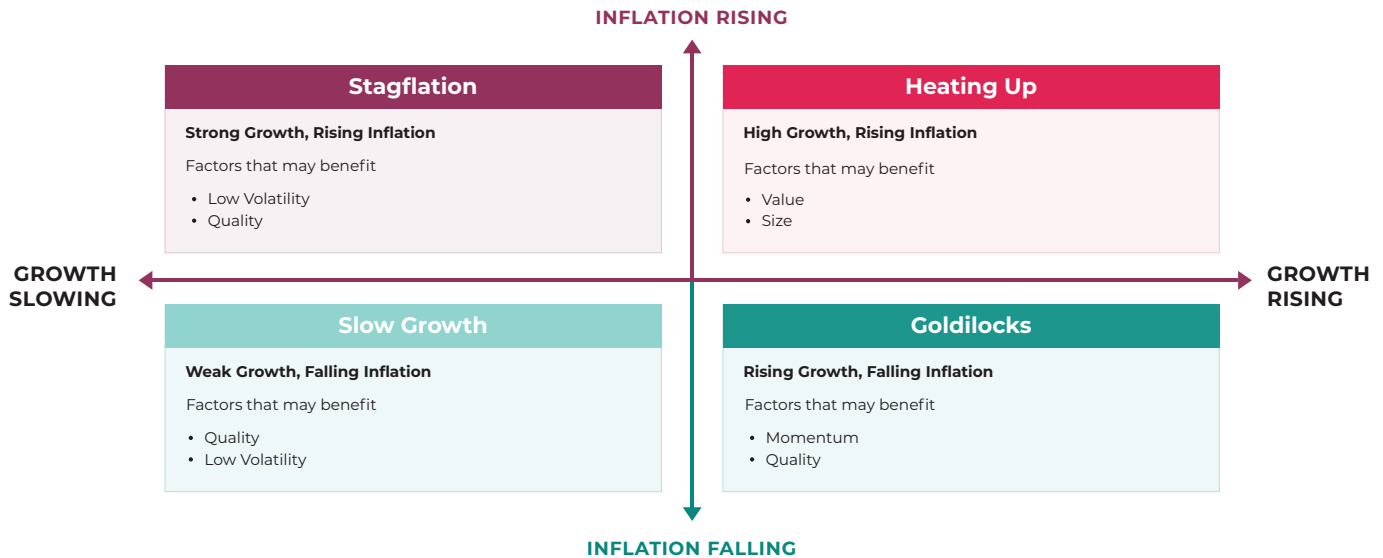
This creates four broad economic regimes:

- **Goldilocks** — rising growth with falling inflation
- **Heating Up** — rising growth with rising inflation
- **Slow Growth** — slowing growth with falling inflation
- **Stagflation** — slowing growth with rising inflation

Factor Regime Model

These performance is influenced by the prevailing combination of economic growth and inflation. Different categories do best at different times.

5. ECONOMIC REGIMES AND FACTOR BEHAVIOUR



Source: MSCI, AQR Capital Management For illustrative purposes only.

Research from MSCI and AQR Capital Management suggests that different factors have historically performed better under different combinations of growth and inflation conditions.

For example:

- Value and Size factors have often performed well during reflationary or “Heating Up” environments.
- Momentum has historically benefited from sustained expansionary trends.
- Quality has often demonstrated resilience during slower growth environments.
- Low Volatility strategies have historically outperformed during periods of market stress or heightened uncertainty.

This framework helps explain why factor leadership rotates over time. The macroeconomic conditions that benefit one factor may become headwinds for another as inflation, interest rates, liquidity conditions, and growth expectations evolve throughout the business cycle.

Importantly, institutional investors generally do not use regime analysis as a precise market timing tool. Economic transitions are difficult to forecast consistently and rarely occur in predictable ways. Instead, regime analysis is increasingly used as a diversification framework — helping investors understand how different factors may behave under varying macroeconomic conditions.

In this sense, factor investing can be viewed not simply as diversification across securities or sectors, but diversification across economic environments themselves. This distinction became particularly evident following the inflation and interest rate shock of 2022, which marked a sharp departure from the post-Global Financial Crisis (GFC) environment of falling inflation, ultra-low interest rates, and abundant liquidity that had strongly favoured growth-oriented assets for much of the prior decade.

As a result, many institutional investors increasingly focus less on predicting which factor will outperform next and more on building diversified multi-factor portfolios capable of adapting across a wide range of economic environments over time.

6. THE DEMOCRATIZATION OF INSTITUTIONAL INVESTING AND THE FUTURE OF SYSTEMATIC PORTFOLIO MANAGEMENT

For much of modern financial history, sophisticated portfolio construction techniques were largely reserved for pension plans, endowments, sovereign wealth funds, and institutional asset managers. Access to factor investing, advanced risk management, and systematic portfolio construction was typically limited to investors with significant scale and institutional resources.

Over the past two decades, however, that landscape has changed dramatically. The rise of ETFs helped democratize access to factor investing by making systematic exposures available through low-cost, transparent, and liquid investment vehicles. More recently, the continued evolution of direct indexing and portfolio technology has accelerated this shift even further, allowing investors to move beyond standardized pooled products toward increasingly customized portfolio solutions. As a result, the lines between institutional investing and wealth management continue to blur.

- factor investing
- indexing
- systematic portfolio construction
- personalized implementation

Research from organizations such as MSCI, AQR Capital Management, and Research Affiliates has increasingly emphasized that portfolio construction, implementation efficiency, diversification, and cost management can be just as important as security selection itself. In many ways, the industry is shifting away from a traditional product-centric model toward a more architecture-driven approach focused on designing portfolios around desired exposures, risk characteristics, tax considerations, and client outcomes.

The competitive advantage of the future may come less from predicting short-term market movements and more from:

- disciplined portfolio construction
- diversification across multiple return drivers
- cost efficiency
- tax awareness
- indexing
- systematic implementation
- personalized portfolio design

The future of factor investing isn't about finding better factors — the academic case for most of them is already well-established. The competitive edge increasingly belongs to investors who understand how factors interact, how they behave across economic regimes, and how to construct portfolios that capture factor premiums efficiently without introducing unintended risks in the process.

In that sense, the most important shift in modern portfolio management may not be what factors you own — but how intelligently you've engineered the portfolio around them.

ADDITIONAL READING

Foundational / Multi-Factor

Fama, E. & French, K. — The Cross-Section of Expected Stock Returns (1992)
 Fama, E. & French, K. — Common Risk Factors in the Returns on Stocks and Bonds (1993)
 Carhart, M. — On Persistence in Mutual Fund Performance (1997)

Value

Fama, E. & French, K. — Value Versus Growth: The International Evidence (1998)
 Lakonishok, J., Shleifer, A. & Vishny, R. — Contrarian Investment, Extrapolation, and Risk (1994)

Momentum

Jegadeesh, N. & Titman, S. — Returns to Buying Winners and Selling Losers (1993)
 Asness, C., Moskowitz, T. & Pedersen, L. — Value and Momentum Everywhere (2013)

Quality / Profitability

Novy-Marx, R. — The Other Side of Value: The Gross Profitability Premium (2013)
 Asness, C., Frazzini, A. & Pedersen, L. — Quality Minus Junk (2019)

Low Volatility

Ang, A., Hodrick, R., Xing, Y. & Zhang, X. — The Cross-Section of Volatility and Expected Returns (2006)
 Frazzini, A. & Pedersen, L. — Betting Against Beta (2014)

Yield / Dividends

Fama, E. & French, K. — Dividend Yields and Expected Stock Returns (1988)
 Litzenberger, R. & Ramaswamy, K. — The Effect of Dividends on Common Stock Prices (1982)
 Arnott, R. & Asness, C. — Surprise! Higher Dividends = Higher Earnings Growth (2003)

Size

Banz, R. — The Relationship Between Return and Market Value of Common Stocks (1981)

Implementation / Costs

Novy-Marx, R. & Velikov, M. — A Taxonomy of Anomalies and Their Trading Costs (2016)
 Frazzini, A., Israel, R. & Moskowitz, T. — Trading Costs of Asset Pricing Anomalies (2015)

Crowding / Factor Timing

Asness, C. — My Top 10 Peeves (2014) — covers crowding and factor valuation
 Arnott, R., Beck, N. & Kalesnik, V. — Timing "Smart Beta" Strategies (2016)
 Israel, Jiang & Ross — Craftsmanship Alpha (2017)

ABOUT THE AUTHOR



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Alfred Lee, CFA, CMT, DMS, is the Deputy Chief Investment Officer at Q Wealth Partners, where he is one of the principal architects of the firm's investment platform and asset management business. Alongside the CIO, Alfred is responsible for setting investment direction, overseeing policy and procedural development, and leading portfolio management for Q Wealth's Beta iQ and Factor iQ suite of funds.

Alfred brings over 25 years of investment experience to Q Wealth and has managed some of the largest funds in Canada. Alfred was a Portfolio Manager and Investment Strategist at BMO Global Asset Management. There, he led a team that oversaw the managing and trading over \$50 billion in equity-based strategies—including index, factor, thematic, and sector approaches—and \$30 billion in global fixed income mandates. During the 2020 pandemic, Alfred was seconded to the Bank of Canada, where he served as co-lead manager on one of the central bank's quantitative easing programs, which was authorized to purchase up to \$50 billion in provincial bonds providing funding relief and market stability.

As a senior member of the BMO team, Alfred played a key role in shaping the growth of the firm's ETF franchise—contributing across thought leadership, product development and structuring, portfolio management, trading, business development, and investor education. He was part of the core team that helped build BMO ETFs from a startup platform into one of the largest asset managers in Canada, establishing its position as a dominant force in the domestic ETF market.

Prior to BMO, Alfred led ETF research and manager research at CIBC, where he also supported macroeconomic research for the advisor network. He began his career at RBC, working in its pension consulting division, where he gained foundational experience in institutional portfolio construction and manager oversight.



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