timeline
MONEY FOR LIFE

Factor Investing

What it is and why you should consider it

February 2024

Contents

Abstract

This research paper delves into the evolving narrative of factor investing, a concept that has significantly transformed from a niche strategy to a pivotal player in the investment arena.

Sparked by the 2008 financial crisis and further complicated by recent global challenges such as the pandemic, economic shifts, and geopolitical turmoil, factor investing has re-emerged as a critical area of focus. This study aims to demystify factor investing, situating it within the spectrum of traditional passive and active investment strategies.

We begin by addressing the fundamental questions: What constitutes factor investing? And how does it differentiate itself from conventional investment approaches? The paper then navigates through the various dimensions of factor investing, including its key components and their relative importance. A critical examination of the challenges in capturing factor premiums, the nuances of risk diversification, and the response of factors under diverse market conditions forms the core of this paper.

Supported by historical data and academic insights, this research seeks to provide a comprehensive understanding of factor investing, highlighting its potential advantages in a rapidly changing investment landscape. Additionally, this paper presents Timeline's strategic approach to incorporating risk factors within a multi-asset portfolio and evaluates the prevalence of these factors across different global regions. This exploration is aimed at offering valuable perspectives to investors and practitioners, enhancing their ability to navigate the complexities and opportunities presented by factor investing in today's dynamic world.

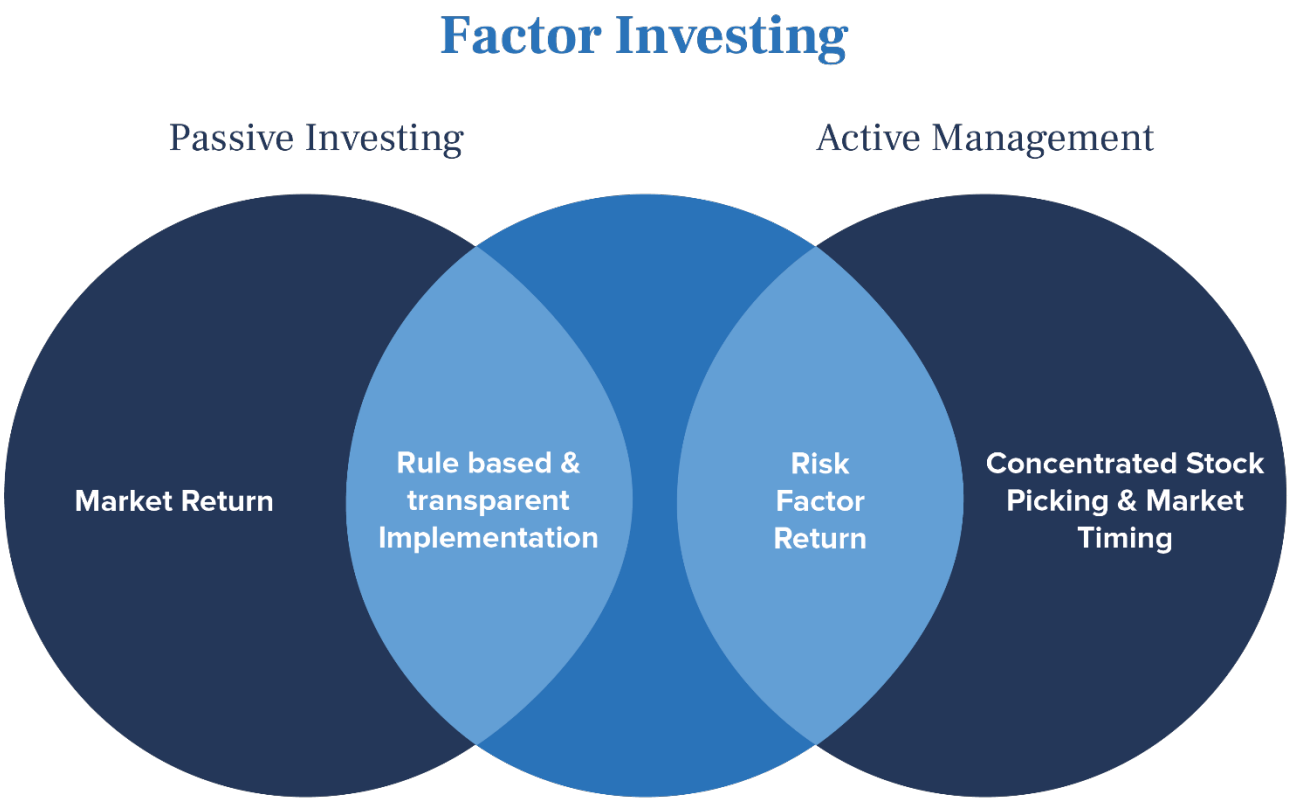
Introduction

Why Factor Investing?

Traditionally, the world of investments was divided into two main schools of thought: active- and passive strategies. Active investors, who have been around for thousands of years, view themselves as pioneers, always striving to outperform the market's average returns by navigating the complex landscape of short-term price fluctuations. They face a lot of uncertainty but are perceived to have confidence in their ability to select securities and time the market movements to ultimately outperform the market.

In contrast, passive investing, a more recent approach, has revolutionised the investing world. It involves tracking market-cap-based indices and is grounded in the principle of mirroring market movements. These indices assign more weight to larger companies based on higher stock prices, more shares in circulation, or a combination of these factors. As a result, a company with higher market capitalisation will have a more significant influence on the index's overall value, while smaller companies with lower market capitalisations will have less impact.

In this research paper, we consider a third approach that bridges the gap between active and passive strategies, called factor investing. Factor investing shares the belief with passive investing that market prices are generally efficient and outsmarting the market is a formidable challenge. However, it introduces a systematic, rules-based approach to target specific market segments with the potential for higher returns.



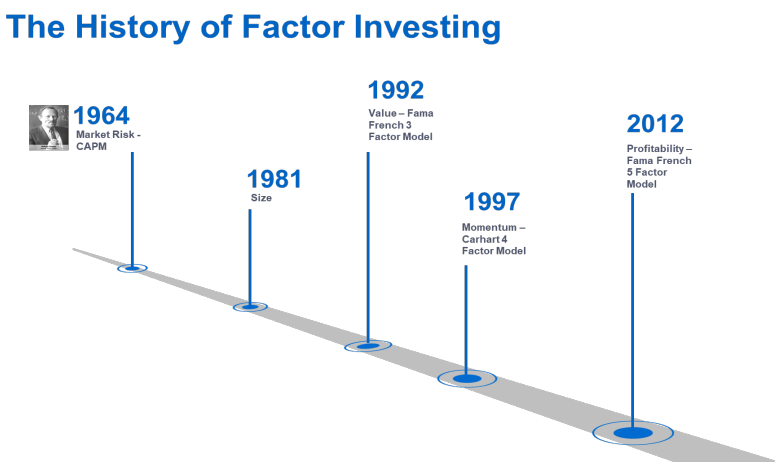
(MSCI, 2013)

Defining Risk Factors and their Evolution

Before we delve into the analytical aspects of this research, let's establish a foundational understanding of risk factors and their development over time. Risk factors, in essence, are underlying characteristics or attributes that help explain how the returns of an asset class behave. They are quantifiable traits such as a stock's relative price (i.e. value), size, momentum, quality, and low volatility, each possessing a unique ability to clarify and forecast stock performance.

The concept of factor investing traces its origins to early financial theories, notably the Capital Asset Pricing Model (CAPM) conceived by prominent economists in the 1960s. CAPM suggested that an asset's sensitivity to the market, commonly known as its Beta, should explain an asset's return.

However, as the timeline below illustrates, the landscape of investment theory has evolved significantly over the years. Researchers began to explore factors beyond market risk to comprehensively understand stock market behaviour.



In 1981, Rolf Banz published a groundbreaking paper titled "The Relationship Between Return and Market Value of Common Stocks." In this work, he documented the phenomenon of small-cap stocks outperforming large-cap stocks, laying the groundwork for subsequent factor investing research.

Fast forward to 1992, when Eugene Fama and Kenneth French revolutionised factor investing with their influential three-factor model. This model not only acknowledged the significance of the market portfolio but also highlighted the importance of a firm's Size (S) and Value (V) as crucial drivers of returns. Subsequently, in 1997, Carhart expanded the factor landscape by introducing the momentum risk factor.

In recent years, this journey through financial theory has continued to evolve. In 2012, Fama and French expanded their three-factor model to include two additional factors: operating Profitability and Investment.

Today, factor investing has become a buzzword in the investment industry, with academics and institutions identifying hundreds of risk factors. In this paper, we will focus on some of the established risk factors to provide a better understanding of factor investing in general.

The Different Factors

In the wake of the Capital Asset Pricing Model (CAPM) and the acknowledgement of market Beta as a crucial factor influencing expected investment returns, researchers became obsessed with discovering additional factors that could potentially yield higher returns beyond the broad market. One notable study by Harvey and his colleagues in 2016 compiled a list of over 300 factors proposed as contributors to what appeared to be significant excess returns.

However, the extensive list of factors, while intriguing, faced a formidable challenge: statistical significance. Harvey's 2016 findings revealed that many of these factors failed to meet the established threshold for statistical significance, typically characterised by a t-statistic of 2.0 or higher. In statistical terms, a higher t-value signifies increased confidence in the coefficient as a predictor, while a lower t-value suggests a greater similarity between the two sample sets. The threshold of 2.0 is widely considered the benchmark for significance. Consequently, only a select few factors gained favour among investors and portfolio managers -those factors that could genuinely enhance the value of a portfolio. It's worth noting that when incorporated into a portfolio, many factors tend to lose their effectiveness over time.

As a result, while the list of potential factors may seem endless, practical application tends to gravitate toward a set of well-established ones, as illustrated in the table below. These factors have demonstrated their ability to influence investment outcomes positively, offering valuable opportunities for those seeking to optimise their portfolios.

The Main Factors

The table below summarises the most established factors in the industry and the most common metrics used to evaluate the specific factors.

Systematic Factors	Factor profile	Commonly Captured by
Value	Captures excess returns to stocks that have low prices relative to their fundamental value	Book to price, earnings to price, book value, sales, earnings, cash earnings, net profit, dividends, cash flow
Size	Captures excess returns of smaller firms (by market capitalisation) relative to their larger counterparts	Market capitalisation
Momentum	Reflects excess returns to stocks with stronger past performance	Relative returns (usually 12 months with the last month excluded)
Low Volatility	Captures excess returns to stocks with lower-than-average volatility, Beta, and/or idiosyncratic risk	Standard deviation (1-yr, 2-yrs, 3-yrs), Downside standard deviation, standard deviation of idiosyncratic returns, Beta
Dividend Yield	Captures excess returns to stocks that have higher-than-average dividend yields	Dividend yield
Quality	Captures excess returns to stocks that are characterised by low debt, stable earnings growth, and other 'quality' metrics	ROE, earnings stability, dividend growth stability, the strength of balance sheet, financial leverage, accounting policies, strength of management, accruals, cash flows
Profitability	Capture excess returns to stocks with efficient operational profits	Return on Assets, Gross profit margin, Gross profitability, Asset Turnover

(MSCI, 2013)

In this research paper, we use 'Quality' and 'Profitability' interchangeably, mirroring their common usage in the industry. While acknowledging their close alignment. Upcoming research will explore 'Profitability' in greater depth as a distinct factor.

What Drives Factor Returns

Understanding the mechanisms behind factor returns is complex, involving insights from both systematic risk theory and behavioural finance.

Systematic risk

Systematic factors play a crucial role in determining factor returns. These inherent risks, unique to certain market characteristics, are not easily diversifiable. This aligns with the efficient market hypothesis, which posits that markets are generally efficient, and investors behave rationally.

Take, for example, the size premium associated with investing in smaller companies. Such investments are often marked by limited liquidity, less transparency, and higher volatility. Systematic risk theory suggests that to compensate for these heightened risks, investors expect and demand higher returns. This expectation forms the bedrock of why smaller firms might offer better investment opportunities despite their apparent risks.

Behavioural Biases

In the second perspective, the focus turns to the field of behavioural finance. This theory suggests that investors often exhibit systematic errors, more commonly described as behavioural biases, that stem from cognitive or emotional vulnerabilities. These biases manifest as behaviours like chasing recent winners, overreacting to market movements, displaying overconfidence, and favouring familiar investments.

The table below summarises the different systematic risks and behavioural theories associated with its respective risk factor.

Systematic Factors	Systematic Risk-based Theories	Behavioural-based Theories
Value	Higher systematic (business cycle) risk	• Errors-in-expectations • Loss aversion • Investment-flows-based theory
Low Size (Small Cap)	• Higher systematic (business cycle) risk • Proxy for other types of systematic risk	Errors-in-expectations
Momentum	• Higher systematic (business cycle) risk • Higher systematic tail risk	• Underreaction and overreaction • Investment-flows-based theory
Low Volatility	N/A	• Lottery effect • Overconfidence effect • Leverage aversion
Dividend Yield	Higher systematic (business cycle) risk	Errors-in-expectations
Quality	N/A	Errors-in-expectations[19]

(MSCI, 2013)

The valuation Theory: The Foundation of Factor Returns

While there are different opinions over whether factor returns are propelled by systematic risk or behavioural biases, one essential perspective prevails - it doesn't fundamentally matter. Regardless of the underlying driving forces, a critical lens to analyse factor returns involves turning to what is known as the valuation theory which offers a clearer and more robust theoretical foundation for understanding the associated premiums.

Valuation theory suggests that an asset's fair price (V) should reflect the expected future cash flows discounted to present value. A formula commonly expressed as:

$$\boldsymbol{V = \sum(\ CF)/i}$$

The discount rate (i) equals an investor's expected return. Therefore, as long as stocks have different expected returns, those with lower prices and higher expected cash flows should have higher expected returns. Factors like value, size and profitability for example, which have demonstrated their historical ability to outperform, can be more comprehensively understood through this lens. In essence, it underscores that these factors offer premiums not merely due to risk or behavioural phenomena but because they align with the core principles of asset valuation. This perspective adds depth and robustness to our comprehension of factor returns, reinforcing their significance.

Absolute Factor Returns

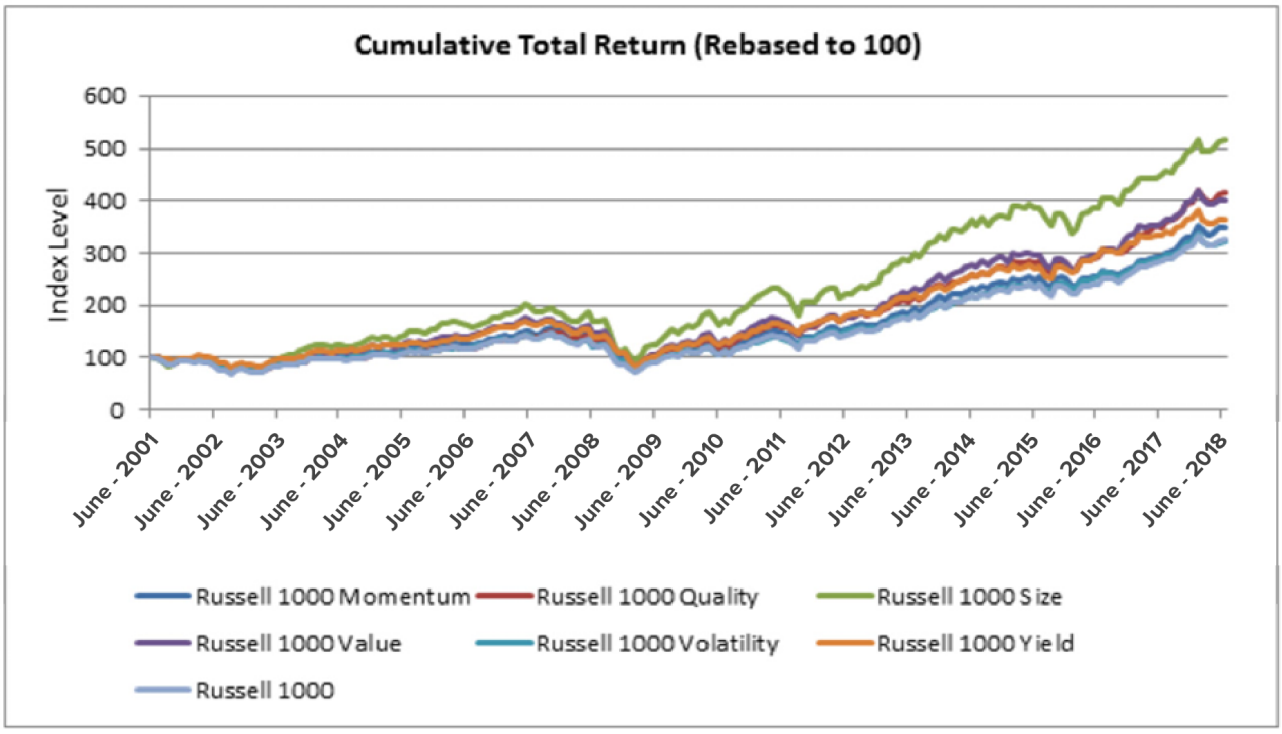
All the theories we've explored so far focus on how certain risk factors can, in theory, bring in extra returns on your investment. While having a solid theoretical foundation is essential, it's equally important to understand that achieving these theoretical premiums isn't always straightforward in the real world. Let's dive into the difference between the absolute returns, also known as paper returns, and what we can realistically achieve in our investment portfolios, also known as realised portfolio returns.

Understanding factor investing involves recognising the gap between absolute returns and actual, achievable returns. Absolute returns are pure metrics indicating how risk factors might perform in isolation. They are theoretical constructs that don't account for real-world elements such as transaction costs and turnover that can diminish returns.

When we analyse absolute returns statistically, we take a dual perspective. The first approach is to compare absolute returns between different factors, while the second approach focuses on one factor at a time, but at different levels of exposure.

1. Historical Performance of Factors

The chart below illustrates the absolute returns for different factors, using the Russell 1000 as our benchmark for comparison. This approach allows us to understand how each factor performs relative to an index with a more diverse composition.



*Source: FTSE Russell Data from June 2001 to June 18. Past performance is no guarantee of future results. Returns shown prior to index launch represent hypothetical historical data.. *Please see end of article and full paper for important legal disclosures.*

(Cumulative_total_return_pg10)

When we take a close look at the data over the specified time frame, it's clear that the Size factor has consistently delivered strong performance, outperforming other factors. Following closely behind are Value and Quality, which have shown relatively similar performance trends. Surprisingly, Momentum appears to have lagged behind during this period.

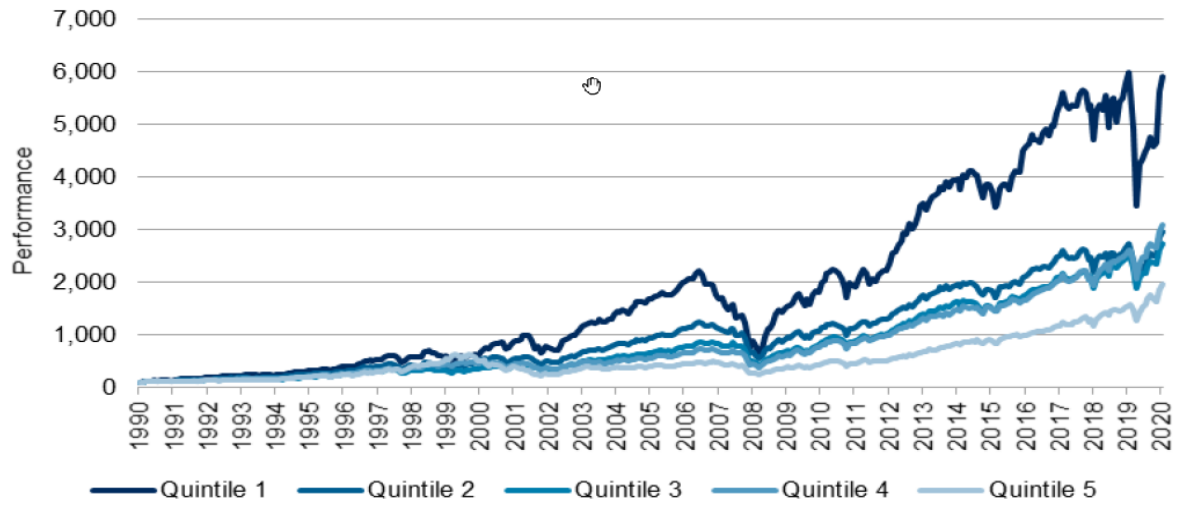
On the defensive side of things, both the Volatility and Yield factors have generally fallen behind the other factors. However, they have managed to slightly outperform the market index.

2. Factor Performance Through Varying Exposures

The second method for assessing a factor's effectiveness involves adjusting the factor exposure within a specific index and then analysing how it impacts performance. In our analysis, we refer to a study conducted by S&P. To conduct this assessment, we sort historical data of the S&P 500 constituents based on each factor and create equal-weighted quintiles using these sorted factor values. Quintile 1 includes stocks with the highest factor exposure, while Quintile 5 consists of stocks with the lowest factor exposure. This approach provides a better perspective on how factors perform under varying weightage scenarios.

i. Value

Top Value Quintile Outperformed



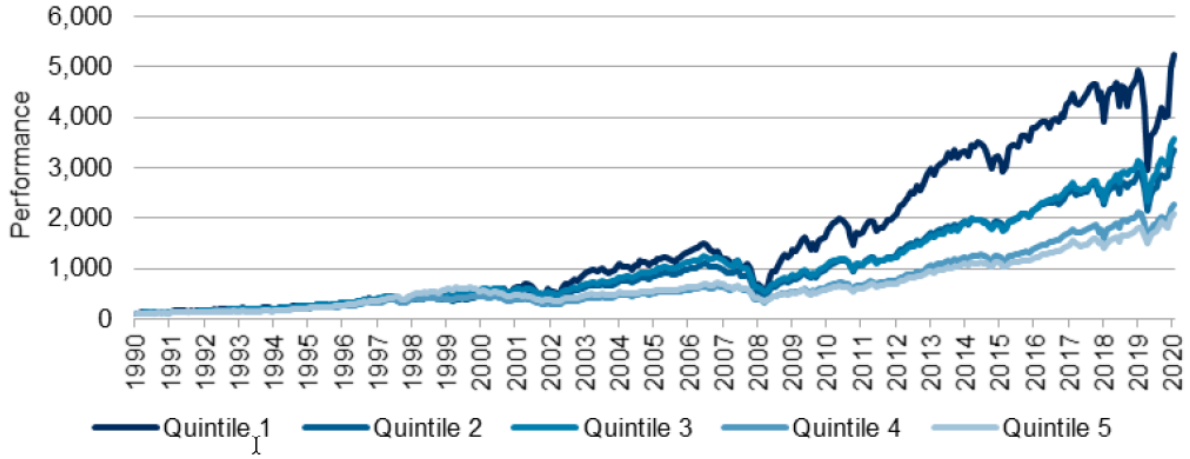
Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Chart is provided for illustrative purposes.

(S&P Global, 2021)

When we look at how the Value factor performs through quintile distribution, a clear correlation with weightage emerges. Quintile 1, featuring the most inexpensive stocks, has shown significant outperformance. Quintiles 2, 3, and 4 exhibit similar performance with minimal distinctions. Quintile 5, however, lags notably behind, highlighting a substantial gap between Quintile 1 and Quintile 5. This aligns with the principle that cheaper stocks tend to perform better over the long term, confirming the effectiveness of the Value factor.

ii. Size

Top Size Quintile Outperformed



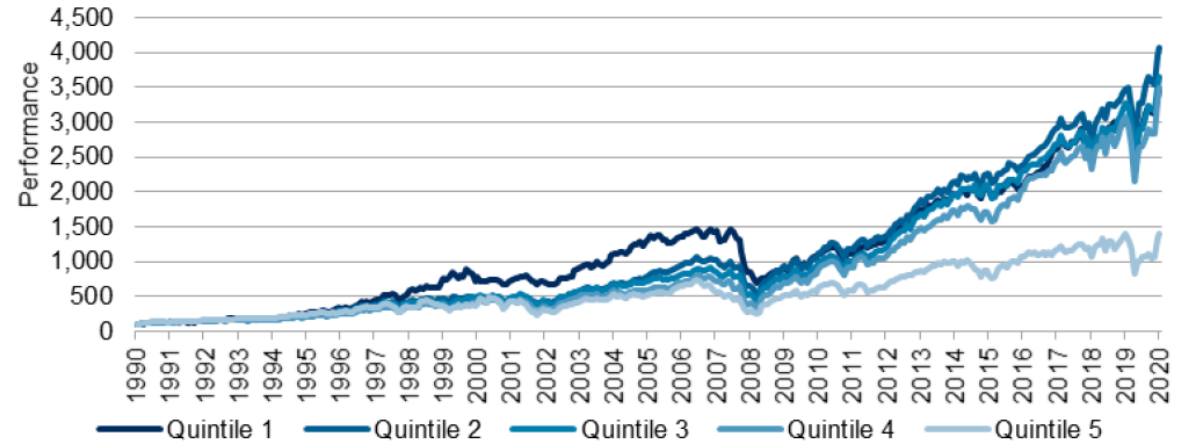
Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Chart is provided for illustrative purposes.

(S&P Global, 2021)

Similar to the Value factor, the Size factor shows that constructing portfolios with a focus on the top quintile, aligns with stronger historical performance.

iii. Momentum

Bottom Momentum Quintile Underperformed Significantly



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Chart is provided for illustrative purposes

(S&P Global, 2021)

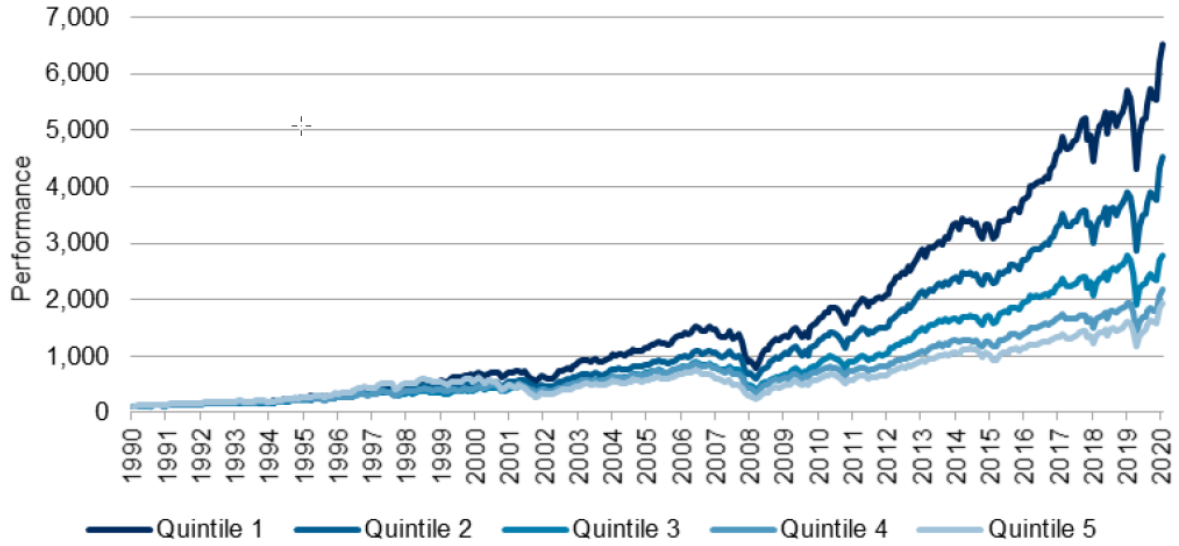
Momentum investors aim to acquire stocks that have demonstrated strong recent performance while actively avoiding those that have shown weaker performance.
The Momentum factor is generally calculated by analysing 12 months of data beginning 13 months prior, effectively avoiding the one-month reversal effect. Additionally, the momentum scores for each security are adjusted to account for risk.

Upon analysing the quintile analysis for Momentum (as seen in Exhibit M1), it becomes

strikingly clear that an exclusionary approach to portfolio construction is highly recommended. Notably, the returns of Quintiles 1 through 4 exhibit close clustering, while Quintile 5 shows a significant underperformance. Therefore, it is paramount to stress the necessity of steering clear of the lowest-momentum stocks, as this proves to be a critical aspect of effective factor-based investing.

iv. Quality

Top Quality Quintile Outperformed



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Chart is provided for illustrative purposes.

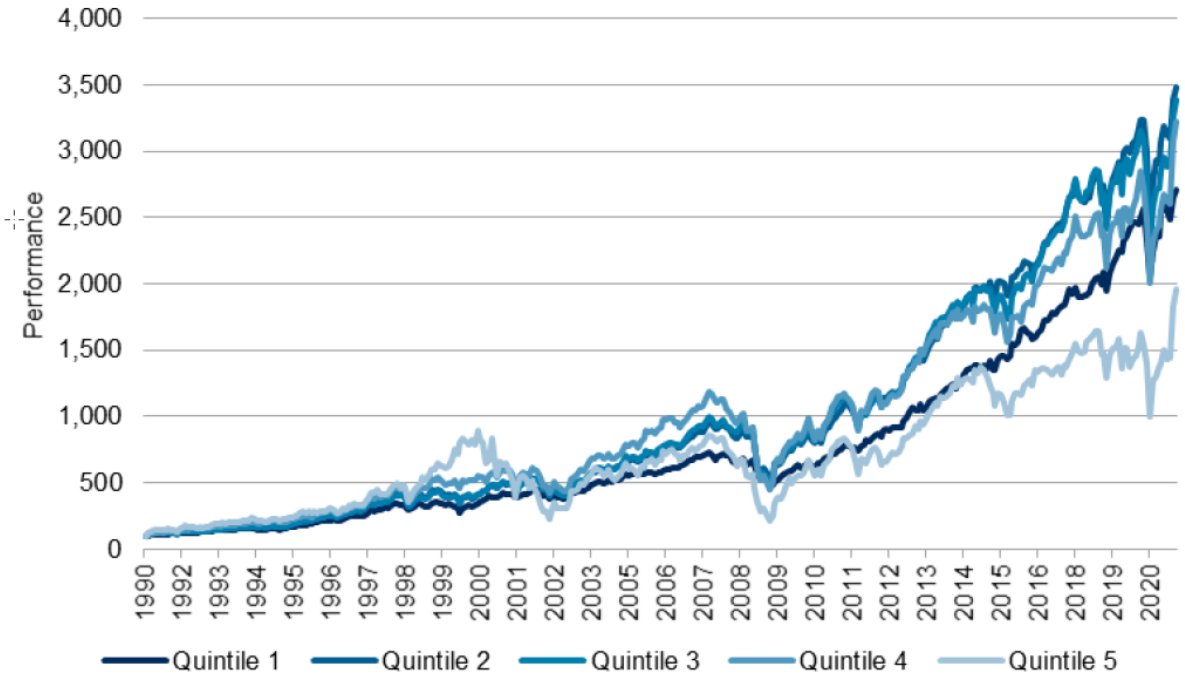
(S&P Global, 2021)

In contrast to some other well-established factors like Size or Momentum, defining quality remains less standardised. Typically, quality is associated with metrics related to profitability, encompassing factors such as cash flow generation, earnings stability, growth, and financial strength. It's essential to view quality as an attribute of a company rather than a characteristic tied solely to its stock.

Quality measures aim to pinpoint companies with strong profitability and minimal balance sheet leverage. Generally, high-quality companies adopt prudent and effective capital structures that support consistent growth, increased revenue, and robust cash flow.
As depicted in Exhibit Q1, historical data suggests that investors have historically reaped rewards by investing in high-quality stocks. Over extended periods, the top-quality quintile of stocks has consistently outperformed others, with subsequent quintiles exhibiting progressively lower returns.

v. Low Volatility

The High Volatility Quintile Significantly Underperformed



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Chart is provided for illustrative purposes.

(S&P Global, 2021)

The concept of Low Volatility gained widespread recognition, particularly in the wake of the 2008 global financial crisis. This strategy centres around reducing risk relative to the benchmark index. Consequently, it tends to soften the impact of market fluctuations, which can result in underperformance during bullish market phases and outperformance during bearish periods.

When we examine the performance of Low Volatility strategies, as depicted in the accompanying chart, a clear pattern emerges. High volatility funds tend to underperform, affirming the effectiveness of Low Volatility strategies in delivering more stable and resilient returns over time.

Among all factors, strategies tied to Volatility and Beta maintain an especially explicit connection to overall market performance.

Summary: In our comprehensive analysis of various factors through quintile-based performance evaluation, distinct patterns and behaviours emerged. The Value factor exhibited a strong positive correlation between quintiles, with the cheapest stocks (Quintile 1) significantly outperforming the rest. Size, similarly, demonstrated a top-quintile approach, showcasing the outperformance of smaller companies over the long term. Quality, on the other hand, showed progressive underperformance from Quintile 1 to Quintile 5, affirming the notion that high-quality stocks tend to outshine their counterparts. Momentum displayed the importance of avoiding the lowest-momentum stocks rather than concentrating solely on the highest-momentum ones. Lastly, Low Volatility strategies proved effective in providing more

stable and resilient returns, with high volatility funds consistently underperforming. These findings highlight the nuanced behaviour of various factors and emphasise the importance of tailored factor allocation strategies for investors.

Factors' Cyclical Nature

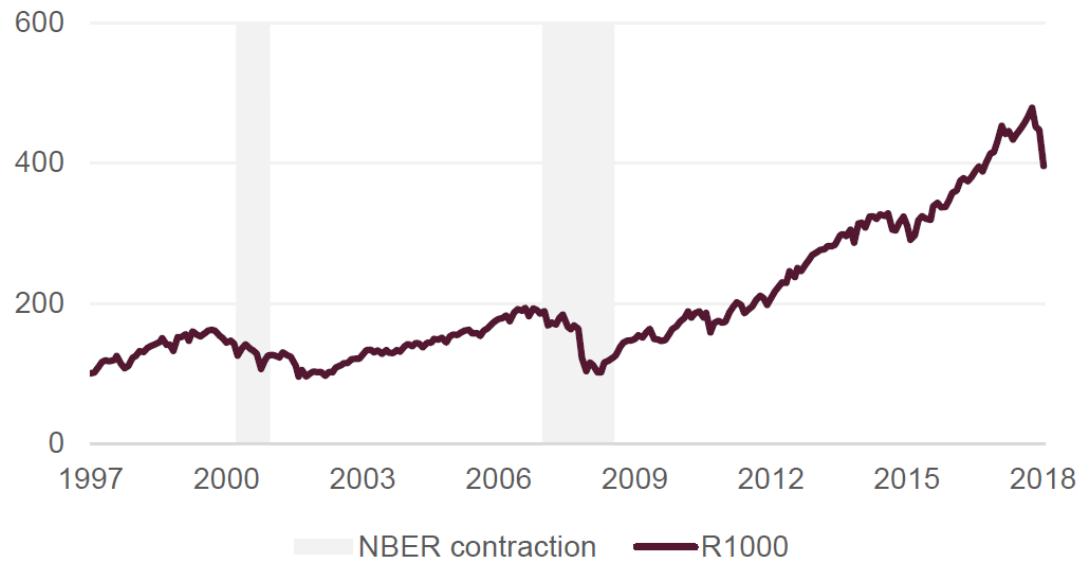
Building on our examination of absolute returns, it's imperative to acknowledge that these returns are not static. Instead, they fluctuate in response to factors' cyclical patterns, significantly influencing investment outcomes. In their simplest form, investors might assume that factors consistently outperform the market-cap-weighted index, forming the basis for their expectations. However, these expectations often collide with the reality of factor returns, which are marked by a pronounced cyclical nature. Some factors are more sensitive to these cycles than others, making them susceptible to underperformance against the broader market for extended periods.

Crucially, the impact of these cyclical trends isn't uniform across all factors. They respond differently to varying economic and market conditions, introducing diversity into their performance behaviours. This diversity underscores the significance of diversification as a risk management strategy. By incorporating multiple factors into an investment approach, investors can potentially mitigate the duration and severity of underperformance periods and enhance the overall resilience of their portfolios.

With this understanding as our backdrop, we will now delve into the statistical data and analysis to substantiate the cyclical nature of factors and provide insights into their distinct responses to changing economic and market landscapes.

As one can expect, the cyclical nature of factors significantly influences their returns. To quantify this phenomenon, we turn to a research paper from FTSE Russell (FTSE Russell, 2019), which provides a comprehensive analysis of how various factors performed under different economic conditions, including economic troughs and peaks, compared to the cumulative performance of the Russell 1000 index.

Russell 1000 Index cumulative returns (%)

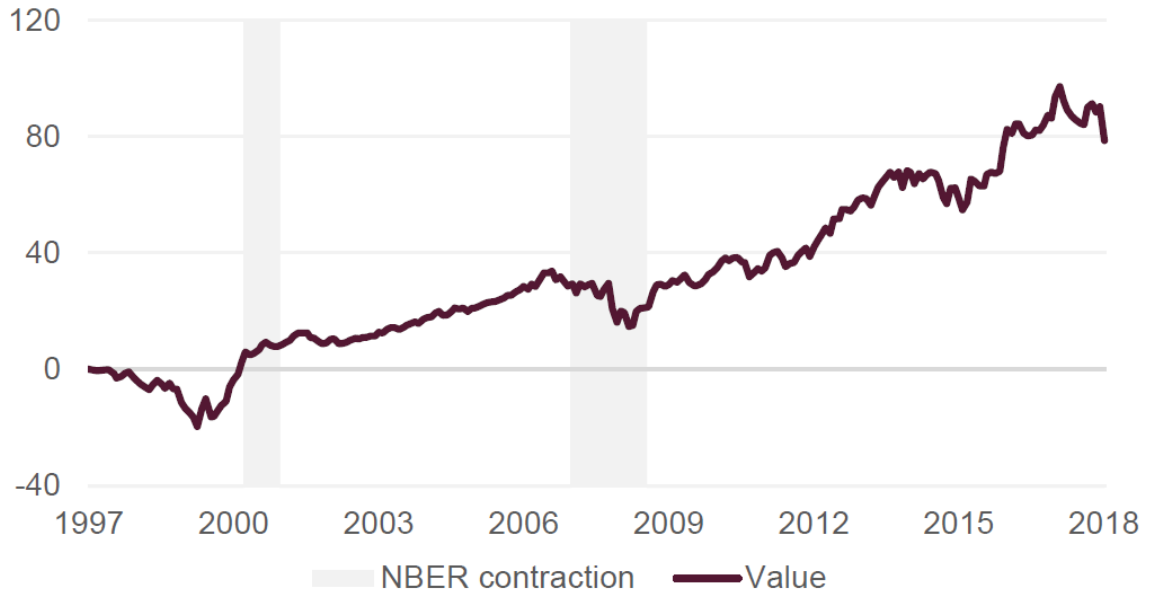


(FTSE Russell, 2019)

The chart above illustrates the performance of the Russell 1000 index from 1998, encompassing periods of economic troughs (recessions) as identified by the US National Bureau of Economic Research. As expected, the markets experienced downturns during

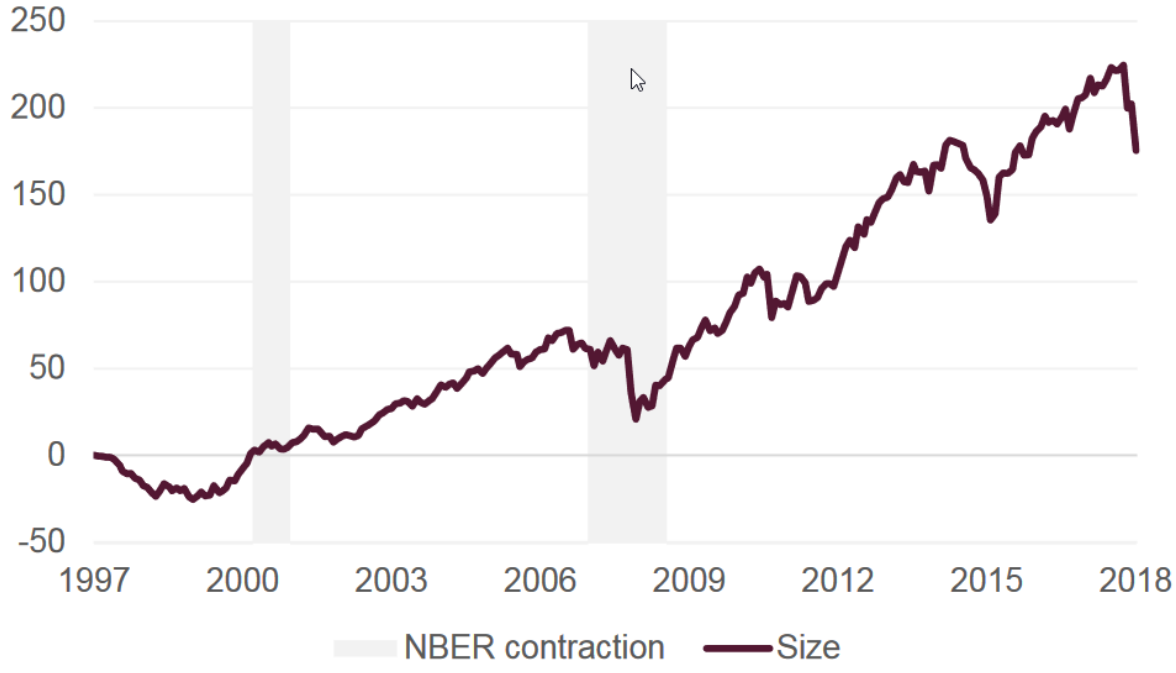
these recessionary phases. To delve deeper into factor behaviours amidst prevailing market conditions, let's begin by examining the responses of Size, Value, and Momentum factors.

Value factor index - excess cumulative returns (%)



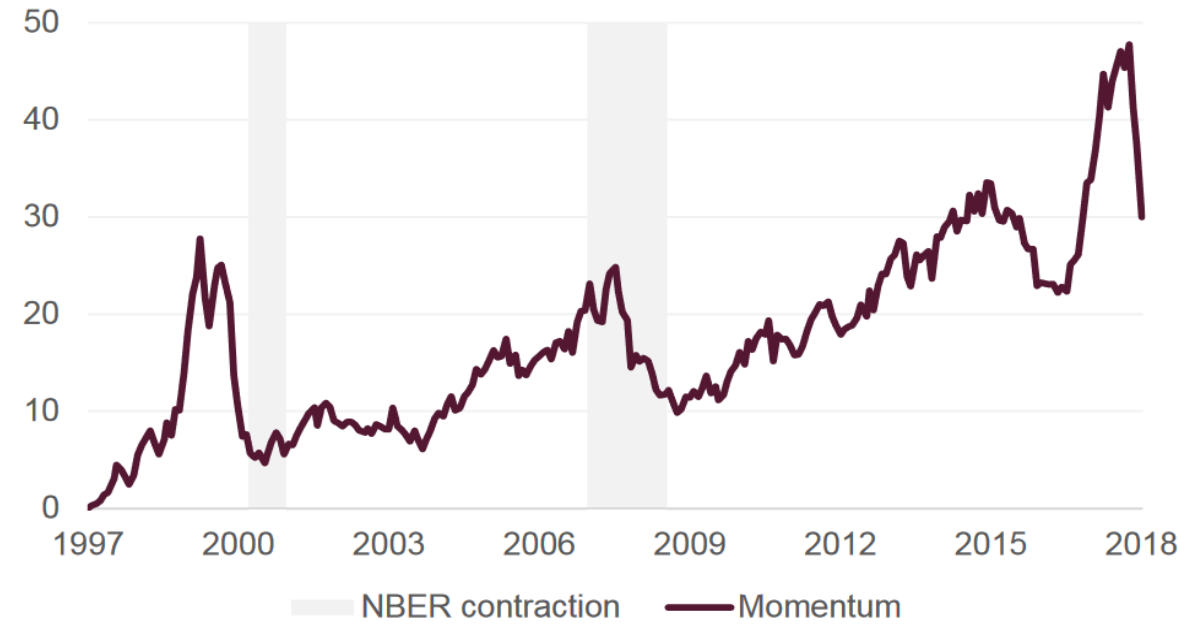
(FTSE Russell, 2019)

Size factor index - excess cumulative returns (%)



(FTSE Russell, 2019)

Momentum factor index - excess cumulative returns (%)

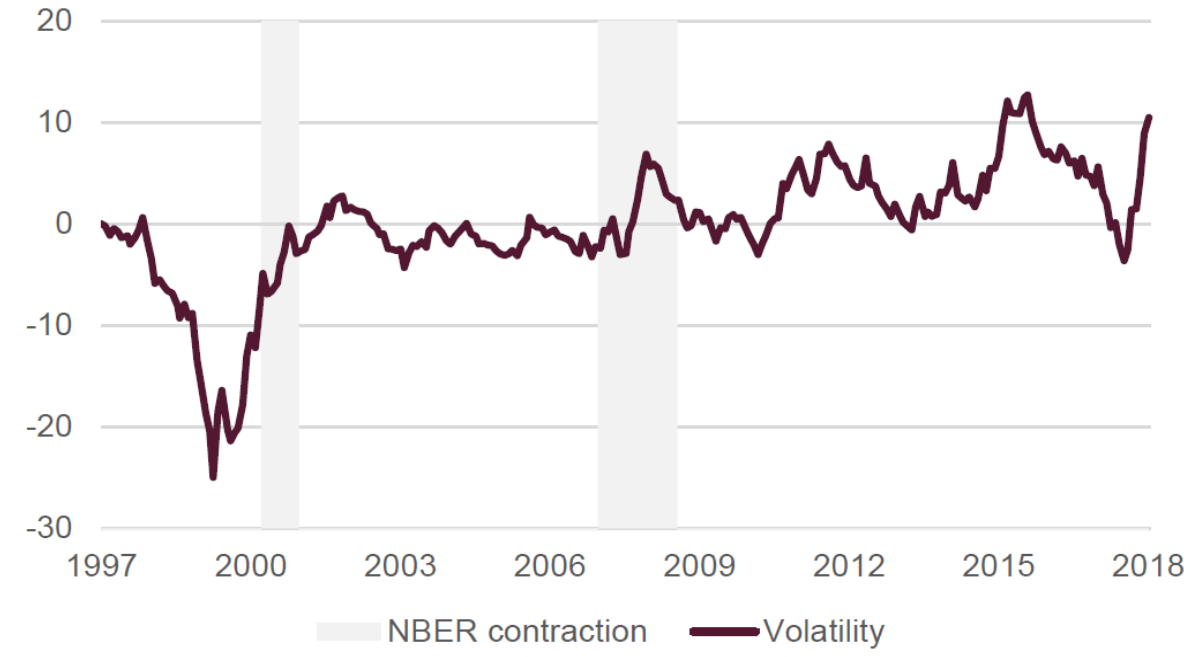


(FTSE Russell, 2019)

From 1997 to 2018, the individual charts reveal how the Size, Value, and Momentum factors captured market movements during both rising and falling market conditions. Notably, during contractions, cyclical factors such as Size, Value, and Momentum tended to underperform.

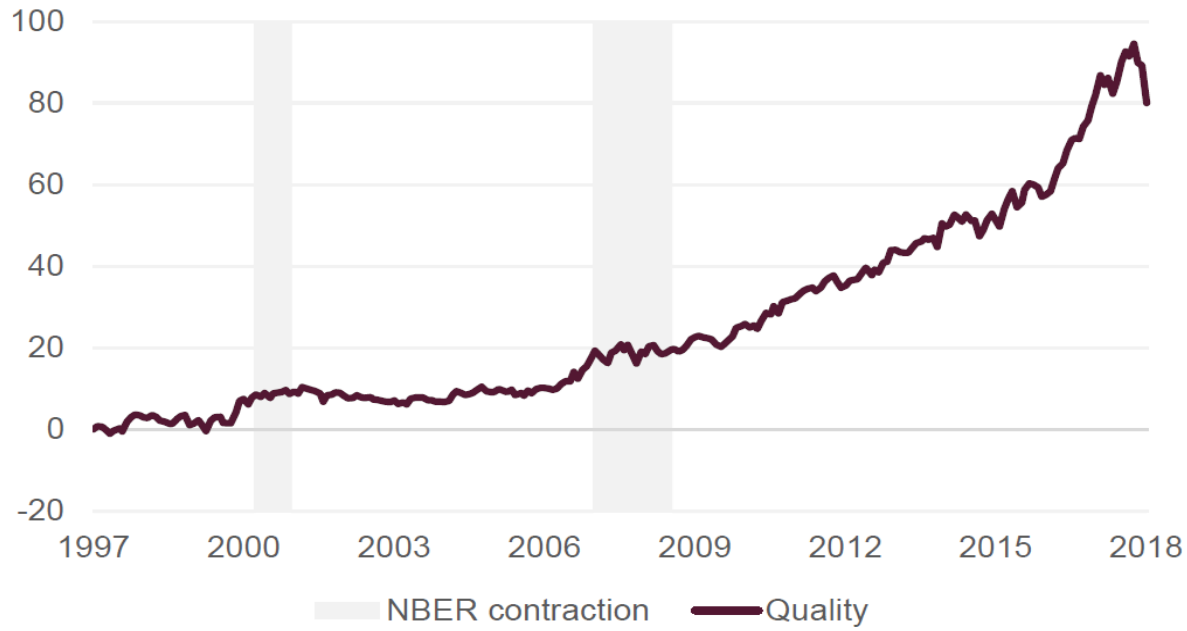
On the other hand, defensive factors, namely Quality and Volatility, displayed a different pattern.

Volatility factor index - excess cumulative returns (%)



(FTSE Russell, 2019)

Quality factor index - excess cumulative returns (%)



(FTSE Russell, 2019)

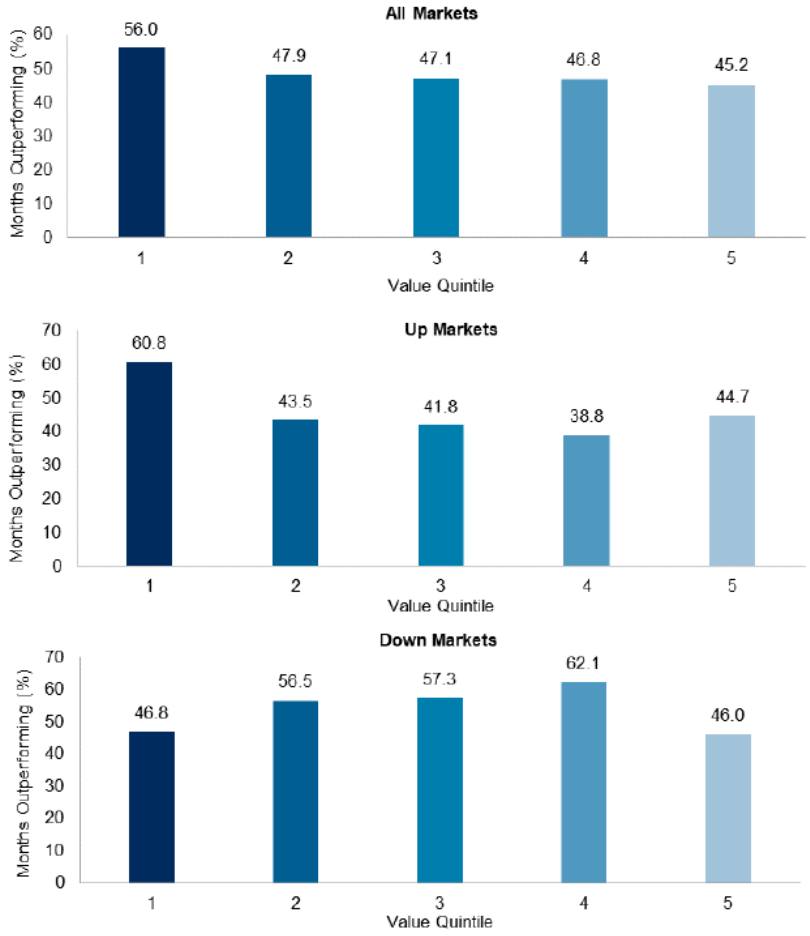
These charts illustrate the performance of the Volatility and Quality factors during the same period. As anticipated, defensive factors generally outperformed during economic contractions. However, it's essential to note that while the shaded regions represent official recession dates defined by the NBER, real economic contractions may occur sometime after an economic or financial shock.

To gain deeper insights into the cyclical nature of factors and how they perform under varying market conditions, we turn to the Quintile analysis from S&P (S&P Global, 2021), which employs a methodology consistent with what we used to previously examine absolute returns.

i. Value

Value Did Better in Rising Markets

Exhibit V2: Value Did Better in Rising Markets



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Charts are provided for illustrative purposes.

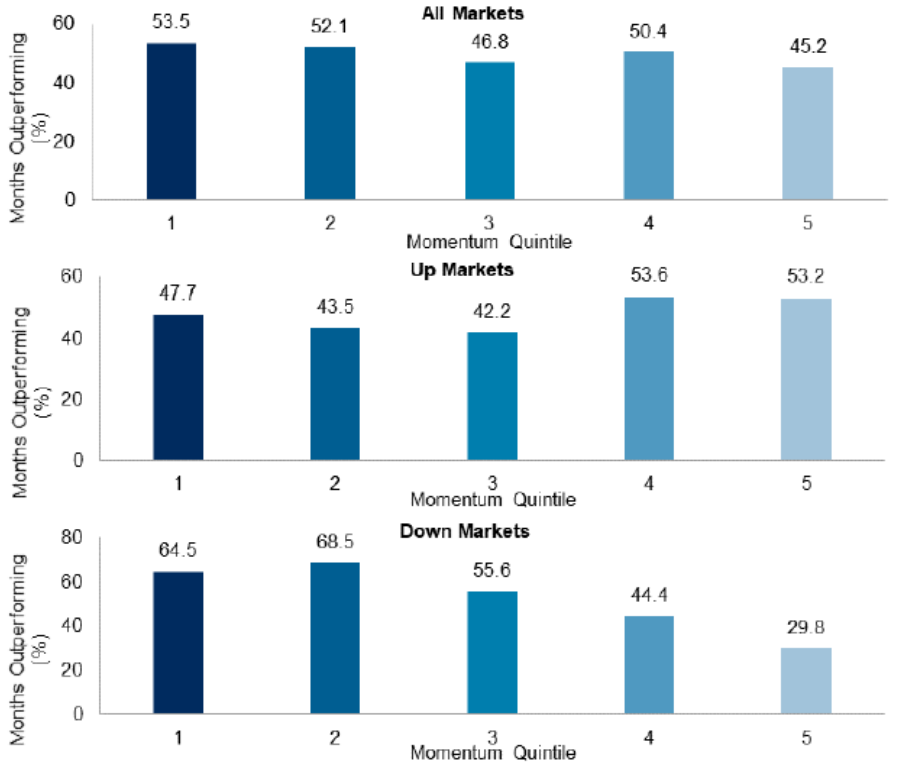
(S&P Global, 2021)

We begin by examining the performance of different Value Quintiles during all market conditions, up market conditions, and down market conditions from 1990 to 2020. The results highlight that Value factors are not consistent performers but are closely tied to the broader market environment.

- Quintile 1 demonstrated its prowess in rising markets, emerging as the top performer. However, this outperformance was not consistent and strongly correlated with the overall market climate.
- In down market conditions, Quintile 1 showed a different side, underperforming compared to its stellar performance in up markets.

ii. Momentum

Momentum Did Better During Down Markets



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Charts are provided for illustrative purposes.

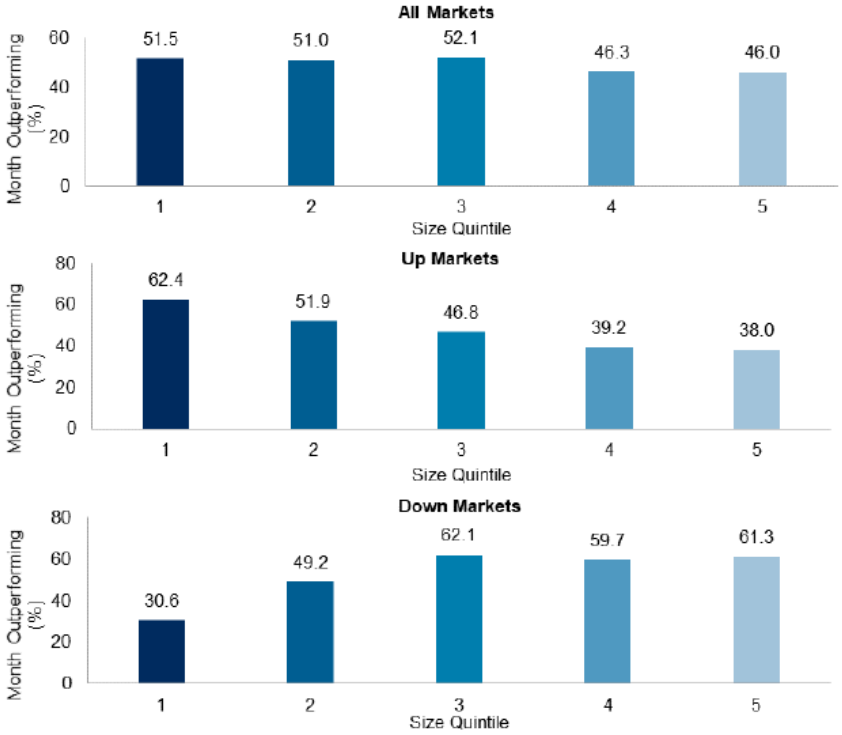
(S&P Global, 2021)

The analysis of Momentum Quintiles during various market conditions from 1990 to 2020 reveals intriguing patterns in factor behaviour.

- The top Momentum quintiles displayed defensive characteristics when examined across different market environments.
- Quintiles 1 and 2 excelled during months when the benchmark return was negative, showcasing their resilience.
- Conversely, Quintiles 4 and 5 demonstrated superior performance when markets were on an upswing.

iii. Size

Size Did Better in Rising Markets



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Charts are provided for illustrative purposes.

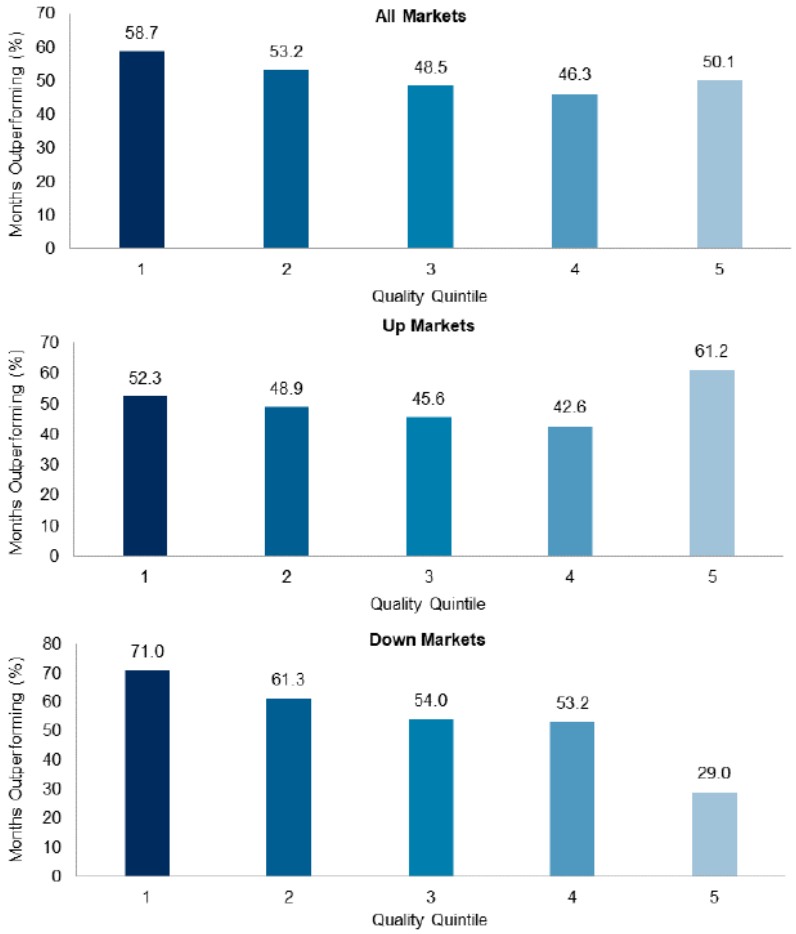
(S&P Global, 2021)

Exploring different Size Quintiles during varying market conditions from 1990 to 2020 provides valuable insights.

- Quintile 1, representing the smallest companies, tended to outperform in months when the benchmark return was positive. Historically, it outperformed 62% of the time.
- Interestingly, this quintile was the least defensive among the Size quintiles.

iv. Quality

Quality Had Asymmetric Performance in Rising and Declining Markets



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Charts are provided for illustrative purposes.

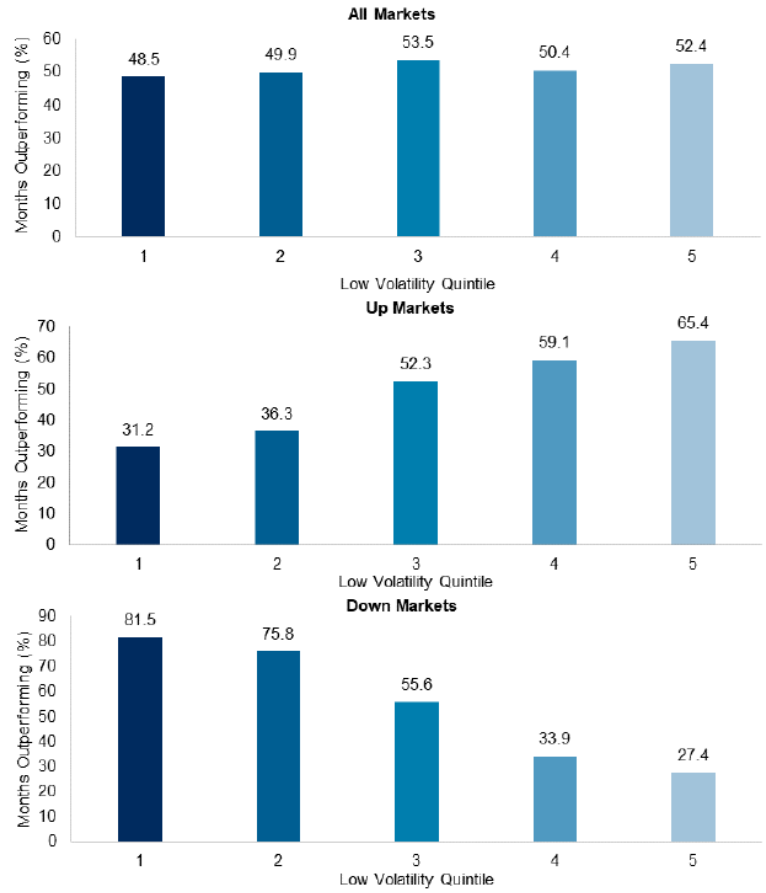
(S&P Global, 2021)

Delving into the performance of different Quality Quintiles during diverse market conditions from 1990 to 2020 reveals asymmetric behaviour.

- High-quality stocks consistently had a higher likelihood of outperforming the market.
- Notably, their outperformance during market declines was particularly impressive.
- The asymmetric performance of top and bottom quintiles in rising and declining markets suggests that quality stocks are sensitive to market conditions.

v. Low Volatility

Volatility Strategies Were Tied to the Overall Market



Source: S&P Dow Jones Indices LLC, FactSet. Data from Dec. 31, 1990, through Dec. 31, 2020. Past performance is no guarantee of future results. Quintiles shown are hypothetical. Charts are provided for illustrative purposes.

(S&P Global, 2021)

The analysis of different Low Volatility Quintiles during various market conditions from 1990 to 2020 provides valuable insights.

- In up markets, the high volatility quintile had the highest hit rate, outperforming the benchmark in 65% of the months.
- Conversely, during down markets, the lowest volatility quintile displayed its resilience, outperforming in 82% of the months.

The findings from the S&P report align closely with those from the FTSE Russell report, providing further evidence of the cyclical nature of factors. While their behaviour generally follows the same trends, the degree of cyclicality varies among them.

Additionally, it's worth noting that the defensive factors exhibit stronger performance in down market conditions, as expected. While Quintile 1 Low Volatility displayed pronounced underperformance in up-market conditions, Quintile 1 Quality exhibited commendable performance in such conditions.

Risk and Return Characteristics

As illustrated in the previous section, Factor investing offers promising theoretical formulas. However, practical applications present a complex landscape where theory and reality converge. While factor indexes generate absolute returns, transforming these into tangible investor gains involves grappling with intricacies such as implementation costs, return capture efficiency, and other crucial nuances. In this context, understanding realised returns becomes a paramount pursuit.

The key aspect to consider when measuring absolute returns is the risk associated with achieving it. For this exercise, we are focussing on maximum drawdown as a measure of risk.

Continuing with the Russell 1000 index for reference, the factor performance statistics are given below.

	Russell 1000	Value	Size	Momentum	Volatility	Quality	Yield
Absolute							
Arithmetic Return % p.a.	8.12	8.98	10.27	8.46	7.98	8.80	8.36
Volatility % p.a.	17.30	17.27	19.32	17.29	15.76	16.17	15.89
Geo. Return % p.a.	6.77	7.70	8.65	7.14	6.90	7.71	7.29
Return/Risk Ratio	0.39	0.45	0.45	0.41	0.44	0.48	0.46
Max Drawdown %	-47.6	-48.9	-53.4	-45.5	-44.5	-41.9	-49.0
Turnover % p.a.	12.5	39.3	37.3	81.2	14.6	34.9	23.4
Relative to Benchmark							
Arithmetic Excess Return % p.a.	--	0.87	2.16	0.35	-0.14	0.68	0.25
Geometric Excess Return % p.a.	--	0.87	1.76	0.35	0.12	0.88	0.49
Volatility Reduction % p.a.	--	0.17	-11.68	0.06	8.90	6.53	8.15
Tracking Error % p.a.	--	2.89	5.12	2.89	2.98	2.37	5.65
Information Ratio	--	0.30	0.34	0.12	0.04	0.37	0.09

Source: FTSE Russell. Data from December 1997 to December 2018. Data based on the Russell 1000 Index universe. All results based on back-tested data. Past performance is no guarantee of future results. Please see end for important legal disclosures.

(FTSE Russell, 2019)

The table presents a comparative analysis of different investment factors against the Russell 1000 benchmark over a given period. The arithmetic return, which calculates the simple average of annual returns, shows that cyclical factors - Value, Size, and Momentum - have outperformed the benchmark. This suggests they tend to do well during times of economic growth. Among the defensive factors, Volatility has underperformed the benchmark, while Quality and Yield have surpassed it, with Quality notably achieving a return of 8.80%, suggesting that these factors may provide a buffer during market volatility while still contributing positively to performance.

Turning to the measure of volatility, which assesses the fluctuation in trading prices, we observe that Value and Momentum align closely with the benchmark's volatility, whereas Size shows a greater degree of volatility, indicating a higher risk profile. Defensive factors, such as Volatility, Quality, and Yield, show lower volatility percentages. Despite its underperformance in returns, the Volatility factor lives up to its defensive classification by having the lowest volatility.

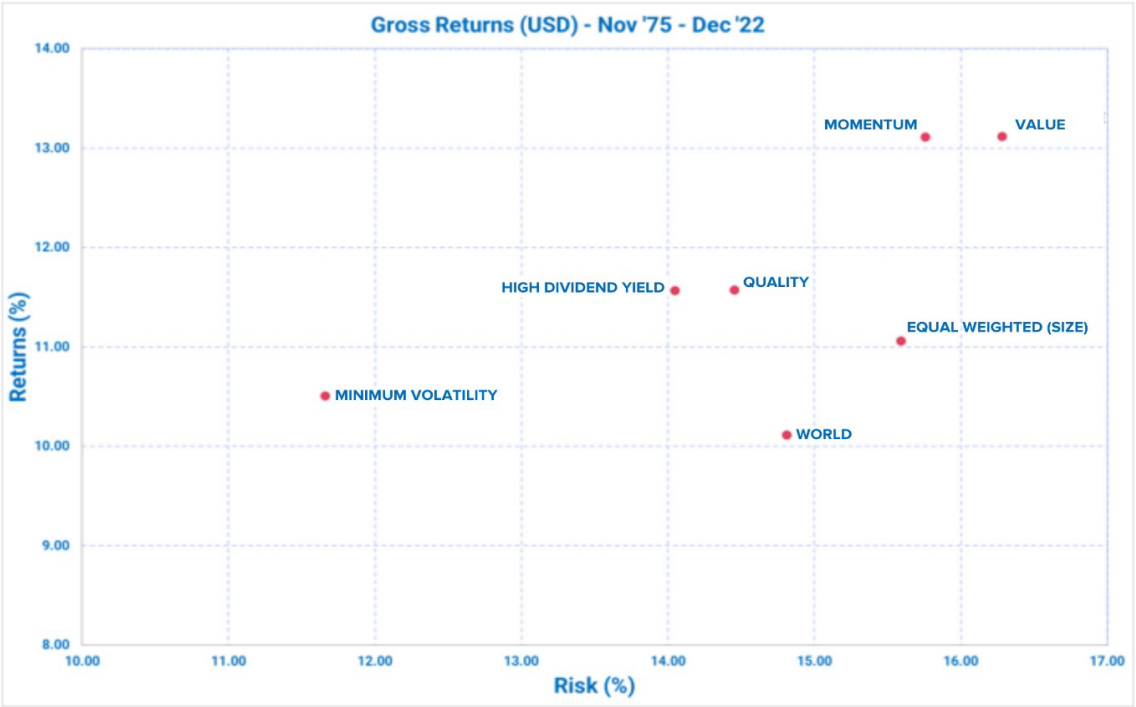
In assessing max drawdown, a metric used to gauge the largest drop from peak to trough, it is apparent that cyclical factors display higher max drawdowns, underscoring their susceptibility to larger losses during market downturns. Size, in particular, exhibits the most significant

negative max drawdown. In contrast, Quality shows the most favourable max drawdown among all factors, reinforcing its defensive stance and ability to mitigate risk.

When analysing turnover percentage, which indicates the level of trading activity, it's important to note that while it may not significantly impact absolute returns, it is crucial from a cost perspective. The Volatility factor's turnover is closest to that of the benchmark, suggesting lower trading costs. Although Value, Size, and Quality have higher turnover percentages than the benchmark, suggesting higher trading costs, they are relatively similar to each other. Momentum is distinct, with a considerably higher turnover percentage, which may lead to increased costs that could affect net investment returns.

Overall, while the cyclical factors have yielded higher returns, they also carry higher volatility and max drawdown risks. In contrast, Quality and Yield, despite being defensive factors, have not only provided stable returns but have also exceeded the benchmark, demonstrating their potential for outperformance even in less favourable economic conditions. Investors should weigh these factors against their individual risk appetites and investment goals.

The below scatterplot from MSCI, supports the findings above. It illustrates the relationship between risk and returns for various investment strategies, from November 1975 to December 2022. Each point represents a different strategy, with risk (volatility) plotted on the x-axis and returns on the y-axis. Strategies like 'Minimum Volatility' show lower risk and moderate returns, making it a potentially attractive option for risk-averse investors. 'High Dividend Yield' and 'Quality' lie in the middle ground, suggesting a balance between risk and return. Momentum and value are positioned towards the higher end of both risk and returns, indicating that they might be suitable for risk-tolerant investors seeking higher gains. The 'World' index, represents a global benchmark, offers lower returns at a risk level similar to 'Minimum Volatility', suggesting it might not be as efficient in terms of the risk-return trade-off. 'Equal Weighted' sits centrally, suggesting it offers a moderate approach without skewing too far towards high risk or high returns. Overall, the chart provides a clear visualisation of how different strategies perform against each other in terms of the returns they generate for the level of risk taken.



(MSCI, 2023)

Factor Returns Across Regions

When we delve into the valuation theory highlighted earlier, we expect that a bona fide factor premium would manifest uniformly across different regions and sectors. Using Dimensional's research as a reference, we probe the behaviour of Size, Value, and Profitability factors across varied geographical markets.

The analysis spans extensive timeframes and the synthesised results are presented in the accompanying table. In summary, the data shows positive average returns for Size, Value, and Profitability premiums in the United States, developed markets outside the United States, and emerging markets. This underscores the global pervasiveness of these factor premiums. Additionally, the robustness of these results is reinforced by the t-statistics, which all surpass the threshold of 2.0, underscoring the reliability and consistency of these premiums across different regions.

Summary Statistics of Monthly Size, Value, and Profitability Premiums by Region, Through December 2020

Region	Size	Value	Profitability
US	1927–2020	1927–2020	1964–2020
Average (%)	0.25	0.31	0.22
Standard Deviation	3.13	4.05	2.51
t-Statistic	2.73	2.56	2.31
Developed ex US	1970–2020	1975–2020	1991–2020
Average (%)	0.38	0.32	0.26
Standard Deviation	2.32	2.60	1.86
t-Statistic	4.05	2.93	2.69
Emerging Markets	1989–2020	1989–2020	1992–2020
Average (%)	0.21	0.34	0.24
Standard Deviation	1.96	2.84	2.13
t-Statistic	2.10	2.36	2.08

(Stanley Black, Dec 2021)

The table below presents a statistical comparison of the performance between different investment premiums - size, value, and profitability - across multiple regions. This analysis includes pairwise assessments: Size versus Value, Size versus Profitability, and Value versus Profitability, both within specific regions and globally.

The t-statistics provided in the table are crucial indicators in these tests; they measure the reliability of the average differences observed. In this case, the consistently low t-statistics across all regional comparisons suggest that there is no strong statistical evidence to support the dominance of one premium over another within these regions.

In essence, the findings from this analysis are in harmony with the principles of valuation theory, which posits that true factor premiums should present a positive and consistent performance across different markets. The data reinforces the concept that Size, Value, and Profitability premiums can be targeted by investors globally to potentially enhance expected returns, given their positive performance trends observed across the spectrum of markets analysed.

Summary of t-Tests for Monthly Return Differences Across Size, Value, and Profitability Premiums

Region	Size vs. Value	Size vs. Profitability	Value vs. Profitability
US			
Average Difference (%)	–0.05	0.03	0.09
t-Statistic	–0.36	0.23	0.51
Developed ex US			
Average Difference (%)	0.05	0.11	0.06
t-Statistic	0.38	0.80	0.38
Emerging Markets			
Average Difference (%)	–0.13	–0.03	0.10
t-Statistic	–0.75	–0.18	0.56
Global			
Average Difference (%)	0.02	0.02	–0.00
t-Statistic	0.19	0.15	–0.03

(Stanley Black, Dec 2021)

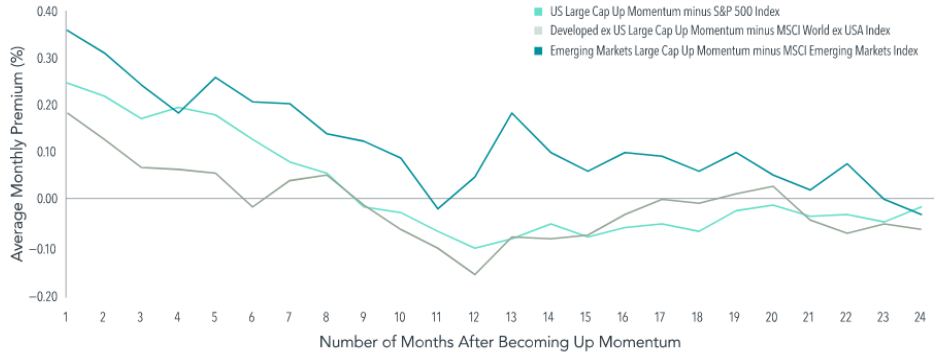
Capturing Factor Premiums: The Real-World Challenges

While the theoretical foundation of factors seems straightforward, putting these concepts into practice poses several intriguing challenges. Looking at the full picture, securing those elusive factor premiums is similar to navigating a complex maze or brewing potions in a wizard's lab. Here, we'll explore these challenges in a way that both experts and newcomers can understand.

The Fleeting Nature of Momentum

Consider Momentum as the 'shapeshifter of factors. It's like chasing after fireflies on a summer night – they shine brilliantly, but they quickly change direction. Simulated Momentum strategies indeed offer promising returns, but they come with a catch: they require constant adjustments. These adjustments lead to high trading activity, and the costs associated with this can eat into your gains.

So, Momentum could be hard to keep up, and capturing it becomes challenging. To illustrate, let's look at the data below. Just 10–12 months after stocks are considered "high Momentum," those extra gains they offered often disappear.



(Crill, 2021)

Challenges with Other Factors

Momentum isn't the only factor facing hurdles. Let's look at some other factors and their unique challenges:

- Value: Think of Value investing like a treasure hunt. While it has a strong theoretical foundation, it can be like digging for buried treasure that's deep underground. Sometimes, you need a lot of patience because these treasures take time to shine.
- Size: Imagine investing in small businesses as if you were collecting rare coins. Small businesses have fewer coins available, making it tougher to buy a lot of them without raising the price. This can result in higher costs and a few surprises.
- Quality: Quality, in a way, is like finding the perfect ingredients for a recipe. But everyone has a different recipe, and sometimes it's hard to agree on what 'quality' really means. This makes it challenging to consistently pick high-quality stocks.
- Low Volatility: Picture Low Volatility like a cosy house. It's safe, but it might not be the most exciting place. Sometimes, by playing it safe, you miss out on the thrill of a

rollercoaster ride in the market.

- Yield: Think of Dividend Yield as a steady stream of income flowing into your bank account, like a reliable tenant paying rent for occupying a property you own. While it may not offer the adrenaline rush of high-growth stocks, it provides the comforting stability of regular payouts, akin to the consistent warmth of a crackling fireplace on a chilly evening

Now, let's turn our attention to the costs involved in capturing these returns.

The Costs of Capturing Returns

When it comes to implementation, such as live trading, there are associated costs. These costs can resemble a hefty toll on the road to your gains. Each factor comes with its own set of obstacles, resulting in varying costs for each. Therefore, it's essential to approach factor investing with a thoughtful strategy.

Research has shown that, among all factors, Momentum, due to its nature, entails high turnover and has a more significant impact on costs. For typical investors, capturing Momentum returns over short periods (up to 6 months) may require a second thought. While Momentum poses some of the trickiest challenges, other factors have their unique puzzles to solve. By understanding these challenges, investors can better prepare to address the costs and capture those elusive factor premiums.

Portfolio construction

Like many aspects of investing, the decision to include factors in portfolios is a matter of individual choice. When considering factor inclusion in portfolio construction, there are several approaches to explore. These generally fall into two main categories: single-factor portfolios and multi-factor portfolios. However, it's essential to proceed with caution and conduct a thorough evaluation of the complexities related to factor selection and combination. In this section, our goal is to offer an overview of the critical considerations to bear in mind.

Single-factor vs multi-factor portfolios

Single factor portfolios, as a component of investment strategies, focus on a specific factor like Value, Momentum, Size, or Quality. These portfolios are structured by selecting assets that exhibit distinct characteristics associated with the chosen factor. The goal is to leverage the factor's historical performance or its potential to generate excess returns within an investment approach. While single factor portfolios offer targeted exposure to a particular factor premium, they may lack diversification and could be more susceptible to underperformance during periods when the selected factor is not favoured.

When it comes to constructing multi-factor portfolios, the considerations become more intricate. Combining multiple factors introduces additional complexities in terms of factor selection, weighting, and interaction. The objective is to create a well-balanced portfolio that harnesses the benefits of various factors while managing their potential risks. As we delve into multi-factor strategies, it's essential to navigate these intricacies effectively to build a diversified and robust investment approach.

Factor Correlations

One of the key considerations that requires careful attention when creating a multi-factor portfolio is factor correlation. Factor correlation measures how two or more factors move relative to each other. In simpler terms, it involves assessing whether the factors you're combining tend to behave similarly or differently under various market conditions. Understanding factor correlations is of paramount importance for several compelling reasons:

- **Enhanced Diversification:** Factor correlations play a crucial role in risk management. Highly correlated factors can lead to an over-concentration of risk, potentially magnifying losses during market downturns.
- **Impact on Returns:** Factor correlations can significantly influence return expectations. Combining factors with similar performance characteristics might not necessarily result in the anticipated performance boost.
- **Portfolio Construction:** Factor correlation guides decisions regarding how much weight to assign to each factor and whether certain factors should be included or excluded based on their correlation with others.
- **Behavioural Factors:** Factor correlations can also affect the psychological aspect of investing. Investor tolerance for portfolio fluctuations may vary depending on how factors interact with each other.

In the upcoming sections, we will take a deeper dive into factor correlation. We'll explore methods for assessing it and discuss how to navigate its implications when constructing effective multi-factor portfolios.

To quantify factor correlations, we've referred to the FTSE Russell paper centred on the Russell 1000 index. This paper quantifies the relationships between different factors, enriching our understanding of their interactions. This knowledge will be pivotal as we proceed with our exploration of multi-factor portfolio construction.

The following table presents data from the Russell 1000 index spanning the years 1997 to 2018. The research reveals intriguing relationships between these factors, which intuitively make sense:

	Value	Size	Momentum	Volatility	Quality	Yield
Value	**1.00**	0.49	-0.64	0.47	-0.02	0.77
Size	0.49	**1.00**	-0.32	-0.24	-0.37	0.10
Mom	-0.64	-0.32	**1.00**	-0.21	0.26	-0.46
Vol	0.47	-0.24	-0.21	**1.00**	0.59	0.84
Quality	-0.02	-0.37	0.26	0.59	**1.00**	0.29
Yield	0.77	0.10	-0.46	0.84	0.29	**1.00**

Source: FTSE Russell. Data from December 1997 to December 2018. Data based on the Russell 1000 Index Universe. All results based on back-tested data. Past performance is no guarantee of future results. Please see end for important legal disclosures.

(FTSE Russell, 2019)

Value tends to thrive when Momentum is underperforming and when Yield (an indicator of income) is performing well. It also performs better with smaller stocks, often found at lower prices. However, in the data and time period under consideration it's noteworthy that Value can sometimes excel even when stocks exhibit volatility. This peculiarity may be attributed to historical events like the dotcom bubble.

Larger stocks, typically characterised by low price fluctuations (Low Volatility), are considered high in Quality. Thus, it's logical that Size exhibits a negative correlation with Volatility and Quality.

Stocks with lower volatility (Low Volatility) tend to exhibit higher Quality and provide consistent income (Yield). Consequently, Volatility shows a positive connection with both Quality and Yield.

Quality often goes hand in hand with Yield, implying that stocks with good Quality also offer attractive income potential.

These findings shed light on how different factors interact, a crucial insight as we delve into the challenges of multi-factor portfolio construction.

Factor Combinations

As previously mentioned, the success of factor investing hinges on the thoughtful combination of factors tailored to specific investment objectives. There is no one-size-fits-all approach to factor combinations, allowing investors the flexibility to customise their portfolios according to their goals and risk tolerance. The effectiveness of factor combinations can fluctuate depending on market conditions, necessitating ongoing monitoring and adjustments to optimise portfolio performance.

Given these considerations, it becomes evident that no single factor can meet all investment needs. Relying solely on cyclical factors may not provide adequate support during market turbulence, while defensive factors may not yield desirable returns in favourable market conditions.

Even the most conservative investors seek to participate in opportunities. Therefore, it is crucial to emphasise that in a multi-factor investment approach designed to construct a resilient and adaptable portfolio, the inclusion of both cyclical and defensive factors remains paramount. This strategic amalgamation ensures that your investments can prosper across diverse market conditions while effectively managing risk. Think of it as assembling a versatile toolkit that empowers you to confidently navigate the ever-changing landscape of financial markets.

However, it's important to strike a balance. Over-diversifying by capturing too many factors can dilute the distinctive advantages of each, inadvertently steering your portfolio towards a generic market composition, but with higher costs. A deliberate and judicious selection of factors is key to crafting a portfolio that not only stands the test of market variations but does so efficiently and cost-effectively.

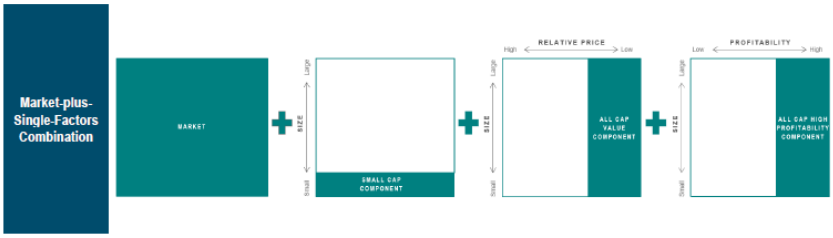
Now, let us assume you have selected the investment factors to include in your portfolio, the next step is to blend them thoughtfully with the broader market. This is a crucial phase where different theoretical models may be considered. These theoretical approaches include:

- **Risk Equalisation,** where each factor is balanced to contribute equally to the overall risk profile of the portfolio.
- **Factor Ranking,** which involves weighting factors according to their historical performance, giving precedence to the highest achievers.
- **Equal Exposure,** where each factor is given the same weight, avoiding overemphasis on any single factor.
- **Minimum Volatility,** which seeks to minimise the overall volatility of the portfolio while maintaining exposure to the desired factors.
- **Optimisation,** a process that employs mathematical models to adjust factor allocations within set constraints.
- **Dynamic Rotation,** an adaptive strategy that modifies factor exposures in response to changing market conditions.
- **Factor Overlay,** which involves adding factor exposures to an existing portfolio to enhance returns or manage risk more effectively.

In practical terms, Dimensional Fund Advisors have explored three distinct methods for combining factors with the market, all aimed at evenly valuing different return premiums.

Market-plus-single-factors combination

Their "Market-plus-single-factors combination" approach combines single factor strategies with a broad market portfolio.



(Wei Dai, Namiko Saito, Stephen Watson, 2021)

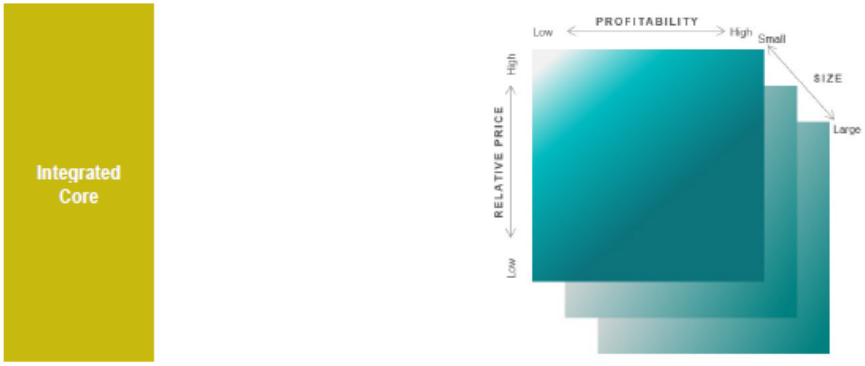
Market-plus-satellite combination

In the second approach which is termed, **Market-plus-satellite combination,** A market portfolio is combined with a satellite strategy that integrates all factors within a single strategy.

(Wei Dai, Namiko Saito, Stephen Watson, 2021)

Integrated core

The third approach which is referred to as **Integrated core,** as the name suggests is built by a market-wide simulation that simultaneously targets all factor premiums in a balanced manner.



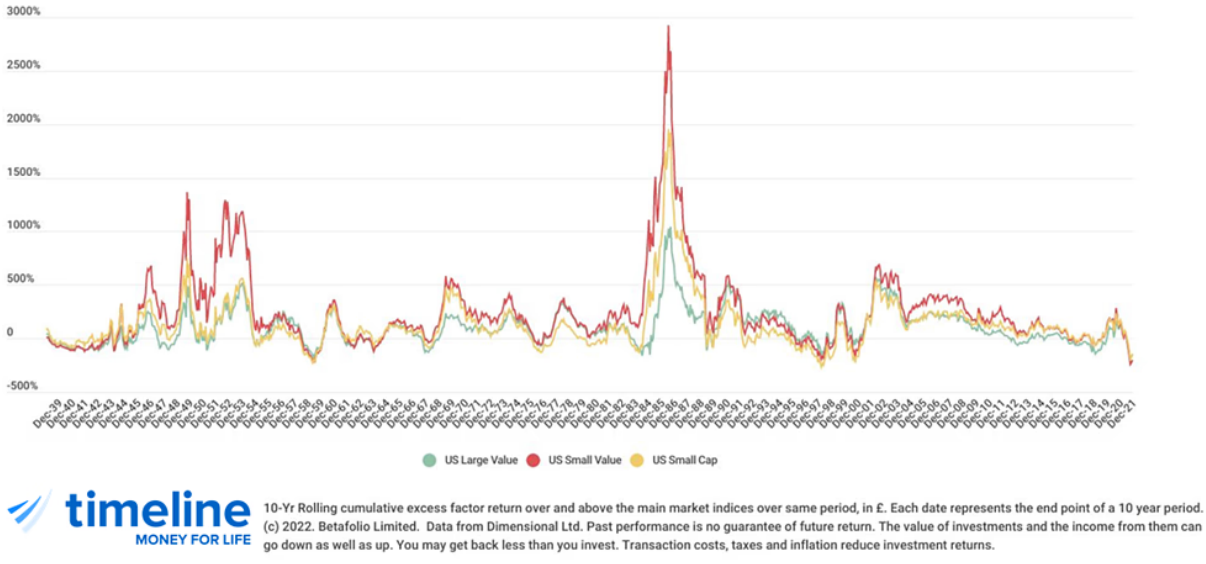
(Wei Dai, Namiko Saito, Stephen Watson, 2021)

Timeline's Perspective: Building a Robust Multi-Factor Portfolio

At Timeline, we approach factor investing with a healthy scepticism of a single factor strategy that might inadvertently lead to over-diversification, essentially bringing your portfolio back to a broad market position but with higher costs. We prefer a 'Market plus satellite' strategy for two primary reasons:

1. **Market Premium Emphasis:** We identify the market premium as the cornerstone risk factor, responsible for a substantial share of returns. Capturing this market premium in a cost-effective manner is our primary objective, setting the stage for the inclusion of other factors.

2. **Factor Integration:** We value the integration of complementary factors, such as Size and Value. Our analysis below shows that portfolios combining small-value stocks have historically outperformed portfolios focusing solely on small-cap or value stocks over rolling 10-year periods. The excess return chart illustrates this point, with periods above zero indicating that the combined small-value factor has outperformed the broad equity market since 1939.



(Timeline)

This methodical and deliberate approach affords us the ability to curate portfolios that not only resonate with the core attributes of the market but also capitalise on the compounded benefits of factor interplay.

Our factor selection favours Value and Size, which are backed by extensive historical evidence underscoring their potential for sustained performance, over Momentum, which despite its promise, often demonstrates quick premium erosion and high turnover, escalating costs that could negate its benefits.

Additionally, we advocate for Quality (or high profitability) as a defensive factor, which has demonstrated consistent strength, as corroborated by the research highlighted here. By layering our Value and Size positions with a high profitability exposure, we create a robust asset allocation poised to flourish across varying market landscapes and offer the prospect of returns that outpace those of a broad market portfolio.

Conclusion

Factor investing has emerged as a nuanced and versatile approach in the investment landscape. It's an attractive strategy that offers a middle path between the rigidity of passive investing and the intensity of active strategies. This approach, however, is not without its challenges. It demands careful consideration and a strategic blending of elements to align with specific investment goals.

Additionally, our exploration shows that factor investing has a global resonance. It's not limited by regional boundaries, making it a viable strategy for a diverse range of investors across the world.

The real test in factor investing lies in its execution. The journey from theory to practice involves navigating through market volatilities, managing costs, and making timely decisions. Essentially, it’s all about the science of what historical markets tell us.

In essence, factor investing offers a dynamic toolkit for those who are willing to delve into its depths. For investors who are prepared to engage with its complexities, it presents opportunities to craft a portfolio that is both resilient and responsive to market changes.

References

Crill, W. (2021). *Myth-Busting with Momentum: How to Pursue the Premium.* Dimensional.

FTSE Russell. (2019). *Factor behavior through the cycle.* FTSERUSSELL.COM.

MSCI. (2013). *Foundations of Factor Investing.* MSCI.

MSCI. (2023). *MSCI*.

S&P Global. (2021). *Factor Indices: A Simple Compendium.* S&P Global.

Stanley Black, W. D. (Dec 2021). *Assessing the Relative Magnitude of Premiums.* Dimensional Fund Advisors.

Wei Dai, Namiko Saito, Stephen Watson. (2021). *Pursuing Multiple Premiums: Combination vs. Integration.* Dimensional Fund Advisors.

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Factor Investing

What it is and why you should consider it

February 2024