

# Invesco Global Systematic Investing Study 2024

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# Executive summary

Welcome to Invesco's Global Systematic Investing Study 2024. This year's study continues to provide valuable insights into the rapidly evolving landscape of systematic investing, chronicling the latest innovations and how practitioners globally are leveraging advanced quantitative techniques across asset classes.

Based on interviews with systematic investors, defined as investors that employ structured, rules-based quantitative models and algorithms to make investment decisions, this research collects the opinions of senior decision-makers responsible for managing \$22.3 trillion in assets (as of 31 March 2024). We are pleased to share these valuable perspectives on the future of systematic investing worldwide.

This year's study reveals a shift towards more sophisticated, integrated systematic approaches across multiple asset classes. Investors are increasingly leveraging artificial intelligence and machine learning to enhance their decision-making processes, while also grappling with the complexities of Environmental, Social and Governance (ESG) integration and the challenges posed by a rapidly changing macro environment. The following themes explore how systematic investors are adapting their strategies to navigate these new frontiers, balancing innovation with risk management in pursuit of robust, long-term performance.



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## Theme 1

03

### **Navigating complexity: the rise of systematic strategies in multi-asset portfolio construction**

The first theme highlights how investors are increasingly embracing systematic strategies to build resilient multi-asset portfolios. In response to a rapidly changing investment landscape characterized by market volatility and shifting asset correlations, investors are moving towards more adaptive, data-driven approaches capable of navigating complex market dynamics.

## Theme 3

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### **AI's expanding role: From investment tool to strategic imperative**

Theme three chronicles the rising adoption of artificial intelligence (AI) in investment processes. Over half of investors now incorporate AI in some form, with applications ranging from pattern recognition to portfolio optimization. While investors see significant potential in AI, challenges around interpretability and data quality persist.

## Theme 2

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### **The evolution of multi-factor investment strategies**

Theme two explores how multi-factor strategies have become the norm as investors seek to capture a broader spectrum of risk and return opportunities in a complex macro-environment. The dominance of mega-cap tech stocks is reshaping market dynamics, prompting investors to recalibrate their strategies and adopt more diversified approaches to factor allocation.

## Theme 4

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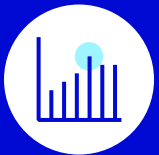
### **An active approach to ESG: The rise of customized, systematic strategies**

In theme four, we find the ESG landscape is undergoing a transformation as investors increasingly demand highly customized solutions to meet their unique sustainability objectives. Systematic approaches have emerged as the vanguard of this evolution, offering the flexibility and scalability required to create highly tailored ESG strategies.

This presentation is for Professional Clients, Financial Advisers and Qualified Clients/Sophisticated Investors (as defined in the important information at the end); for Institutional Investors only in the United States; for Sophisticated or Professional Investors in Australia; in New Zealand for wholesale investors (as defined in the Financial Markets Conduct Act); for Professional Investors in Hong Kong; for Qualified Institutional Investors in Japan; in Taiwan for certain specific Qualified Institutions/Sophisticated Investors; in Singapore for Institutional/Accredited Investors; for Qualified Institutional Investors and/or certain specific institutional investors in Thailand; for certain specific sovereign wealth funds and/or Qualified Domestic Institutional Investors approved by local regulators only in the People's Republic of China; for Qualified Professional Investors in Korea; for certain specific institutional investors in Brunei; for certain specific institutional investors in Malaysia upon request; for certain specific institutional investors in Indonesia and for qualified buyers in Philippines; In Canada this document is restricted to investors who are (i) Accredited Investors and (ii) Permitted Clients, as defined under National Instrument 45-106 and National Instrument 31-103, respectively. It is not intended for and should not be distributed to, or relied upon by, the public or retail investors. Please do not redistribute this document.



# Navigating complexity: the rise of systematic strategies in multi-asset portfolio construction



The investment landscape is evolving rapidly, with market volatility and shifting asset correlations challenging traditional portfolio construction methods



In response, investors are increasingly embracing systematic strategies to build resilient multi-asset portfolios



This shift is characterized by a move towards more adaptive, data-driven approaches capable of navigating complex market dynamics



The global investment landscape has been evolving rapidly. Investors face a shifting terrain: market volatility, asset classes decoupling unpredictably, and new investment vehicles emerging. Traditional portfolio construction approaches have come under unprecedented pressure.

With investors seeking a more adaptive approach to portfolio construction in this environment, systematic strategies have gained traction. As data-driven, rules-based approaches, they offer investors a powerful tool for navigating complexity and achieving investment objectives. A growing cohort of investors is exploring their potential to manage risk, identify opportunities, and optimize returns across various market conditions. This trend is not merely a refinement of existing practices but represents a reimagining of how investment portfolios are built and managed.

### The changing face of portfolio construction

Traditional approaches to multi-asset portfolio construction have typically relied on strategic asset allocation based on long-term expected returns and correlations, combined with periodic rebalancing. However, a rapidly changing market environment has exposed limitations in these static approaches. As one wholesale investor from Europe noted, "Systematic portfolio strategies give us the agility to adapt to market shifts while maintaining a disciplined approach to risk management."

Our interviews highlight varying priorities for institutional and wholesale investors when constructing multi-asset portfolios (figure 1.1). For institutional investors, liquidity constraints rank as the top consideration, scoring 8.0 out of 10 in importance. Following closely behind are minimizing volatility, ensuring low correlation of assets, and minimizing drawdowns. Wholesale investors, while also prioritizing these factors, place a greater emphasis on minimizing drawdowns and ensuring low correlation of assets, reflecting their focus on client-facing outcomes.

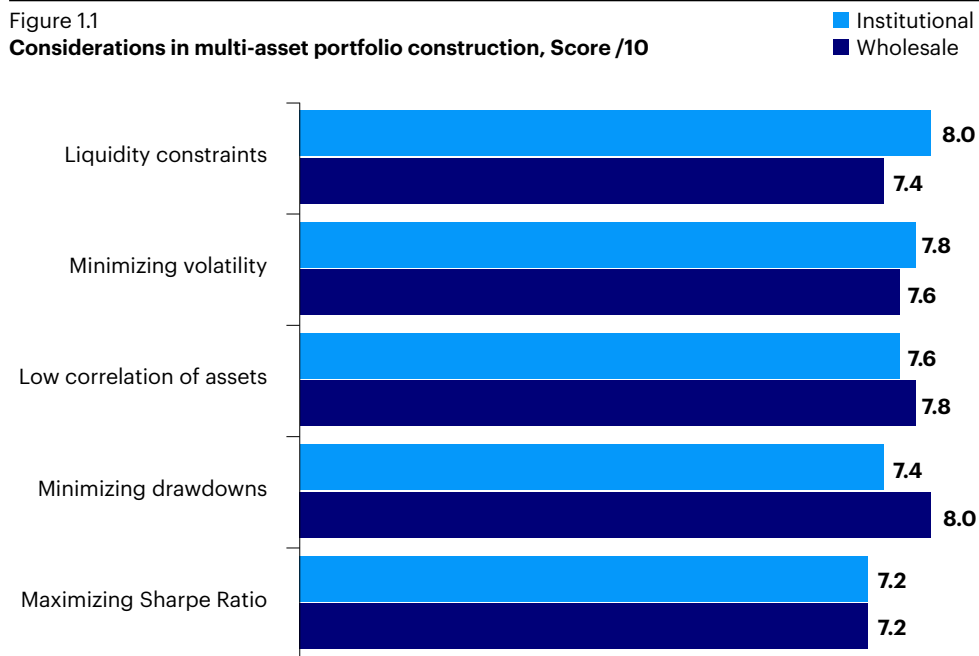
These priorities were seen to align closely with the capabilities of systematic strategies. An institutional investor from North America highlighted this shift in thinking: "We're moving beyond static allocations to a more dynamic, data-driven approach that can better navigate volatility and capture opportunities across asset classes." This approach enables investors to address their key concerns – from maintaining liquidity and minimizing volatility to ensuring diversification and managing downside risk – in a more responsive and targeted manner.



**You have two levers to pull: Can you detect risk quicker and avoid it? Or can you find opportunities that your peers cannot and go full throttle?**

**Institutional Investor**  
North America

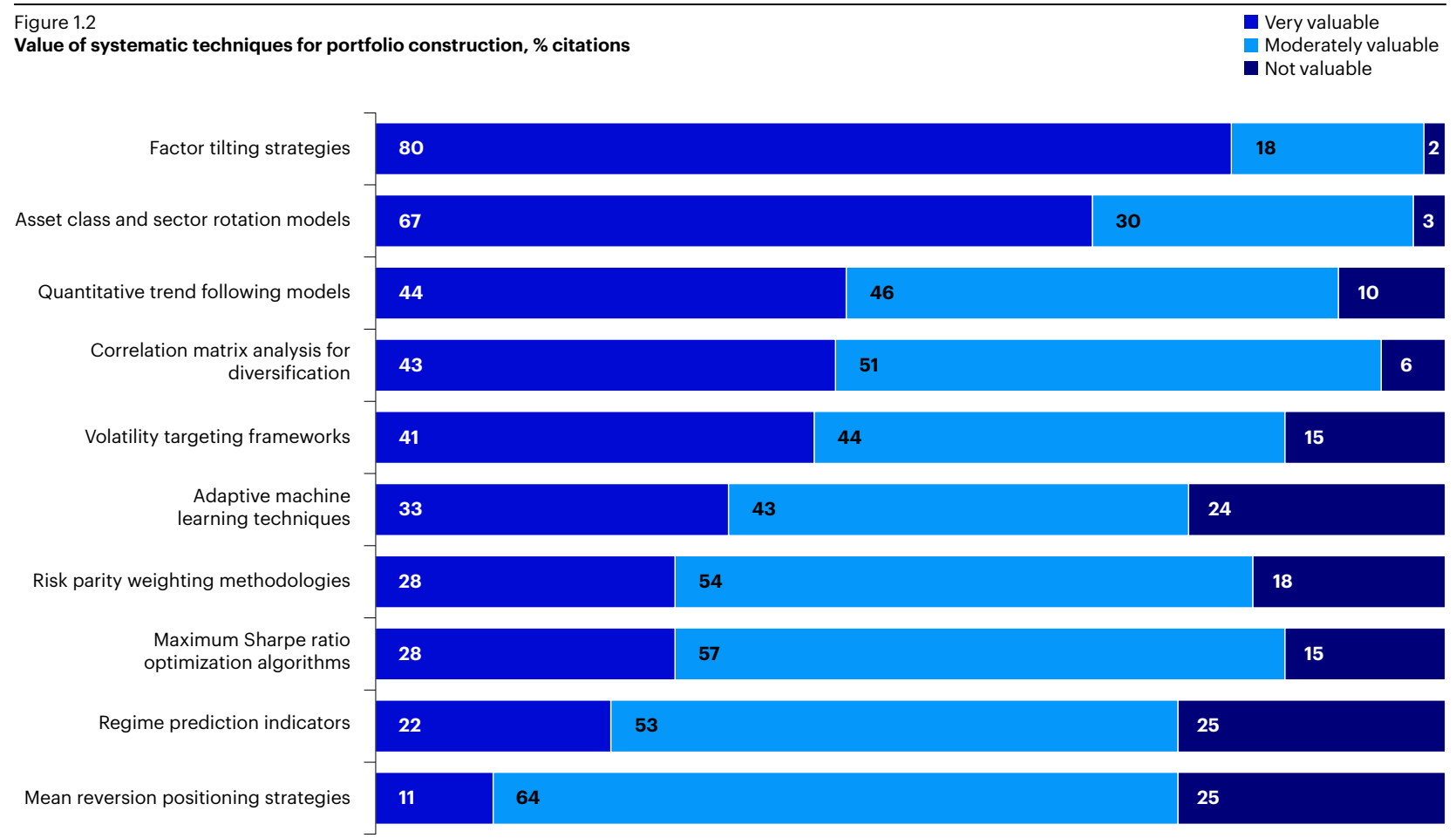
Figure 1.1  
**Considerations in multi-asset portfolio construction, Score /10**



Rate the following factors in order of importance for multi-asset portfolio construction: (Score 1-10 where 10 is very important)

This year's study finds factor tilting strategies and asset class/sector rotation models have emerged as highly valued systematic techniques for portfolio construction. An overwhelming 80% of respondents cited factor tilting strategies as very valuable, while 67% highlighted the importance of asset class and sector rotation models (figure 1.2). As an APAC-based institutional investor explained, "Our systematic models now adjust allocations based on where we are in the economic cycle, allowing us to capture opportunities and manage risks more effectively across different market regimes."

Figure 1.2  
**Value of systematic techniques for portfolio construction, % citations**



What systematic techniques do you think are effective for adding value during portfolio construction?



**Duration has crept into equities so we are applying fixed income logic to look at our portfolio on a more harmonized basis**

**Wholesale Investor**  
Europe

## Systematic approaches extend across asset classes

While systematic strategies have long been associated with equity investing, our study reveals these approaches are increasingly being applied across a wide range of asset classes. Equities remain the most common area for systematic investing, with 99% of respondents applying these strategies to their equity portfolios. However, fixed income is not far behind: 88% of investors now use systematic approaches in this asset class (**figure 1.3**).

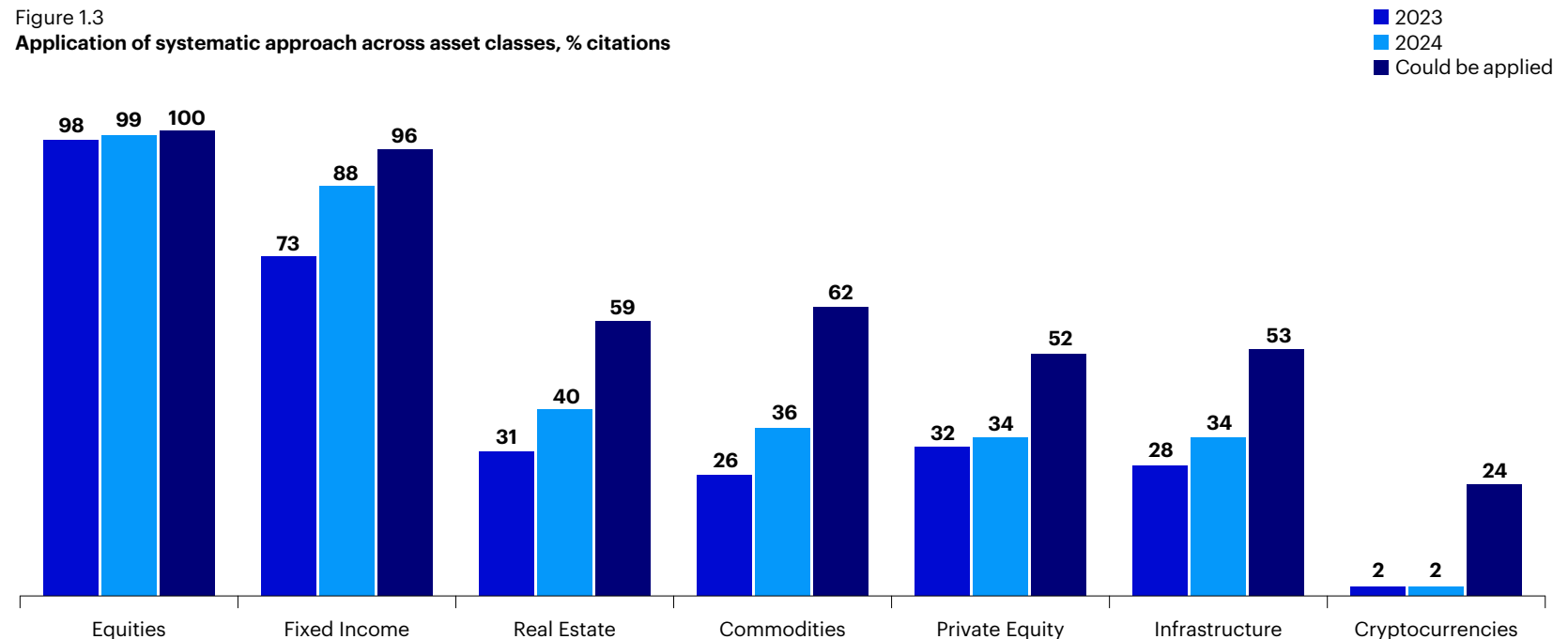
Perhaps more striking is the growing application of systematic strategies to alternative assets. Our study shows 40% of investors now use them in real estate, 36% in commodities, and 34% in both private equity and infrastructure.

This expansion is enabling investors to build more holistic and integrated multi-asset allocation models. For example, one institutional investor

from Europe noted, “Our systematic approach now spans both liquid and illiquid assets. This holistic view allows us to better manage overall portfolio risk and capture cross-asset opportunities that we might have missed before.”

However, the application of systematic strategies to less liquid assets is not without challenges. An institutional investor from North America pointed out, “For illiquid assets, portfolio optimization is harder because of data and pooling complications.” Despite these hurdles, many investors see potential in extending systematic approaches to these areas, with 59% believing systematic strategies could be applied to real estate over time, and 62% seeing potential applications in commodities.

Figure 1.3  
**Application of systematic approach across asset classes, % citations**



In which asset classes of your portfolio are you using a systematic approach? In which parts of your portfolio do you think a systematic approach could be applied?

## The data revolution in portfolio management

Underpinning the rise of systematic portfolios is a data revolution transforming the way investors make allocation decisions. Our study reveals investors are drawing on a diverse range of sources to inform their portfolio allocations, with macroeconomic data (97%), fundamental company financials (81%), and technical analysis indicators (76%) being the most commonly cited (figure 1.4).

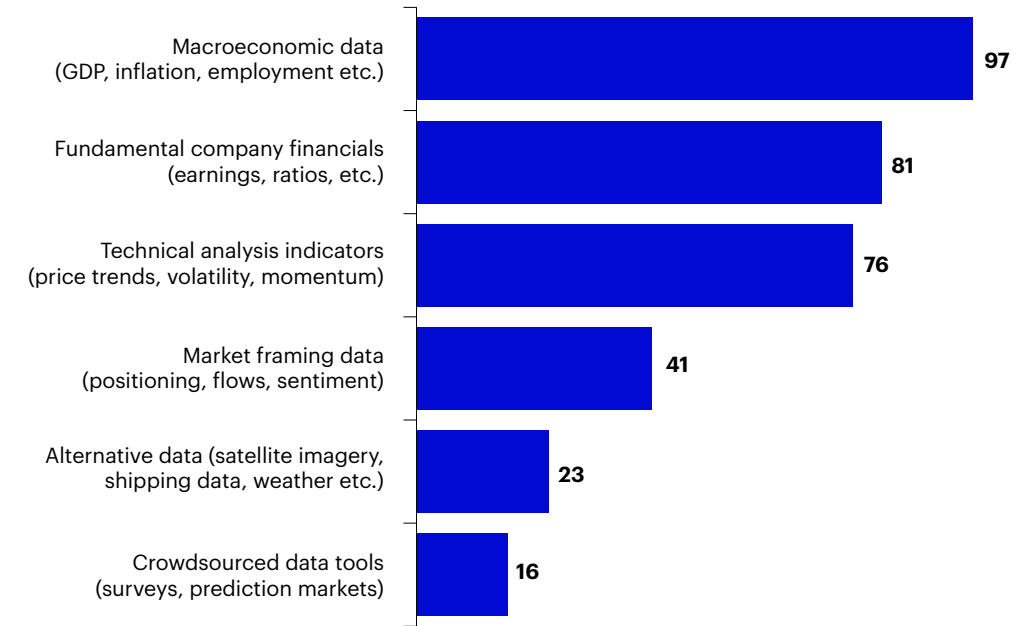
This wealth of data is enabling investors to take a more systematic approach to portfolio management. As one institutional investor from North America explained, “We have an algorithm

for allocating weights to these different data sources and this output goes into our portfolio construction engine.”

The integration of alternative data sources is also gaining momentum, with 23% of respondents including alternative data such as satellite imagery, shipping data, and weather information in portfolio allocation models. While still a minority, this trend points to the growing sophistication of systematic strategies and their ability to leverage non-traditional information sources for asset allocation decisions.

Figure 1.4

### Data that feeds into portfolio allocations, % citations



What data feeds your signals for portfolio reallocations?

## Rebalancing reimagined

As the use of systematic strategies develops, traditional calendar-based portfolio rebalancing is giving way to more fluid methods. While time-based rebalancing remains prevalent (used by 74% of institutional and 51% of wholesale investors), there is a growing adoption of more sophisticated, responsive techniques (figure 1.5).

Threshold-based rebalancing, which triggers portfolio adjustments when allocations drift beyond predetermined bands, has been adopted by 53% of institutional investors and 58% of wholesale investors. Also popular is adaptive rebalancing using market signals, which allows for more responsive portfolio adjustments based on changing market conditions. These methods reflect investors' growing appetite for portfolios can be more responsive to market changes, all within a systematic framework.

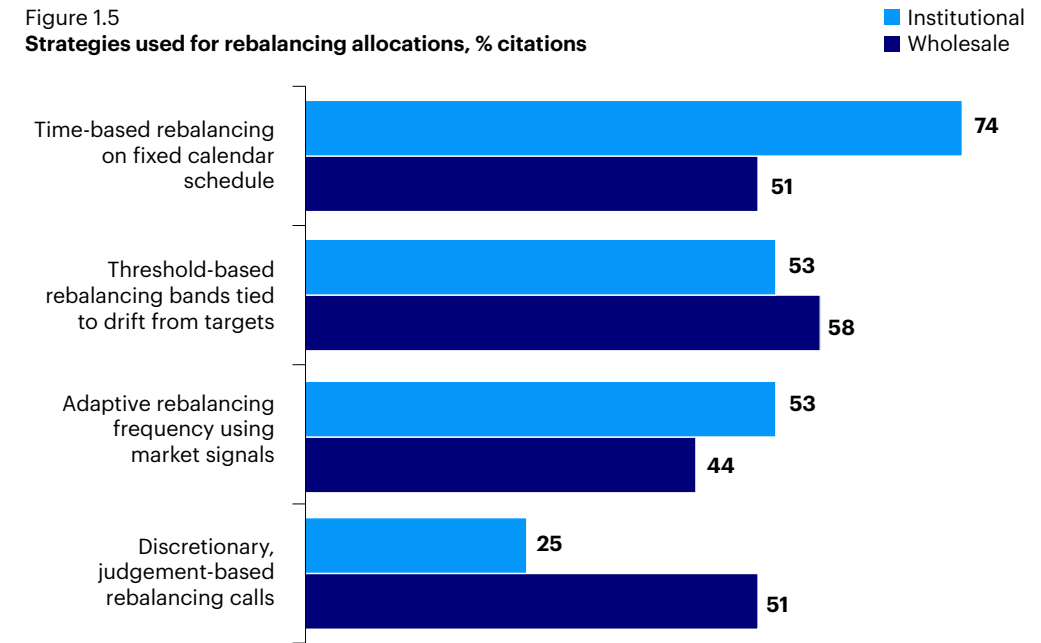
"We have systematic tools for various asset classes, but the challenge is actionability when risks are identified," confided a North American institutional investor. "We're developing processes for illiquid exposures to have similar performance thresholds and exit strategies as liquid assets."

This reveals an important consideration in rebalancing: the varying liquidity profiles of different asset classes. While highly liquid assets like large-cap equities or government bonds can be easily rebalanced, less liquid assets such as real estate or private equity present challenges. Systematic investors are developing innovative approaches to address this, such as using liquid proxies or derivatives to adjust overall portfolio exposures when direct rebalancing of illiquid assets is impractical. "We're developing processes for illiquid exposures to have similar performance thresholds and exit strategies as liquid assets" said an institutional investor from North America.

The implementation of dynamic rebalancing strategies often relies on sophisticated algorithms and data analysis. For example, some systematic investors are using machine learning techniques to identify optimal rebalancing triggers based on a combination of asset drift, market sentiment indicators, and macroeconomic signals. Others are incorporating risk parity concepts into their rebalancing frameworks, adjusting allocations based on the contribution of each asset to overall portfolio risk rather than just market value weights. By focusing on the risk contribution of each asset or strategy investors aim to maintain a more stable risk profile even as market conditions change.

Figure 1.5

Strategies used for rebalancing allocations, % citations



What strategies do you use for rebalancing your portfolio allocations?



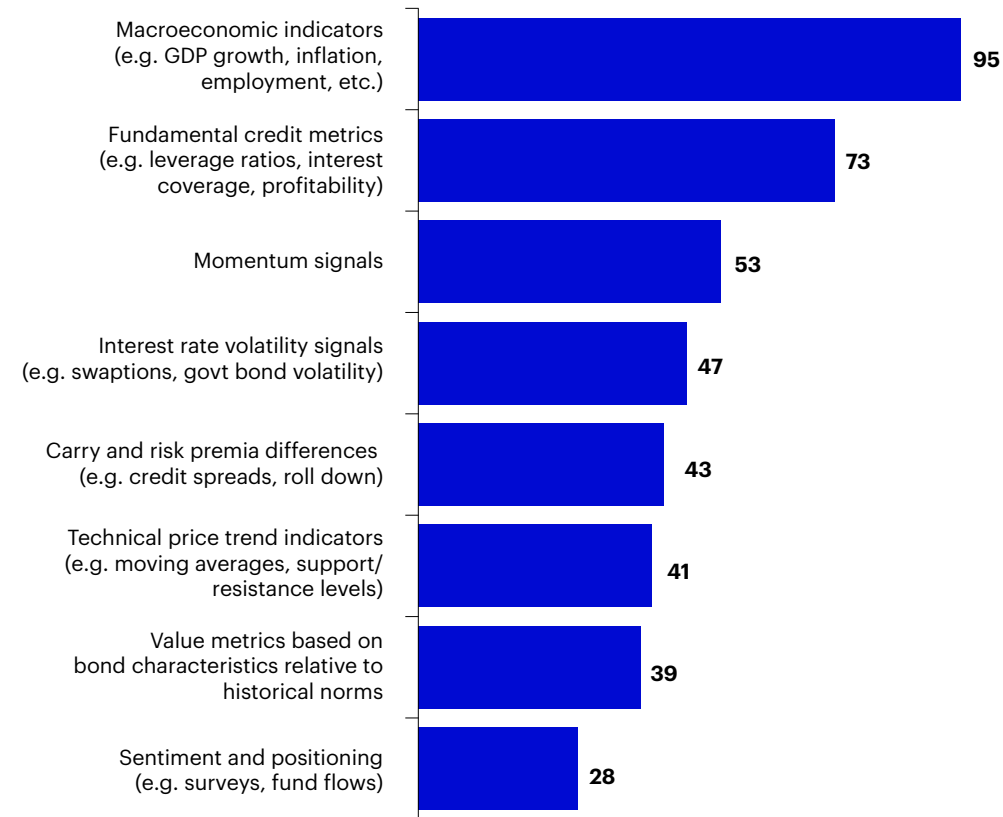
## Systematic strategies in fixed income

Fixed income has become a core component in systematic multi-asset portfolio construction, signalling a shift in how investors integrate this asset class into their overall strategies. Investors are increasingly applying quantitative techniques to bond markets, driven by two key factors. First, advancements in data availability and computing power have made sophisticated analysis of fixed income assets more feasible. Second, the volatile interest rate environment has necessitated more advanced methods for return generation and risk management.

“Our systematic models are helping us dynamically adjust portfolio duration based on our interest rate forecasts and risk tolerance. This has been crucial in navigating the recent volatility in bond markets,” said a Middle Eastern institutional investor.

Investors are leveraging a range of signals to implement systematic fixed income strategies. Macroeconomic indicators (95%) and fundamental credit metrics (73%) are the most widely used, followed by momentum signals (53%) and interest rate volatility signals (47%) (**figure 1.6**). This reflects a growing recognition fixed income markets are influenced by a complex interplay of factors which can often be better captured through systematic approaches. These models are also being used to exploit relative value opportunities across the fixed income universe. “We’re using machine learning algorithms to identify mispricing, taking into account a wide range of factors including credit quality, sector dynamics, and macroeconomic indicators,” shared an APAC based institutional investor.

Figure 1.6  
Signals used for applying systematic strategies in fixed income, % citations



Which signals do you look for when implementing systematic fixed income strategies?



Because municipal markets in the US are so vast and unique, machine learning helps us capture what offers the best tax advantage and investment opportunity.

Wholesale Investor  
North America

## Commodities: a new(er) frontier for systematic strategies

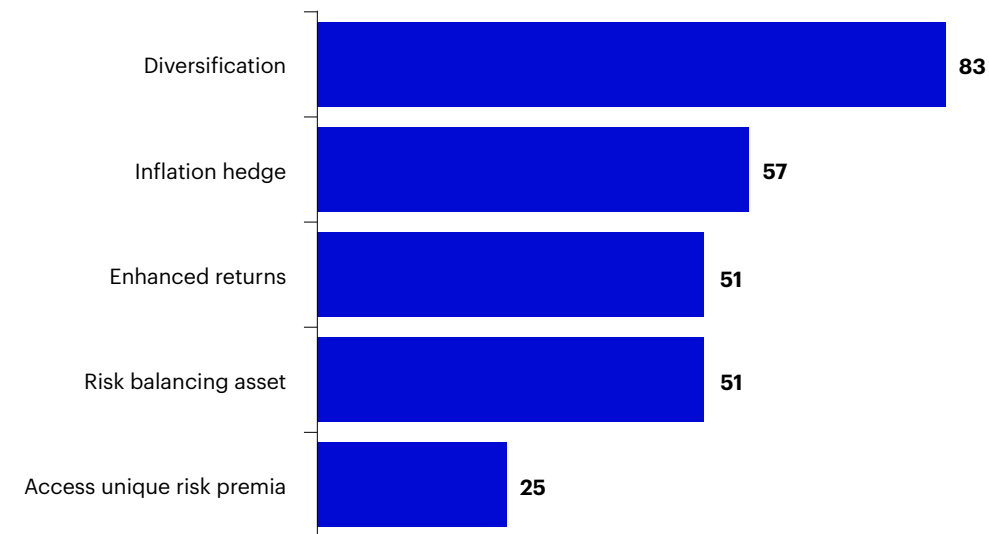
Commodities are increasingly being considered by investors for inclusion in systematic multi-asset portfolios. Some investors view commodities as potentially offering diversification benefits due to their historical performance patterns relative to traditional assets. Additionally, respondents revealed they were exploring commodities as a possible hedge against inflation risks (figure 1.7). Implementation varies between investor types, with institutional investors favoring physical holdings (67%) and futures (51%), while wholesale investors prefer ETPs (Exchange Traded Products) (67%) (figure 1.8).

When discussing the multifaceted role of commodities, several respondents highlighted their versatility and ability to address specific portfolio needs. A European institutional investor explained, "Commodities often exhibit strong trends, making them a good fit for our trend-following algorithms".

Another North American institutional respondent added, "In our risk parity approach, commodities play a crucial role. They help us balance risk across different asset classes, particularly during inflationary periods when traditional assets might struggle". A Middle East-based wholesale respondent shared, "We incorporate commodities into our macro-based models. Their sensitivity to global economic conditions provides valuable signals that complement our other asset classes".

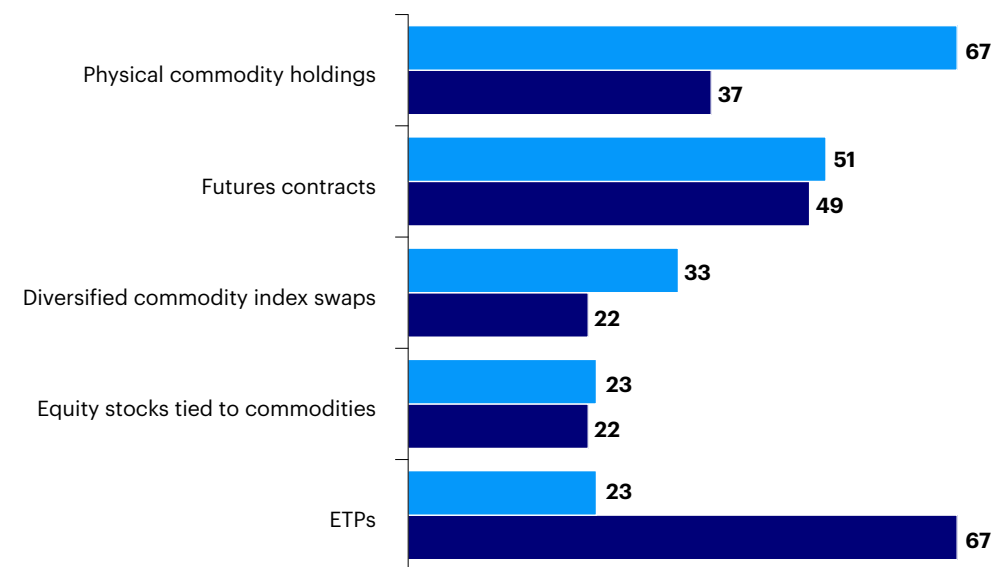
As systematic multi-asset portfolios evolve, commodities are likely to play an increasingly important role. Their unique return characteristics and the ability of systematic strategies to navigate their complexities offer investors a powerful additional tool for building portfolios.

Figure 1.7  
Goal of commodity allocations, % citations



What is the goal of commodity exposure in your portfolio?

Figure 1.8  
Implementation of commodity exposure, % citations



How are your commodity positions implemented?

## The future of systematic multi-asset investing

As systematic approaches continue to mature, they are not just optimizing existing strategies but reshaping the foundations of portfolio construction. The ability to process large amounts of data, identify complex patterns across asset classes, and make dynamic allocation decisions is enabling investors to build more resilient portfolios capable of navigating an increasingly complex and volatile investment landscape.

By leveraging data, technology, and quantitative techniques, investors are developing more dynamic, responsive, and robust approaches to navigating complex market environments. As these strategies continue to evolve, they promise to offer new possibilities for managing risk, identifying opportunities, and achieving investment objectives.

# The evolution of multi-factor investment strategies



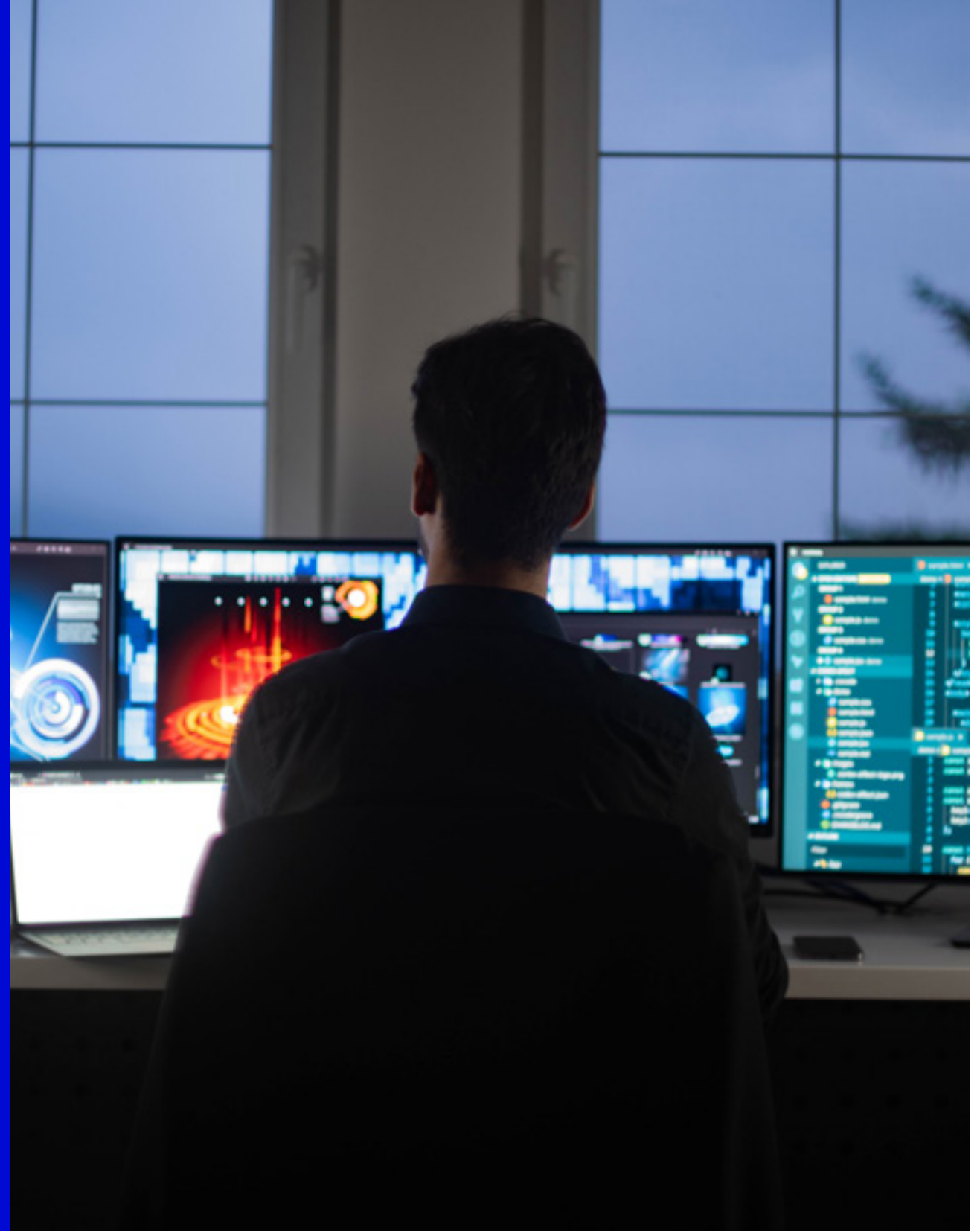
Multi-factor strategies are now the norm as investors seek to capture a broader spectrum of risk and return opportunities in a complex macro-environment



Mega-cap tech stock dominance is reshaping market dynamics, prompting investors to recalibrate their strategies



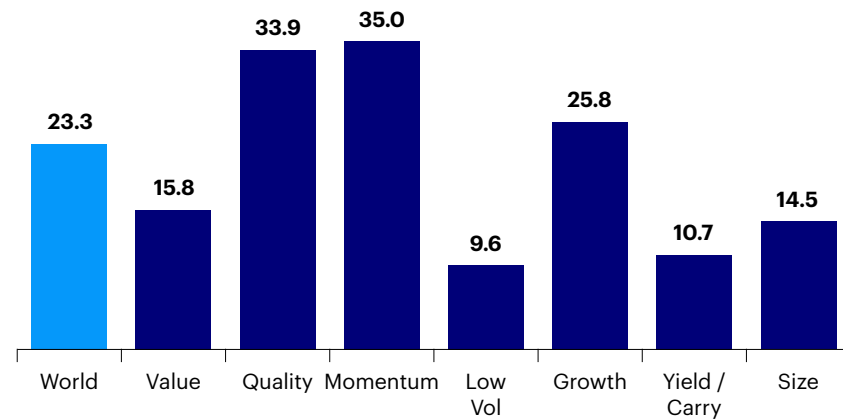
Investors are adopting more diversified approaches to factor allocation, adjusting exposures in response to changing market conditions and the economic cycle



This year's study reveals the rise of pro-active multi-factor strategies as the preferred choice for systematic investors. This shift reflects growing sophistication among investors as they seek to capture a broader spectrum of risk and investment opportunities in an increasingly complex macro-environment. The need to be adaptive has been underscored by recent market dynamics, particularly the extraordinary performance of mega-cap technology stocks over the past year.

Figure 2.1  
Global index returns (%)

12 months to 29<sup>th</sup> March 2024

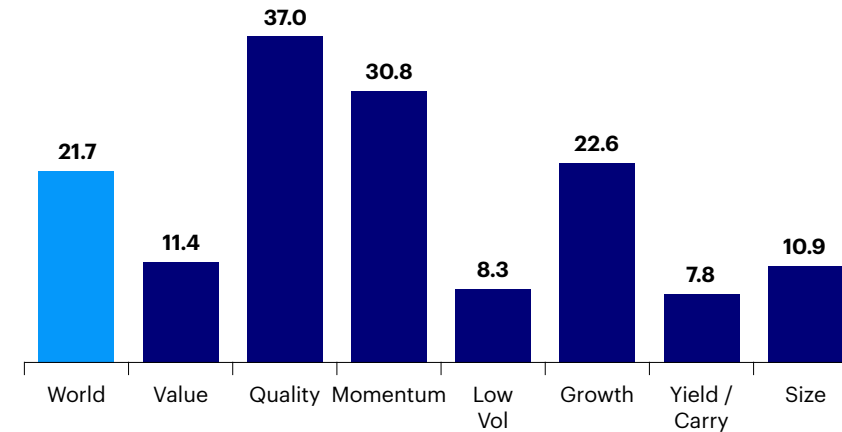


Relative factor performance (%) (12 months to 29 <sup>th</sup> March)	Value	Quality	Momentum	Low Vol	Growth	Yield / Carry	Size
Past performance is not a guarantee of future results.	-7.5	10.6	11.7	-13.7	2.5	-12.6	-8.8

This mega-cap tech stock surge has significantly impacted factor returns, creating both opportunities and challenges for factor investors. Certain factors - notably Momentum, Growth, and Quality - have performed exceptionally well, aligning with the success of large tech companies. In contrast, others, including Value, Low Volatility, and Size, have underperformed the broader market (figure 2.1). For many investors, these divergent factor performances have highlighted once again the importance of pro-active multi-factor strategies in navigating rapidly changing market conditions.

Figure 2.1  
Global index returns (%)

3 months to 29<sup>th</sup> March 2024



Relative factor performance (%) (3 months to 29 <sup>th</sup> March)	Value	Quality	Momentum	Low Vol	Growth	Yield / Carry	Size
Past performance is not a guarantee of future results.	-10.3	15.3	9.1	-13.4	0.9	-13.9	-10.8

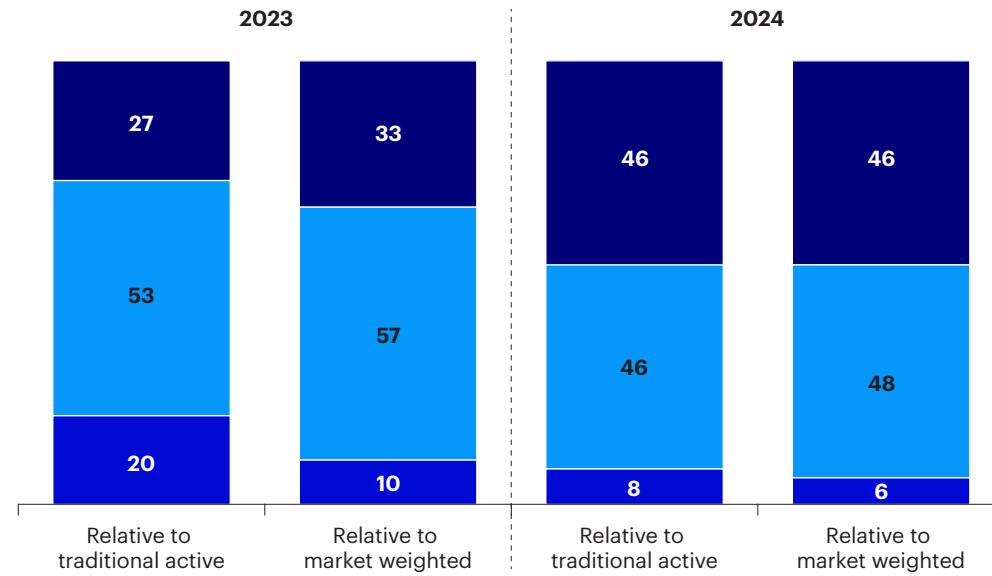
Source: <https://www.msci.com/end-of-day-data-search>  
 Indexes: ACWI, ACWI ENHANCED Value, ACWI QUALITY, ACWI MOMENTUM, ACWI MINIMUM VOLATILITY (USD), ACWI GROWTH TARGET, ACWI HIGH DIVIDEND YIELD, ACWI SIZE TILT,  
 All in Gross USD terms.



On average, the investors in our study have fared well in this environment, over the 12 months to the end of March 2024, 46% of respondents reported their systematic/factor strategies outperformed traditional active strategies, whilst 46% also saw outperformance relative to market-weighted strategies. This contrasts with 8% and 6% reporting underperformance, respectively (figure 2.2).

However, this environment has led to concentration risk and challenges in maintaining balanced exposures. As one North American wholesale investor noted: “The performance of mega-cap technology stocks has skewed traditional factor relationships. We’re observing high correlations between Momentum, Growth, and Quality factors, which poses challenges for diversification within multi-factor portfolios.”

Figure 2.2  
**Performance of systematic/factor strategies, % citations**  
**Past performance is not a guarantee of future results**



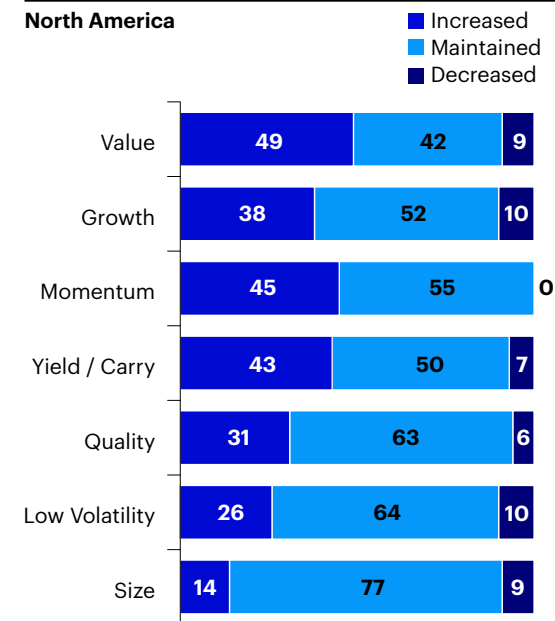
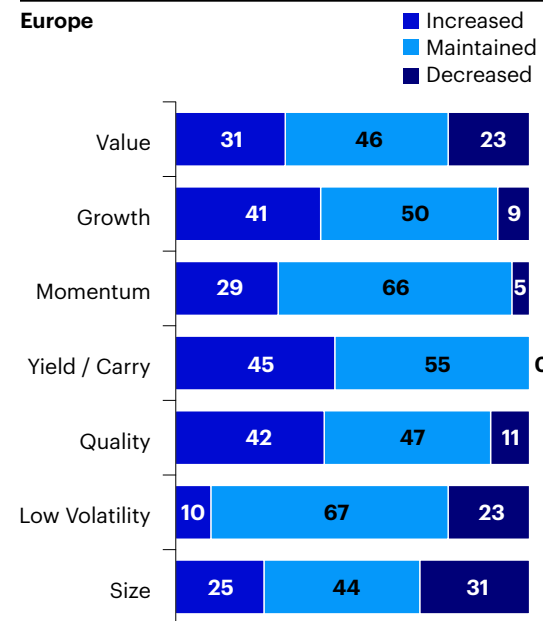
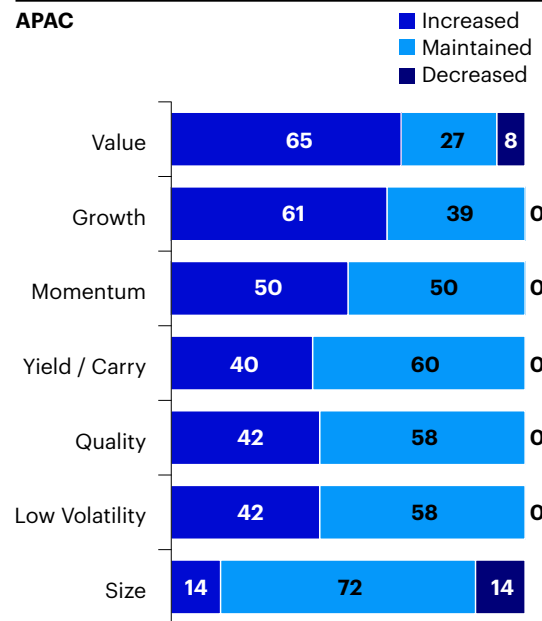
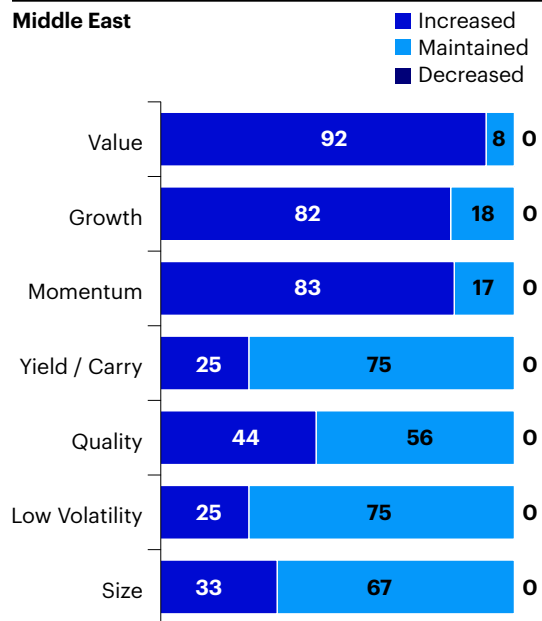
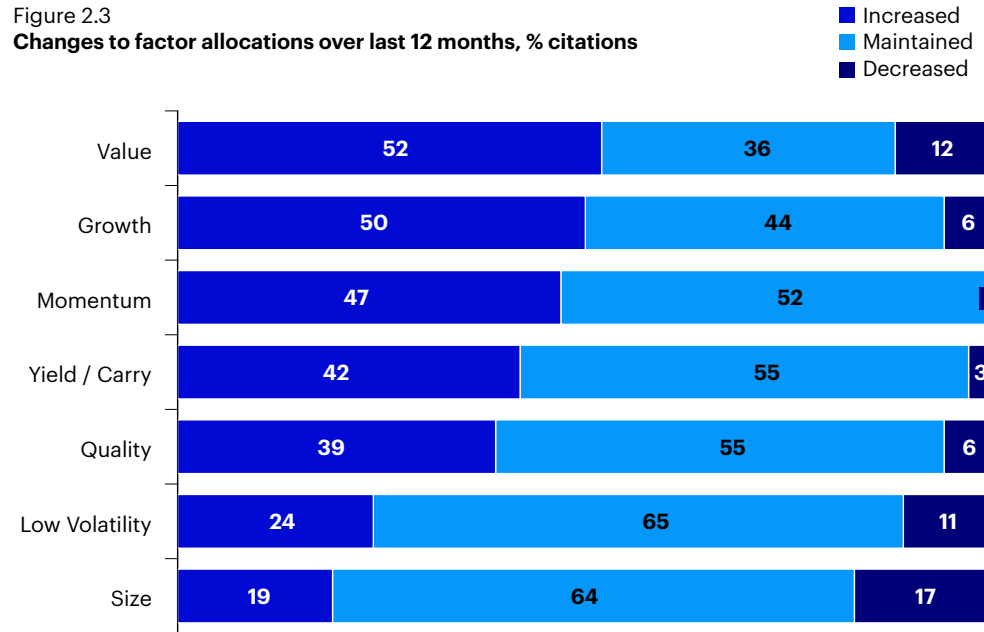
How have your systematic/factor strategies performed in terms of return relative to traditional active / market weighted strategies over the past 12 months (to the end of March 2024)?



**We think the rest of the market will catch up with the ‘big seven’ so we are trying to play that position with factors while having really good exposure to the seven so there is not too much benchmark risk.**

**Wholesale Investor**  
 Europe

This concentration risk has prompted investors to seek solutions through factor investing, for example, via an increase in allocations to Value as a potential hedge. Notably, 52% of investors increased their allocation to Value over the last 12 months, making it the factor with the highest percentage increase (figure 2.3). A European wholesale investor explained their approach: "While we've benefited from the strong performance of Growth and Momentum, we're increasingly looking to balance this with Value exposure. When market dynamics shift, they can do so rapidly, and we want to be well-positioned for such eventualities."



Over the last 12 months, have you increased, decreased, or maintained your allocations to these factors (ignoring market impacts)?

## Momentum builds for a more diversified allocation approach

The trend towards a more diversified approach to factors has been a consistent finding in our study over the past eight years, and it continues to gain momentum. This year's results show a marked acceleration, with 91% of investors now adjusting their factor weights over time, an increase from 75% in the previous year (**figure 2.4**)

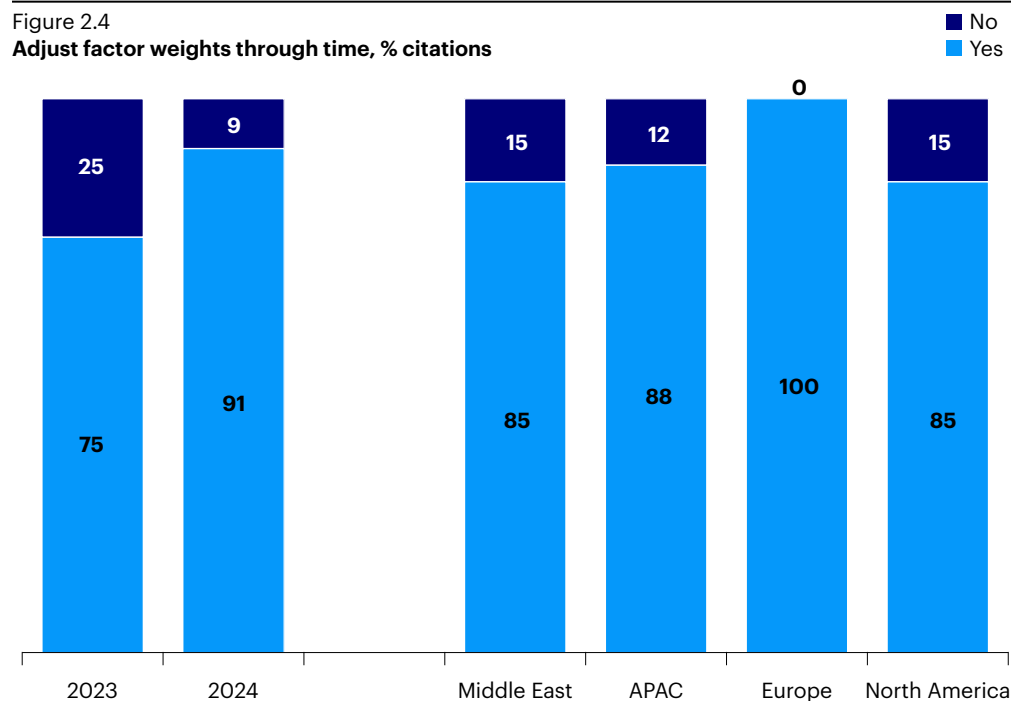
The drivers behind pro-active factor allocation are multifaceted, with several key motivations emerging from the research. Foremost amongst these is the desire to adapt to economic cycles, with an overwhelming 82% of investors interviewed citing this as a primary reason for adjusting their factor allocations (**figure 2.5**). This trend reflects a growing sophistication amongst investors in aligning their portfolios with anticipated factor performance across various economic phases.



**Factors are not mutually exclusive, and we combine them to create a diversified portfolio that balances risk and potential return.**

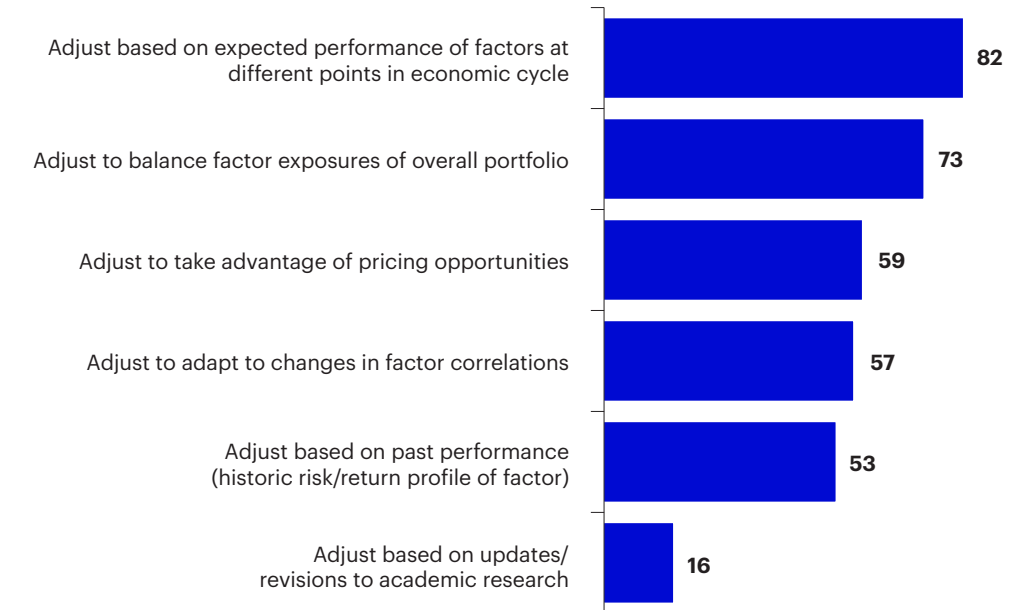
**Institutional Investor**  
Europe

Figure 2.4  
Adjust factor weights through time, % citations



Do you adjust your factor weights through time?

Figure 2.5  
Reasons for adjustments, % citations (those that adjust weights)



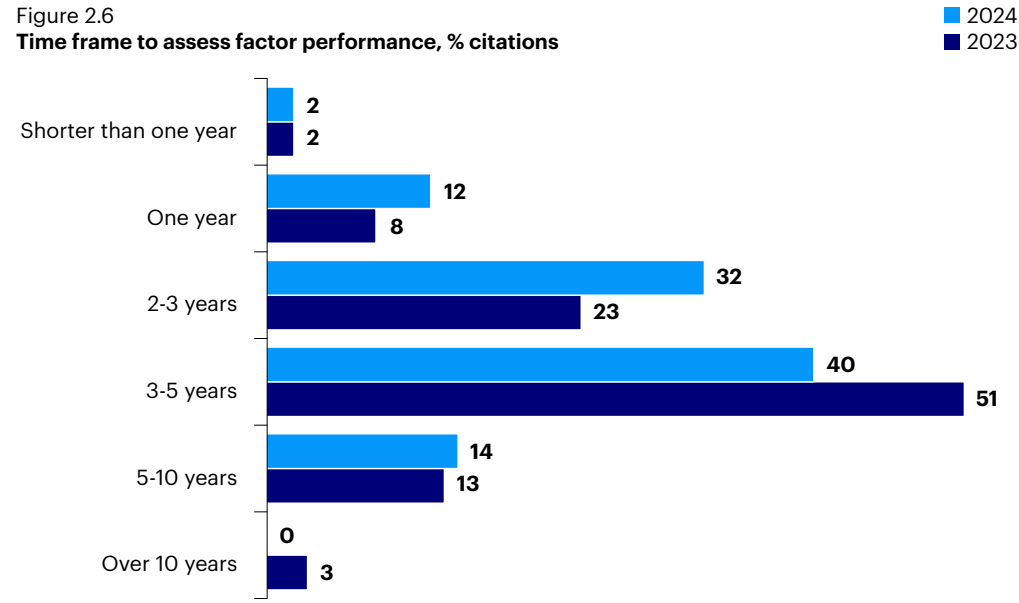
[If yes] why do you adjust your factor weights through time?

Portfolio balance also plays a crucial role, as 73% of respondents report adjusting factor weights to optimize overall exposure. Furthermore, 59% of investors leverage factor adjustments to exploit pricing inefficiencies in the market. These findings underscore the dual utility of pro-active factor allocation: it can serve not only as a tool for tactical market positioning but also as a strategic mechanism for comprehensive risk management. As market complexity increases, the ability to nimbly adjust factor exposures is increasingly seen as a valuable skill in the investor's toolkit.

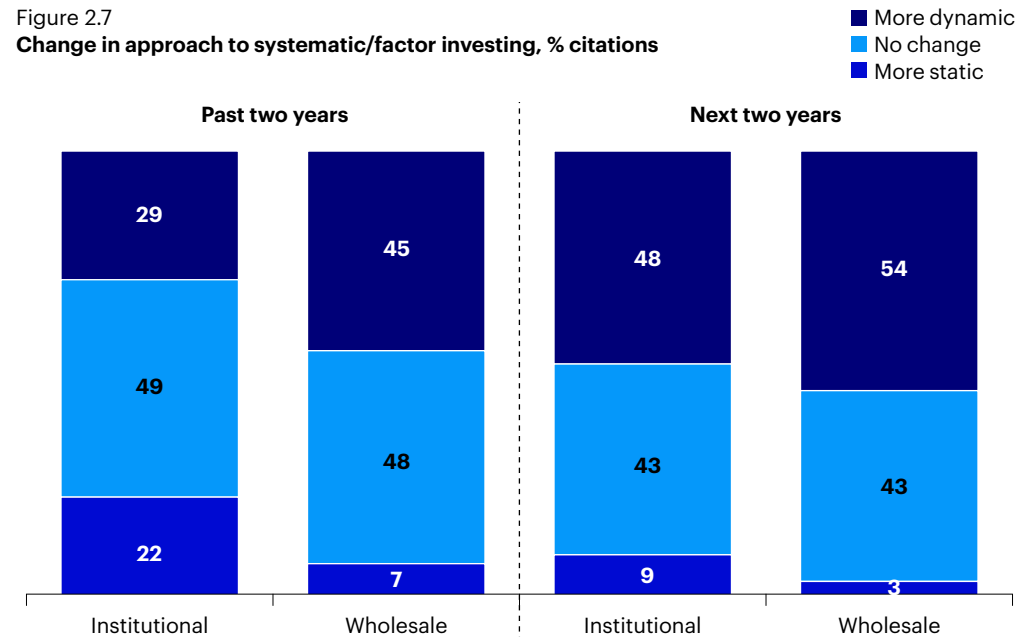
The timeframe used to assess factor performance has also evolved. Whilst 40% of investors use a 3-to-5 year horizon, there is a notable increase in those using shorter time frames compared to last year (figure 2.6). 32% now use a 2-to-3 year horizon, up from 23% in 2023. An APAC-based institutional investor explained this shift: "The increased volatility and rapid shifts in market regimes we've seen in recent years have made us more responsive in our factor allocations. We're still focused on long-term factor premiums, but we need to be more agile in our tactical positioning."

A North American wholesale investor echoed this perspective: "We used to assess across a full market cycle but can't do that anymore, either clients aren't letting you or now economic cycles seem to be lasting a glacial age, so we have set it to be 18 to 24 months and if we don't see a reason to stick with a certain factor then we're willing to make a change."

Looking ahead to the next two years, this trend shows no signs of slowing down, with 48% of institutional investors and 58% of wholesale investors anticipating a move towards an even more dynamic approach (figure 2.7). "We've had to become more dynamic, not chasing yield but chasing opportunity" said one North American wholesale investor.



What time frame do you use to analyze / assess the performance of systematic/factor strategies?



How has your approach changed over the past 2 years? How do you expect it to change over the next 2 years?



## Targeting diverse local flavors in the factor menu

Our study shows Value remains the most widely targeted factor (90% of respondents), followed by Quality (74%), Momentum (69%), and Low Volatility (63%). Growth is now targeted by 51% of respondents, indicating its increasing acceptance as a distinct factor (figure 2.8).

Respondents consistently emphasized different factors tend to outperform at different times and in different regions, requiring a dynamic and geographically aware investment strategy. This perspective is supported by the data, which shows distinct factor preferences across regions.

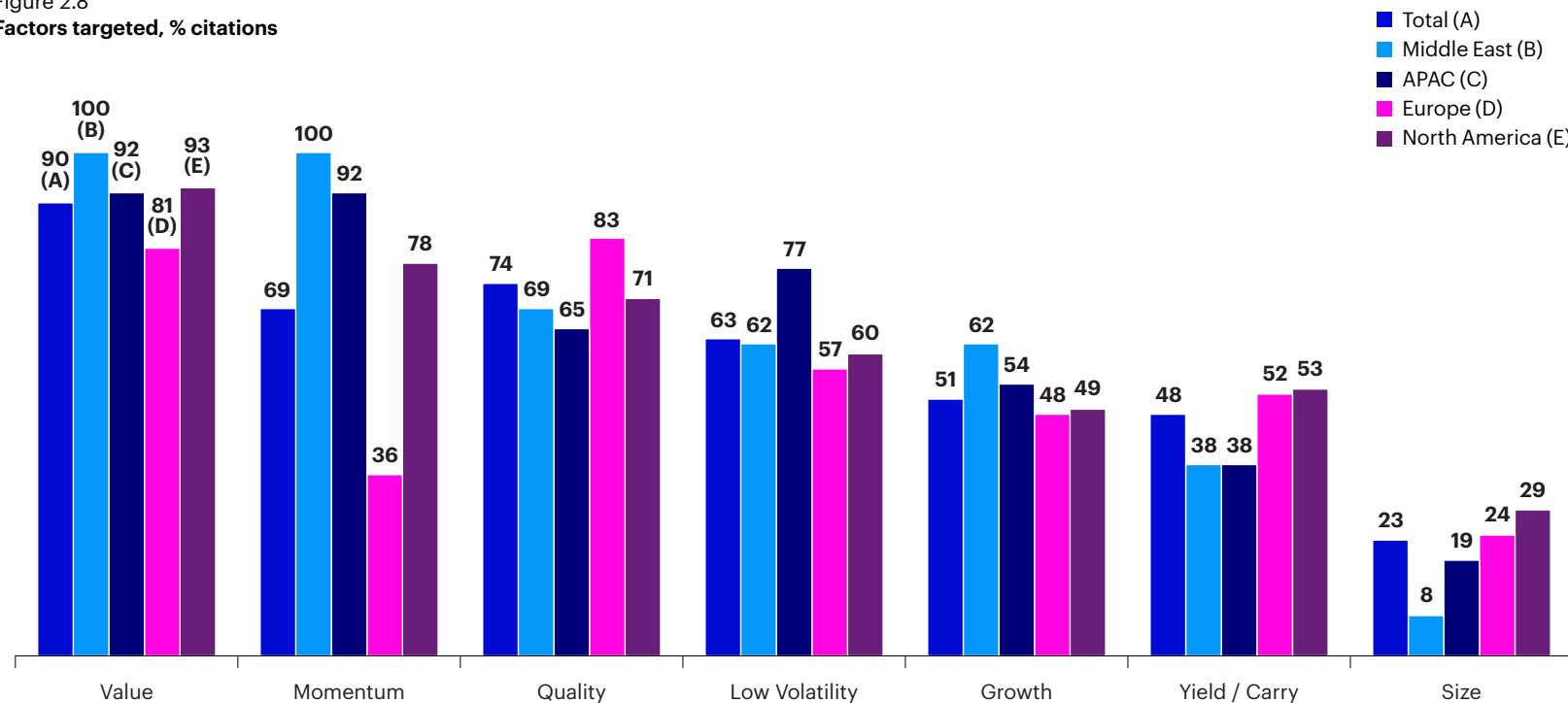
In North America, for instance, there is a strong preference for Value (93%), with Momentum (78%) and Quality (71%) also being widely adopted. The relatively high adoption of Yield/Carry (53%) compared to other regions is also noteworthy. A North American institutional investor explained their approach, “We’ve found that combining Value and Momentum provides a good balance, whilst our focus on Yield/Carry factors helps in the current interest rate environment.”



Some of the typical factors we focus on have done poorly in the US but well in Europe.

Institutional Investor  
North America

Figure 2.8  
Factors targeted, % citations



What investment factors do you explicitly seek / have exposure to within your portfolio (or client portfolios)?

European investors show the highest emphasis on Quality (83%) amongst all regions, with Value (81%) also being widely adopted. Interestingly, Momentum (36%) has a much lower adoption rate compared to other regions. This lower emphasis on Momentum can be partly attributed to the lower levels of technology stocks in European indices, with tech companies often driving momentum strategies. A European institutional investor noted, “We find that a balanced factor approach works well in European markets, given the sector diversity and the varying economic conditions across the continent.”

In the Asia-Pacific region, there’s notably high adoption of both Value (92%) and Momentum (92%) factors. Low Volatility (77%) is also more prevalent here than in other regions. “The rapid economic changes in many Asian markets mean that both Value and Momentum can be effective, but often in different market segments or at different times. We often need to be nimble in our factor allocations,” said an Asian wholesale investor.

The Middle East shows the highest adoption rates for Value (100%) and Momentum (100%), with Growth (62%) also being more prominent than in other regions. “As our markets evolve, we’re finding that different factors come into play. The high adoption of multiple factors reflects our need to be adaptable as our economies diversify,” said a Middle East-based institutional investor.

This regional variation in factor adoption reflects not just current market conditions, but also long-term economic trends, home-bias in allocations, regulatory environments, and investment cultures specific to each area. It highlights the importance of understanding local market dynamics when implementing factor strategies and the potential benefits of a regionally tailored approach to factor investing.

## Rise in dynamism translating into growth of active factor ETFs

This increased dynamism is also evident in the rising adoption of active ETFs, especially amongst wholesale investors. These instruments combine the rules-based, transparent approach of traditional ETFs with some elements of active management, typically through factor tilts or pro-active factor allocation. As a European wholesale investor explained, “Active ETFs with factor tilts allow us to offer our clients sophisticated investment strategies at a lower cost than traditional active management.”

Respondents highlighted several key advantages that are driving this popularity. Cost-effectiveness<sup>1</sup> emerged as an important benefit for some, with investors noting active ETFs offer a middle ground between low-cost passive ETFs and more expensive traditional actively managed funds. As one European wholesale investor remarked, “Active ETFs allow us to access certain strategies at a more competitive price point than traditional active management.”

The ability of active ETFs to adapt pro-actively to changing market conditions was also emphasized. A North American wholesale investor explained, “The world has been binary focused on either Growth or Value, but we believe that companies with different characteristics will potentially perform better in different periods in the economic cycle and we are looking for products that can capture it.”

This shift towards active ETFs reflects a broader trend in factor investing: the need for more dynamic, adaptable strategies that respond to changing market conditions and regional variations in factor performance. As investors become more sophisticated in their use of factors, they are increasingly seeking investment vehicles that can keep pace with their evolving strategies.

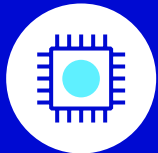
The rise of active ETFs in factor investing also speaks to a growing recognition factor performance can vary significantly across different market regimes and geographic regions. By offering more flexible factor exposures, active ETFs were seen as a tool to capitalize on these variations more effectively than traditional static products.

<sup>1</sup> Since ordinary brokerage commissions apply for each buy and sell transaction, frequent trading activity may increase the cost of ETFs.

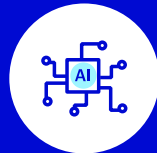
# AI's expanding role: From investment tool to strategic imperative



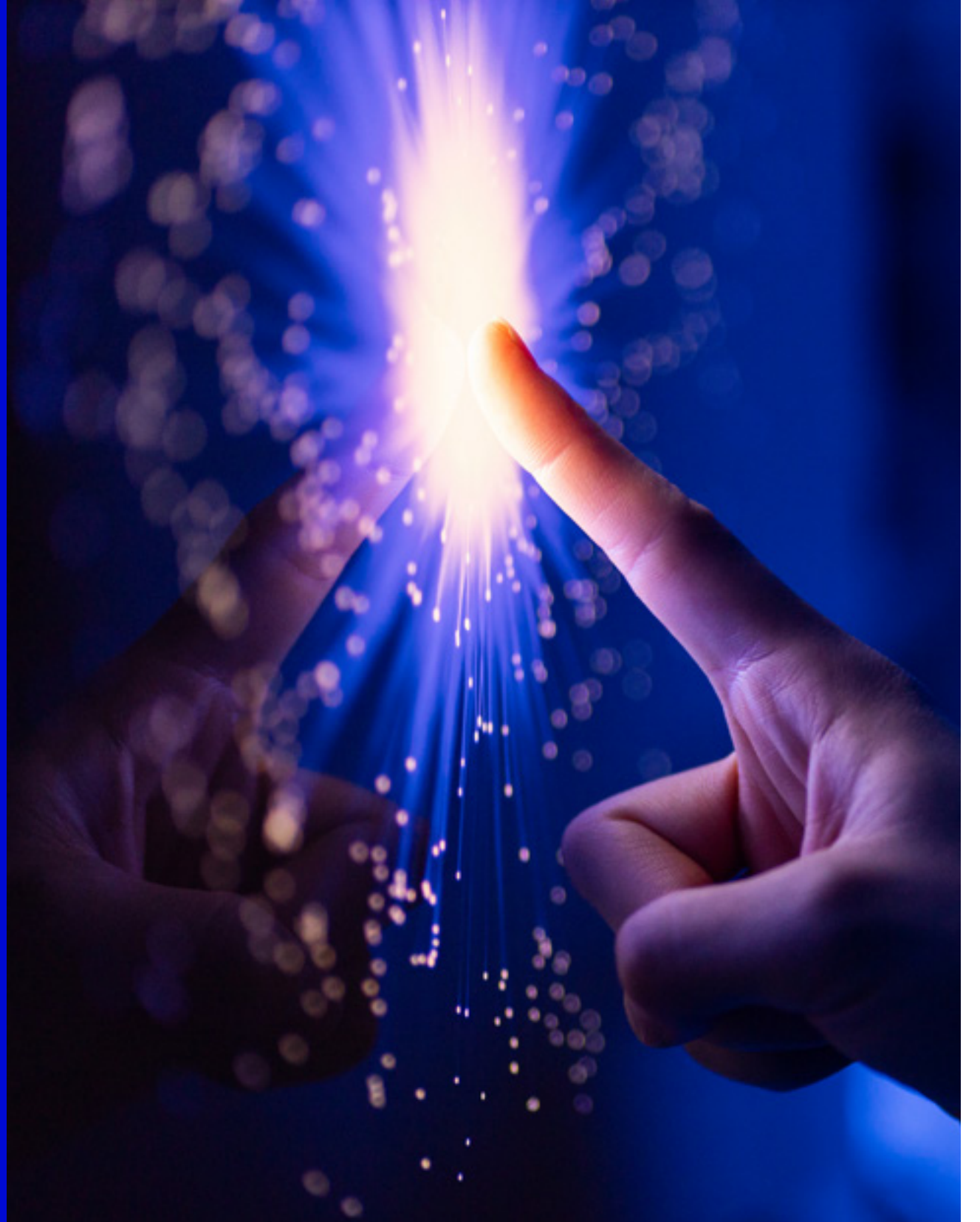
AI adoption in investment processes continues to grow, with over half of investors now incorporating AI in some form



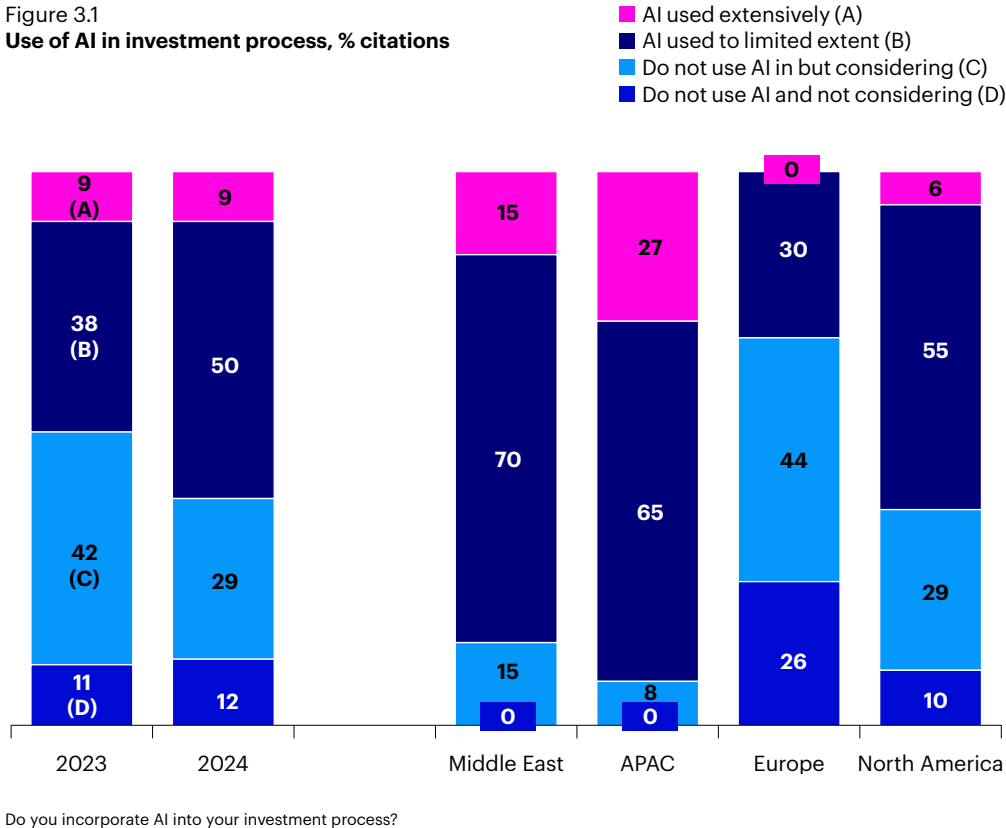
Generative AI is opening new opportunities, helping to uncover hidden market inefficiencies and spawn innovative strategies



While investors see significant potential in AI, challenges around interpretability and data quality persist



The investment landscape is undergoing a transformation as artificial intelligence (AI) rapidly evolves from a peripheral tool to a cornerstone of modern investment strategies. Our latest study reveals a significant leap in AI adoption, with 59% of investors now incorporating AI into their investment processes, up from 47% in the previous year **(figure 3.1)**.



AI is advancing more rapidly than many anticipated. It's become a critical factor in our investment process.

Institutional Investor  
APAC

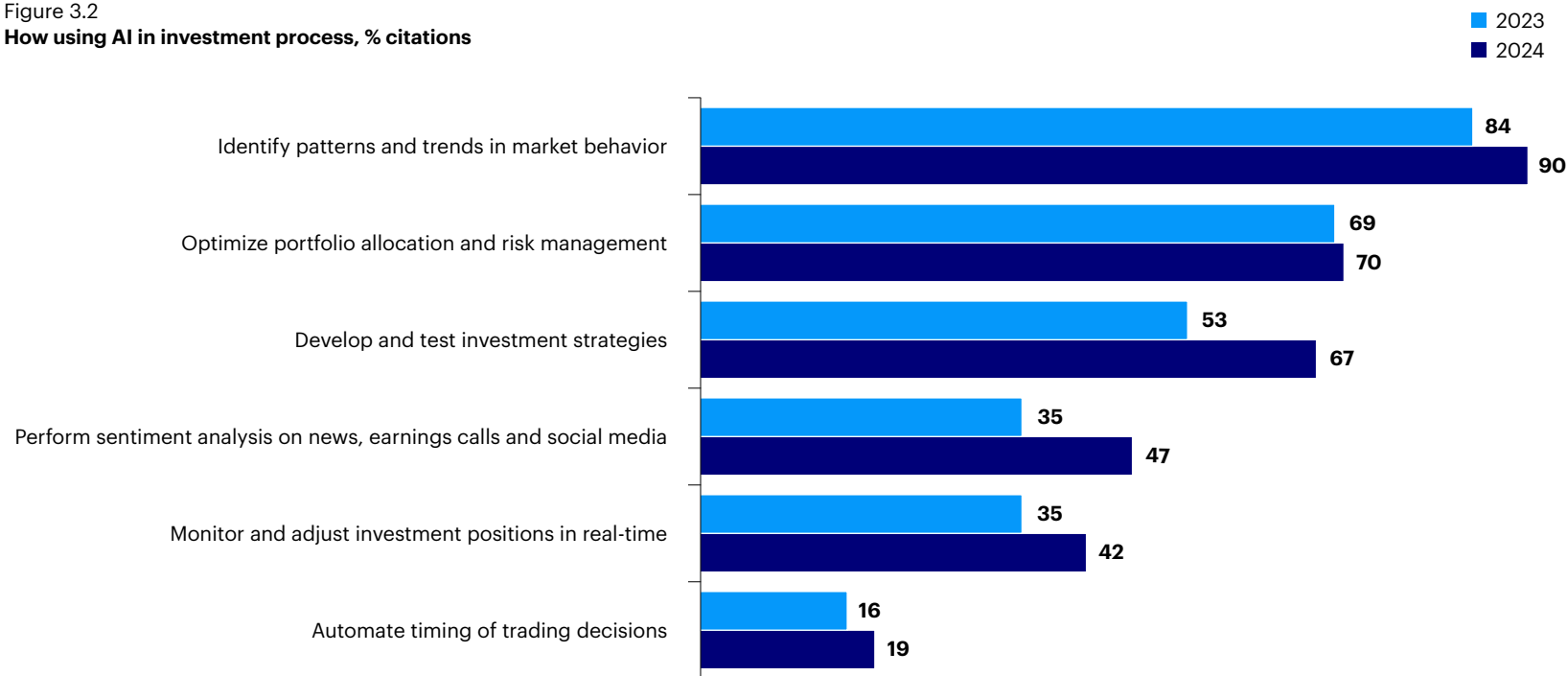


The applications of AI in investment are diverse and expanding. Pattern recognition in market behavior remains the most prevalent use, cited by 90% of respondents, up from 84% last year (figure 3.2). This is closely followed by portfolio optimization and risk management (70%, a slight increase from 69%), and the development and testing of investment strategies (67%, a substantial rise from 53%).

Emerging AI applications are gaining traction rapidly. For instance, 47% of respondents now employ AI for sentiment analysis of news, earnings calls, and social media, up from 35% last year. This real-time gauge of market sentiment offers a potential edge in fast-moving markets. As an institutional investor from North America noted, "AI enables us to process vast amounts of data that was previously inaccessible."

Furthermore, 42% of respondents now use AI to monitor and adjust investment positions in real-time, up from 35%. This application demonstrates AI's potential not only to inform investment decisions but also to execute them with unprecedented speed and precision. An institutional investor from APAC shared, "We use AI modules to monitor our investments and automate the timing of trading decisions. This has enabled us to measure, and up to a certain level, control risks." Echoing this sentiment, a North American wholesale investor added, "The use of AI in execution has proven to be incredibly valuable."

Figure 3.2  
How using AI in investment process, % citations



## AI applications across investment strategies

Our study reveals investors see varying levels of importance for AI across different investment styles. Systematic/factor strategies are viewed as the most likely to benefit from AI, followed by fundamental active strategies and market-weighted (passive) approaches.

For systematic/factor strategies, AI is seen as crucial, scoring 7.9 out of 10 in importance (figure 3.3). Managing factor exposures emerged as the most significant application, closely followed by analyzing factor interactions. Investors are also leveraging AI for identifying new factors, constructing portfolios, and forecasting factor returns. An institutional investor from North America commented: "AI is revolutionizing how we approach factor investing. It is helping us uncover new factors and understand non-linear interactions that were previously hidden. This is opening up new avenues for alpha generation."

For fundamental active strategies, AI scored 7.4 out of 10 in importance. Risk management stands out as the primary application in this area, with portfolio construction and securities selection also featuring prominently. Sentiment analysis, enabled by AI's natural language processing capabilities, is gaining traction as well. A North American institutional investor explained: "AI is enhancing our fundamental analysis, not replacing it. It is helping us process information more quickly and identify patterns that might escape human analysis. This allows our team to focus on higher-level strategic decisions."

Even for market-weighted (passive) strategies AI is still seen as important, scoring 6.7 out of 10. Automated rebalancing emerged as the key application in this area, followed closely by portfolio construction. AI is also being employed to minimize tracking error

and transaction costs, both crucial components of successful passive investing. A European wholesale investor noted: "AI is helping us optimize our processes. It's particularly valuable in minimizing tracking error and transaction costs, which directly impact the returns we can deliver to clients."

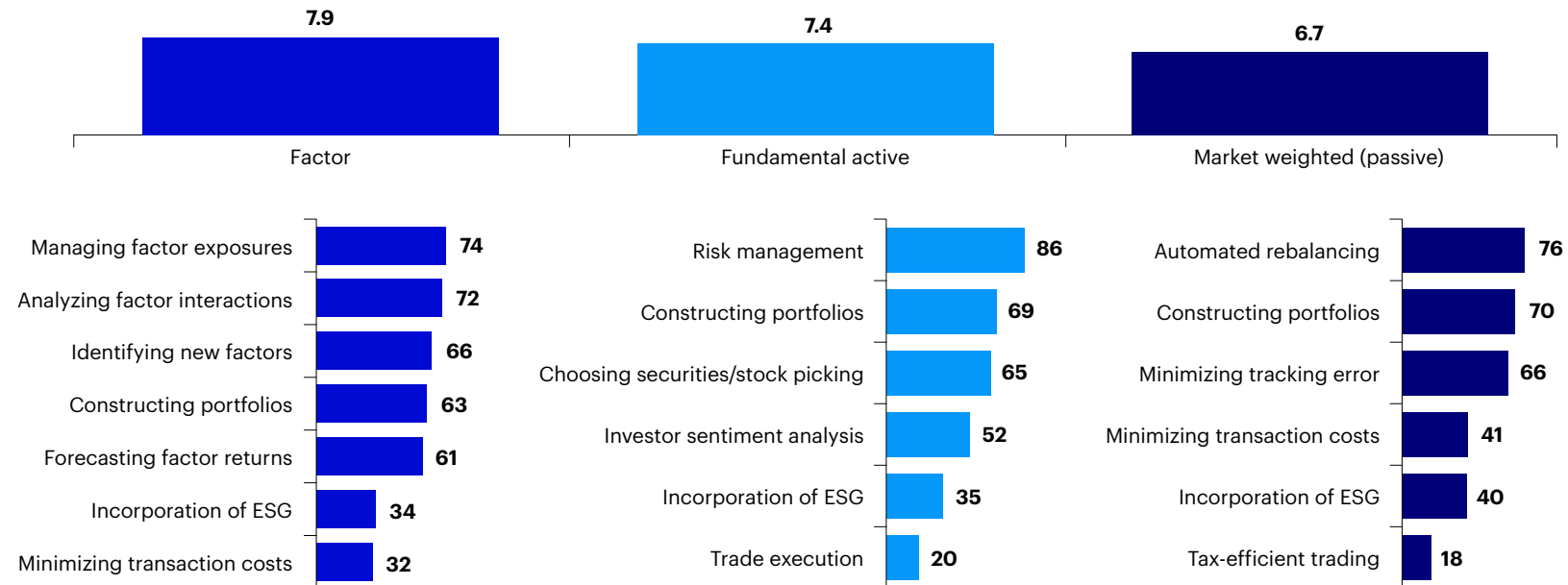
Interestingly, the incorporation of Environmental, Social and Governance (ESG) considerations was mentioned across all strategy types, underscoring the potential for AI to facilitate more comprehensive ESG integration (a topic discussed further in Theme 4).



**For us it is crucial to understand the underlying economic rationale of any new factor discovered by AI before we use it in our models.**

**Wholesale Investor**  
Middle East

Figure 3.3  
Top - Importance of AI for different investment styles, score /10; Bottom - Most important uses of AI for different investment styles, % citations



How important do you think AI will become for different investment styles? For market weighted/passive strategies in which areas do you think AI will be most important? For fundamental active strategies in which areas do you think AI will be most important? For factor strategies in which areas do you think AI will be most important?

## Natural language processing: a key AI application

Natural Language Processing (NLP) has emerged as a key area of AI application within investment processes. Sentiment analysis leads the pack, with 44% of respondents currently using NLP for this purpose, and 72% anticipating its use in the future (figure 3.4). An institutional investor from APAC shared their experience: “We use sentiment analysis based on X (formerly Twitter) data in our systematic models. It helps us to digest big data and include not only quantitative but also qualitative elements in our analysis.”

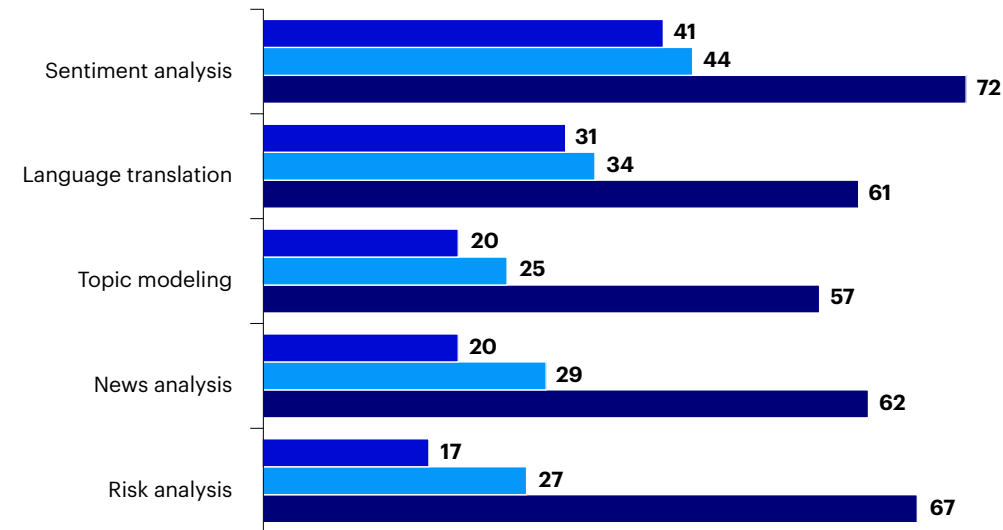
NLP is also being used to analyze earnings call transcripts, not just for content but also for tone and sentiment. An institutional investor from North America explained: “AI can parse text information and detect nuances in earnings calls even experienced humans might miss. It can capture intonation, analyze word choice, and identify subtle changes between calls.”

Language translation (34% current use, 61% future use) is another important application of NLP. This capability is particularly valuable for investors operating in global markets, allowing them to quickly process and analyze information in multiple languages. As one European investor noted, “NLP-powered translation has significantly expanded our research capabilities in emerging markets where English-language information is limited.”

Topic modeling (25% current use, 57% future use) is gaining traction as a way to identify emerging trends and themes across large volumes of text data. This technique can help investors spot new investment opportunities or potential risks before they become widely recognized.

The growing importance of NLP is also reflected in how firms are adapting their processes. Many respondents reported developing in-house NLP capabilities or partnering with specialized firms to leverage these technologies.

Figure 3.4  
Use of natural language processing in the investment process, % citations



What types of Natural Language Processing (NLP) techniques do you use in your investment process?

## The promise of generative AI

Generative AI is seen as having significant potential to generate alpha, with 59% of respondents believing it can play a significant role in identifying market inefficiencies and 55% seeing a significant role for generative AI in developing creative investment strategies (figure 3.5).

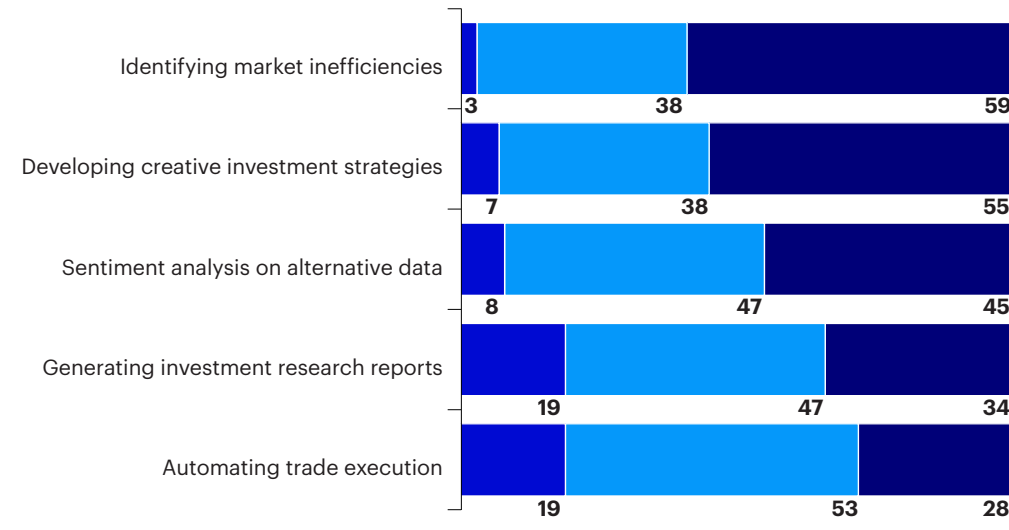
A wholesale investor from Europe commented: “The next stage of development is AI integration with existing portfolios. We are looking at AI to be able to make suggestions such as shifting assets between sectors to improve efficiency, enhance returns, or rebalance factors.”

The potential applications of generative AI in investment are wide-ranging. Some investors are using it to generate and test thousands of potential trading strategies, far more than a human team could develop manually. Others are exploring its use in scenario analysis, using generative AI to create a wide range of possible future market scenarios to stress-test their portfolios.

An institutional investor from Europe shared: “We’re exploring AI’s potential for developing new investment strategies, particularly in areas where traditional methods might miss complex patterns.” Another added, “We’re looking into using AI for finding non-linear relationships in areas like bond-equity correlations.”

However, investors are more cautious about using generative AI for trade execution, with only 28% seeing a significant role for it in this area. An institutional investor from North America explained: “While we’re enthusiastic about using generative AI for strategy development, we’re more hesitant about applying it directly to trade execution. The stakes are simply too high to fully automate this process without human oversight.”

Figure 3.5  
Applications for generative AI, % citations



How can generative AI models be leveraged to generate alpha?

## Benefits and challenges of AI in investment processes

Investors see multiple benefits in incorporating AI into their investment processes. Improved risk management leads the pack, cited by 81% of respondents (up from 75% last year), followed closely by more accurate and timely insights (75%, up from 73%) and increased efficiency and automation (70%, up from 61%) (figure 3.6).

An institutional investor from North America elaborated: “AI helps identify potential pitfalls that we can hedge against or take advantage of. It can process vast amounts of data to spot risks that humans might overlook.”

The efficiency gains from AI are also significant. An institutional investor from APAC noted: “We have been able to speed up our investment decision making process. The benefit here is to not replace our market research, but free up time to learn what’s out there.”

However, the adoption of AI is not without challenges. Complexity and interpretability of AI models remain the top concern, cited by 78% of respondents, up from 72% last year (figure 3.7). This is followed by data quality and completeness (67%, up from 48%) and the cost of implementation (53%).

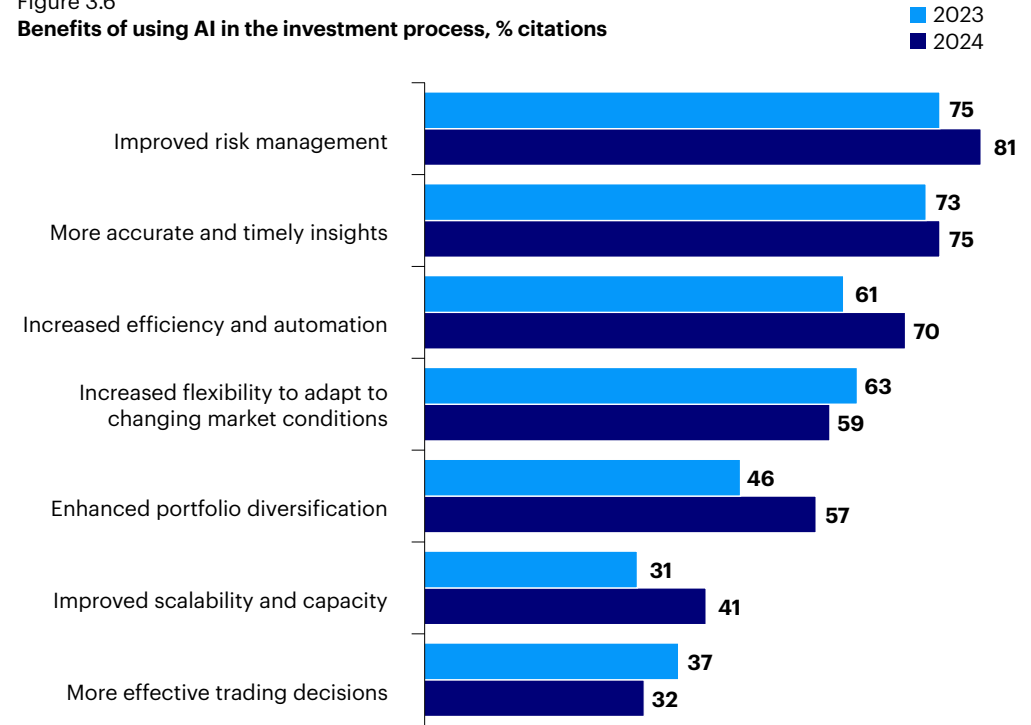
An institutional investor from North America highlighted a specific concern: “Many boards are concerned about AI potentially leaking sensitive information about plans or trading processes, leading to front-running risks.” Another institutional investor from Europe added, “Once AI-derived strategies become common knowledge, they may lose effectiveness.”

The ‘black box’ nature of some AI models poses particular challenges in the heavily regulated investment industry. As one Middle Eastern institutional investor put it, “We need to be able to explain our investment decisions to stakeholders, which can be challenging with complex AI models.”

Data quality is another crucial issue. As one APAC-based wholesale investor noted, “The quality and completeness of data is crucial for AI applications. We spend a significant amount of time cleaning and preparing data before we can apply AI techniques.”

Figure 3.6

Benefits of using AI in the investment process, % citations



What do you see as the main benefits of using AI in the investment process?



**We are concerned that when you send data to a large language centre you have effectively given that company the right to see your data and models.**

**Institutional Investor**  
Middle East



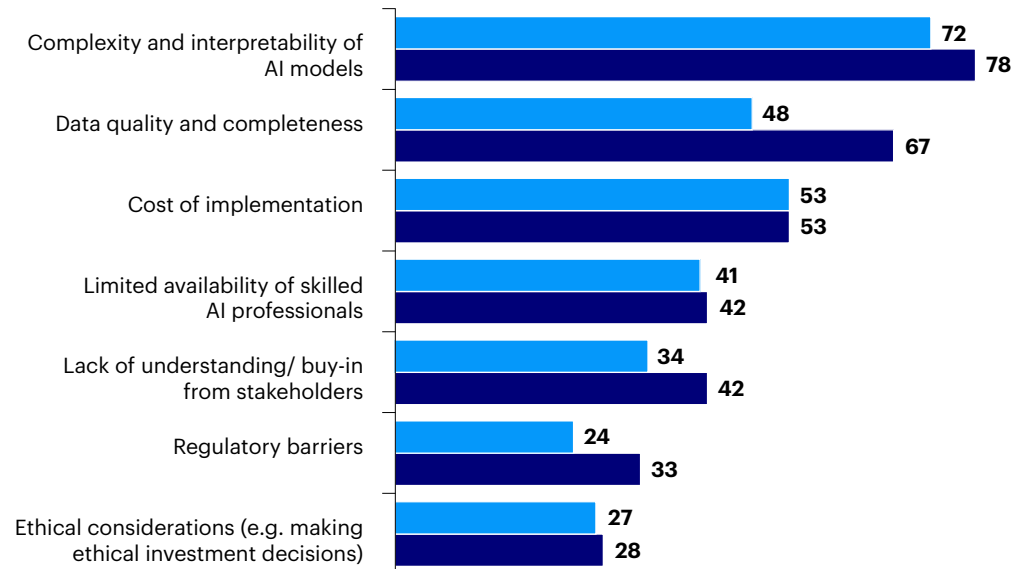
## Ethical considerations and regulatory challenges

As AI becomes more prevalent in investment processes, ethical considerations and regulatory challenges are also coming to the fore. While only 28% of respondents cited ethical considerations as a current challenge in implementing AI (figure 3.7), many anticipate this becoming a more significant issue in the future. Key ethical concerns include the potential for AI to perpetuate or amplify biases, the fairness of AI-driven investment decisions, and the implications of AI for market stability.

Regulatory challenges were cited by 33% of respondents, up from 24%, with a number of respondents concerned the regulatory landscape is struggling to keep pace with rapid technological advancements. Many respondents expressed a need for clearer regulatory guidance on the use of AI in investment processes.

A North American wholesale investor commented: "The regulatory framework is still evolving. We are seeing increased scrutiny from regulators, particularly around issues of model risk management and algorithmic trading. Clear guidelines and standards for the use of AI in investment processes will be crucial as adoption continues to grow."

Figure 3.7  
Challenges of using AI in the investment process, % citations



What are the main challenges of using AI in the investment process?

## The Future Role of AI in Investment Processes

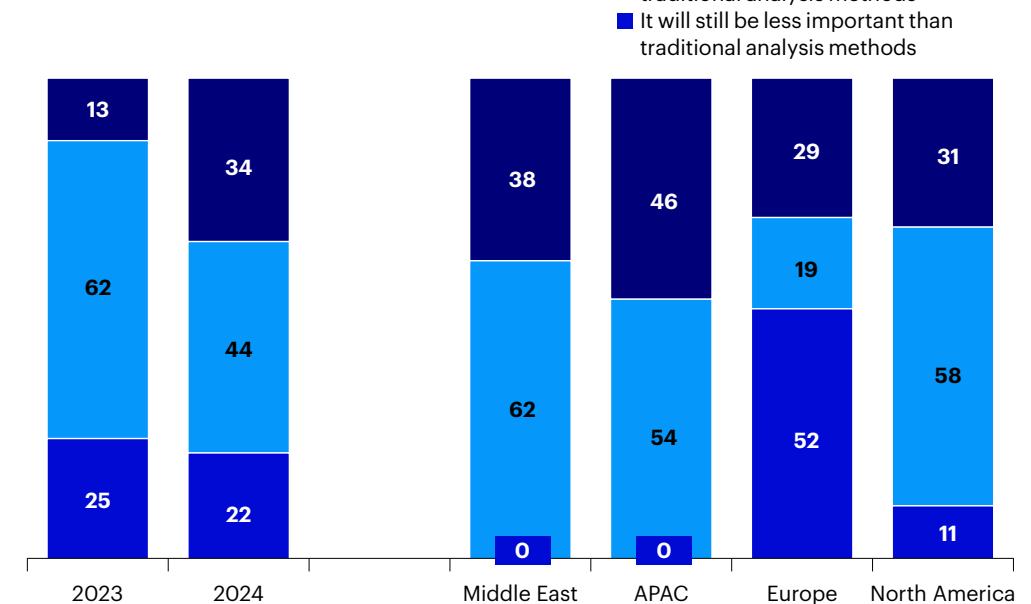
Looking ahead, investors anticipate AI playing an increasingly important role in investment processes. 34% of respondents expect AI to become more important than traditional analysis methods in the next 10 years, while 44% believe it will become equally important (figure 3.8).

An institutional investor from North America shared this: "Over the next decade, systematic investing will grow significantly. We've reached the limits of human analysis, but AI and machine learning can provide customization across thousands of stocks."

Many respondents also anticipate AI playing a crucial role in personalizing investment strategies. A European wholesale investor commented, "AI could allow us to create highly customized portfolios that align precisely with each client's risk tolerance, goals, and values. This level of personalization was simply not feasible before AI."

However, not all investors see AI replacing traditional methods. Another institutional investor from North America noted: "AI will be complementary, just another consideration within the mix, much like ETFs were 10-15 years ago. There will be new trends to discover and develop - it's a new current in the investment world."

Figure 3.8  
Importance of AI in investment process in 10 years' time, % citations

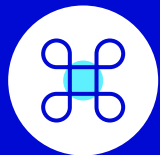


How do you see the role of AI in the investment process evolving in the next 10 years?

# An active approach to ESG: The rise of customized, systematic strategies



The ESG landscape is undergoing a transformation as investors increasingly demand highly customized solutions to meet their unique sustainability objectives



Systematic approaches have emerged as the vanguard of this evolution, offering the flexibility and scalability required to create highly tailored ESG strategies



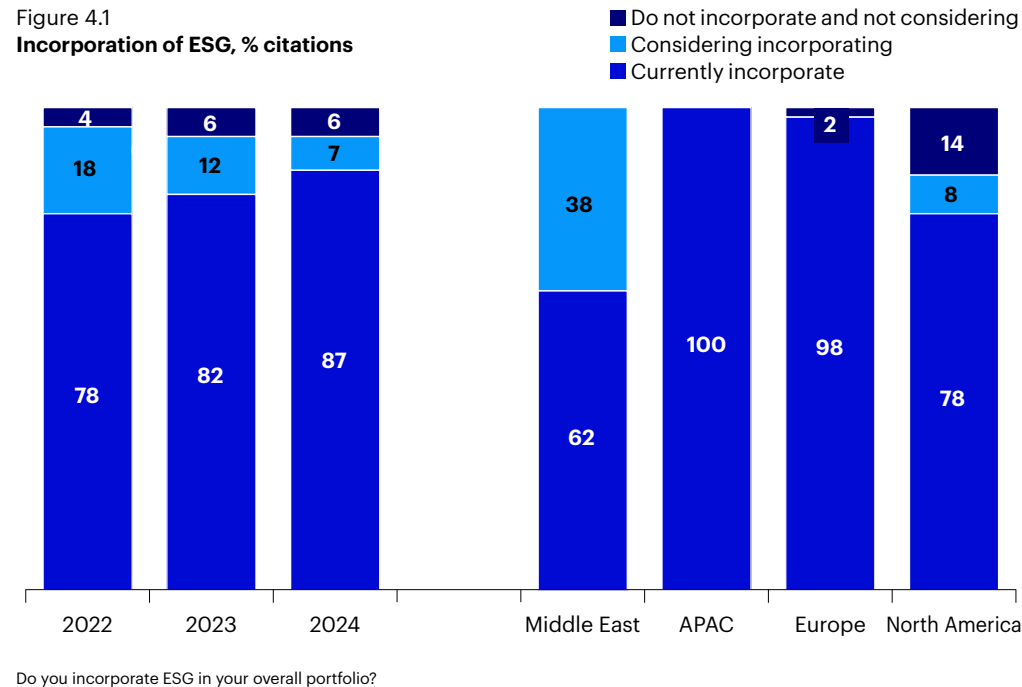
The development of proprietary ESG methodologies and adoption of advanced analytical tools reflect investors' drive for more bespoke sustainability assessments



The landscape of Environmental, Social, and Governance (ESG) investing is witnessing a shift as investors increasingly demand highly customized, bespoke solutions to meet their unique sustainability objectives. Our study reveals ESG integration has become nearly ubiquitous, with 87% of surveyed investors now incorporating ESG considerations into their portfolios, up from 82% in the previous year (**figure 4.1**). This widespread adoption underscores not just the growing importance of sustainability in investment decision-making, but also the pressing need for more tailored approaches.

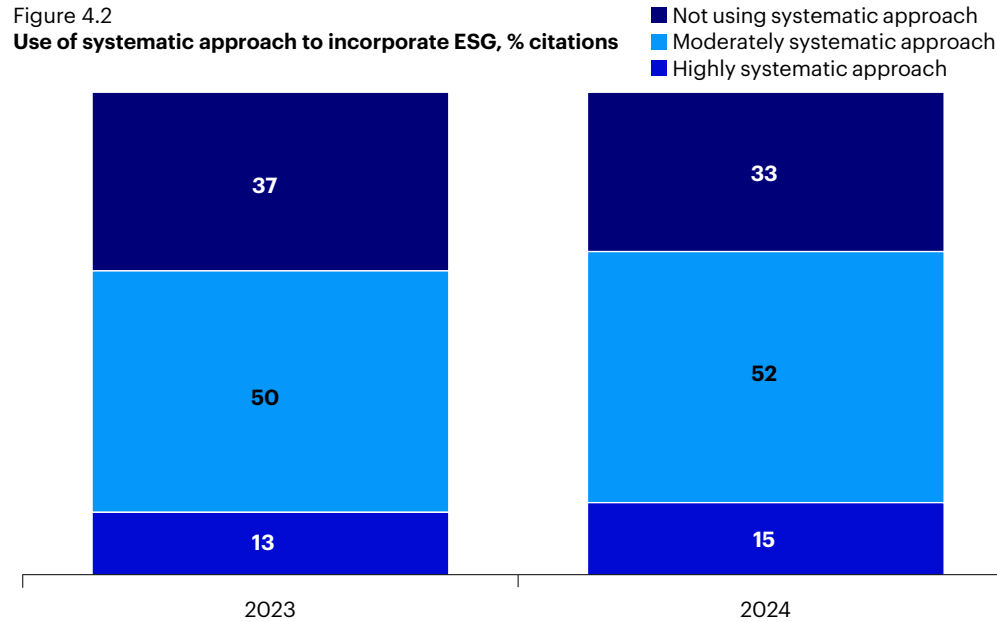
“  
**A systematic approach helps to improve the overall performance and diversify the portfolio to obtain similar returns to a non-ESG portfolio.**  
 Institutional Investor  
 North America

In response to this demand, systematic approaches have emerged as a key tool with investors identifying data-driven strategies offer the flexibility and scalability required to create bespoke ESG solutions that align precisely with their specific goals, risk tolerances, and ethical considerations. By leveraging advanced analytics and quantitative techniques, systematic approaches are enabling investors to move beyond one-size-fits-all ESG products and develop truly custom sustainability strategies.



A shift towards systematic ESG investing is evident in our findings, with 67% of investors now employing a systematic approach (up from 63% last year). Notably, 15% characterize their integration of ESG as highly systematic, indicating a growing recognition of the power of quantitative methods to deliver customized ESG outcomes (figure 4.2).

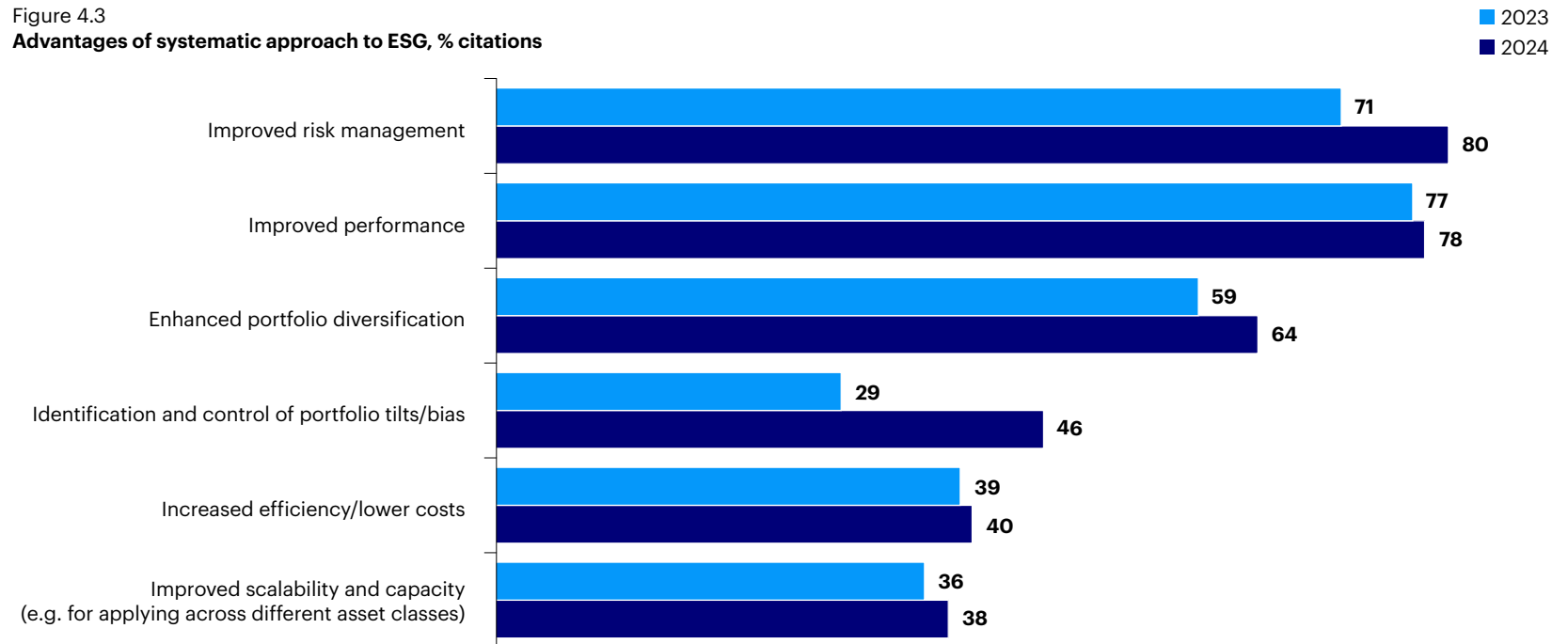
As one institutional investor from Europe noted, “Off-the-shelf ESG solutions no longer suffice. We need the ability to fine-tune our ESG approach to reflect our specific priorities and the unique ESG challenges in our investment universe. Systematic strategies give us the tools to do that.” A wholesale investor from Europe added: “We have run ESG and sustainable propositions and products for 20 years because of the nature of our client base. Over time, we’ve had to become increasingly sophisticated in our approach to meet the diverse and evolving needs of our clients.”



To what extent are you using a systematic approach to implement ESG?

Respondents noted a key advantage of a systematic framework was the ability to integrate ESG factors more precisely, avoiding unintended risks, biases or sector tilts that could negatively impact performance. This is reflected in 80% of respondents citing improved risk management as a key benefit of a systematic approach, and 78% identifying improved performance (figure 4.3). Interestingly, the benefit of controlling portfolio tilts and biases has seen the largest year-on-year increase, rising to 46% as investors recognize the role of systematic strategies in creating truly bespoke portfolios that mitigate unintended consequences of ESG implementation.

An institutional investor from North America elaborated on this point: “Our systematic approach allows us to identify companies that are ESG leaders or improvers in their sectors, which we believe will translate into financial outperformance over time.”



What are the advantages of a systematic approach to applying ESG?

## The rise of customized systematic tools in ESG implementation

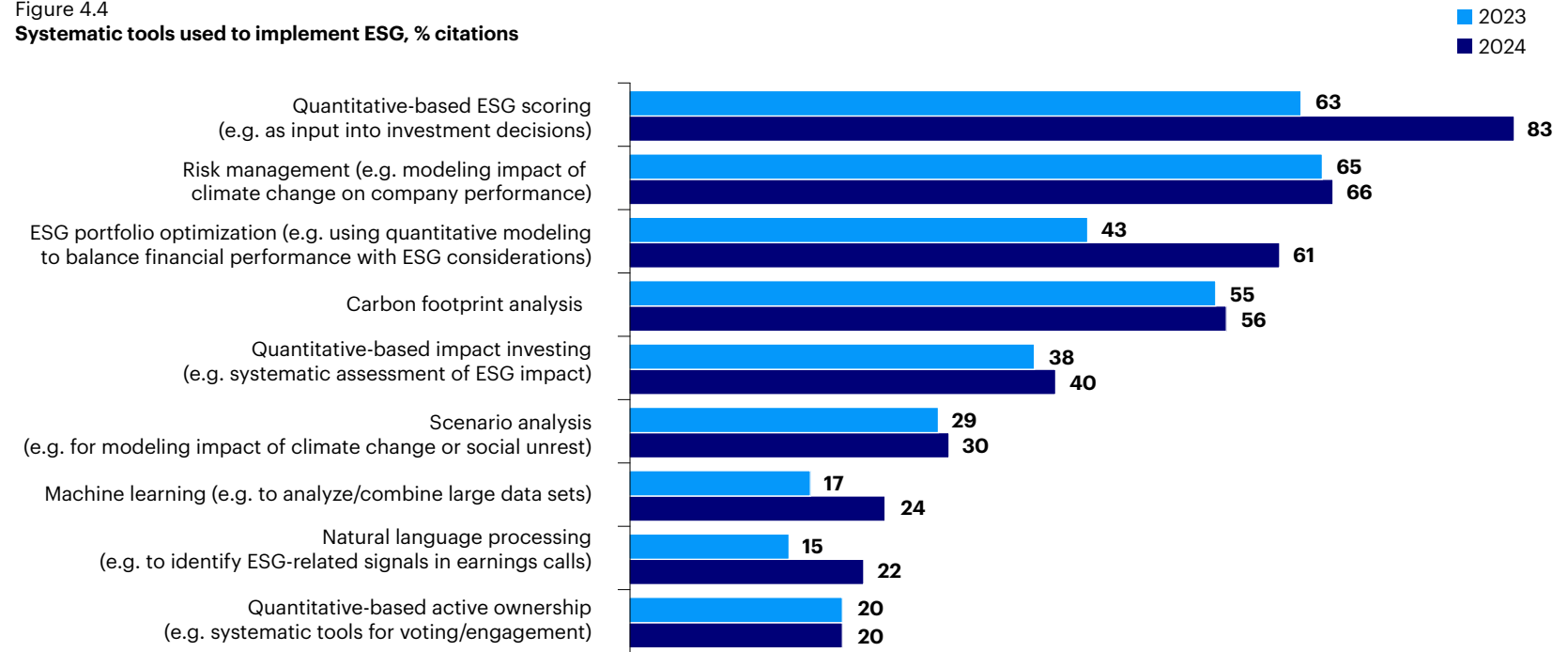
Among the tools being used for systematic ESG integration, quantitative-based scoring systems and risk management tools have the highest rates of adoption, cited by 83% and 66% of respondents respectively (figure 4.4). ESG portfolio optimization has seen a marked increase in uptake, rising from 43% last year to 61% this year as investors put more emphasis on balancing ESG goals with financial performance.

An institutional investor from North America emphasized the importance of these tools in creating customized solutions: “Portfolio optimization is one of the most valuable use cases for systematic tools within ESG. It allows us to balance our specific ESG priorities with our financial objectives in a way that’s tailored to our investment mandate.”

The use of systematic tools is also enabling more sophisticated, customized carbon management strategies. Our study shows 56% of investors are using carbon footprint analysis tools, while 30% are employing scenario analysis. This reflects a focus on climate-related risks and opportunities within ESG investing, with investors seeking to tailor their approach to their specific carbon reduction goals and climate risk tolerances.

Figure 4.4

Systematic tools used to implement ESG, % citations



What systematic tools/methodologies are you using to implement ESG?



## The development of proprietary ESG metrics

In line with the drive for greater customization, half of the institutional investors interviewed have created in-house ESG ratings (**figure 4.5**). This move is often driven by dissatisfaction with available solutions, with these proprietary approaches going beyond off-the-shelf ratings to align precisely with each investor's unique perspective on sustainability.

An institutional investor from North America shared their thinking: "We found that off-the-shelf ESG ratings often didn't capture the nuances of certain industries or align with our investment philosophy. By developing our own methodology, we can ensure our ESG assessments are fully aligned with our investment process and reflect the specific ESG factors we believe are most material to financial performance."

The development of customized ESG metrics follows diverse paths, reflecting the varying resources and expertise of different investors. Among those who have developed proprietary metrics, 53% did so through external collaboration with ratings providers or consultants. This approach allows investors to leverage external expertise while still tailoring the methodology to their specific needs. Meanwhile, 36% relied entirely on in-house research teams, indicating a significant commitment to building internal ESG capabilities. A smaller proportion, 11%, collaborated with asset managers to develop their bespoke ESG metrics (**figure 4.6**).

One institutional investor highlighted their in-house metrics provide granular, industry-specific factors

such as supply chain management, product life-cycle assessments, and the outcomes of company engagements in order to arrive at a more holistic ESG view tailored to their investment universe.

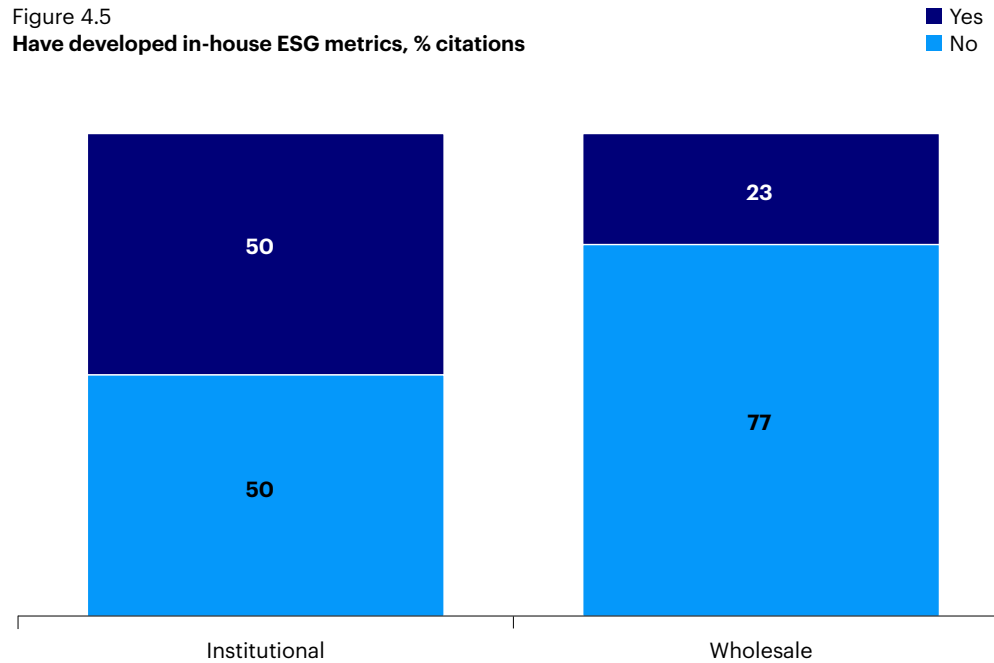
Wholesale investors, while less likely to develop fully proprietary methodologies, are also seeking ways to customize their ESG approach. Many are integrating data from multiple sources into their fund selection models, allowing for a more tailored ESG assessment. A wholesale investor from Europe explained: "We've developed a proprietary framework for combining and weighting ESG data from multiple providers. This allows us to create a more robust ESG assessment that aligns with our investment philosophy and the needs of our clients."



**Custom ESG metrics capture nuances specific to our investment universe and stakeholder priorities.**

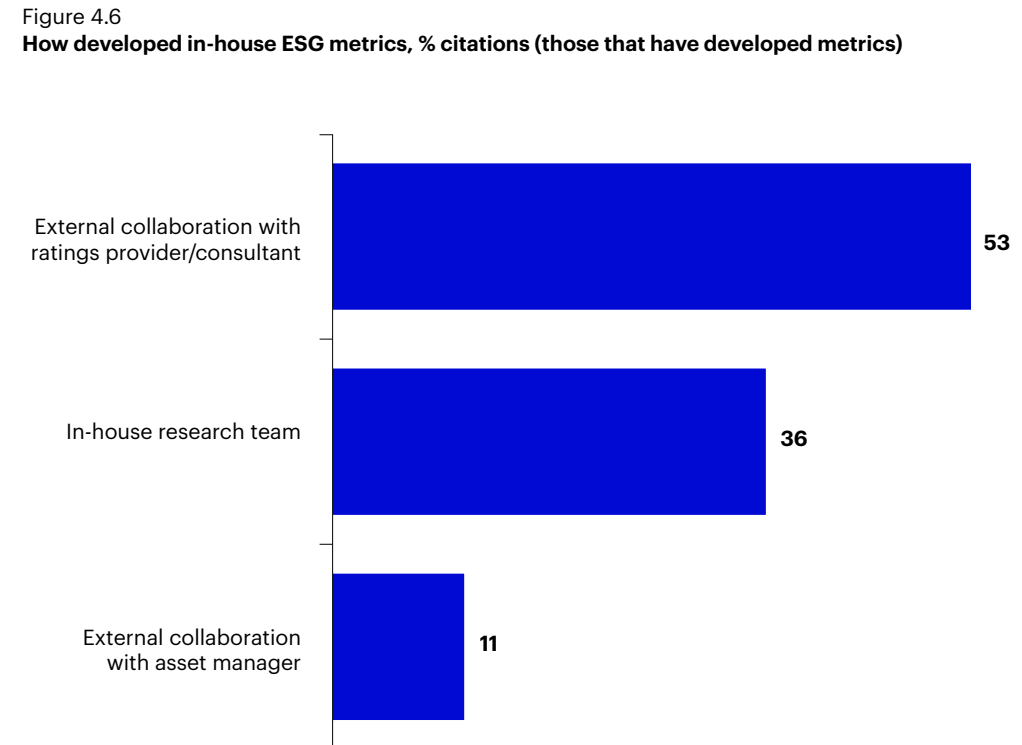
**Institutional Investor**  
APAC

Figure 4.5  
Have developed in-house ESG metrics, % citations



Have you developed your own in-house ESG metrics to rate companies/securities?

Figure 4.6  
How developed in-house ESG metrics, % citations (those that have developed metrics)



How were these developed and tested by your organization?

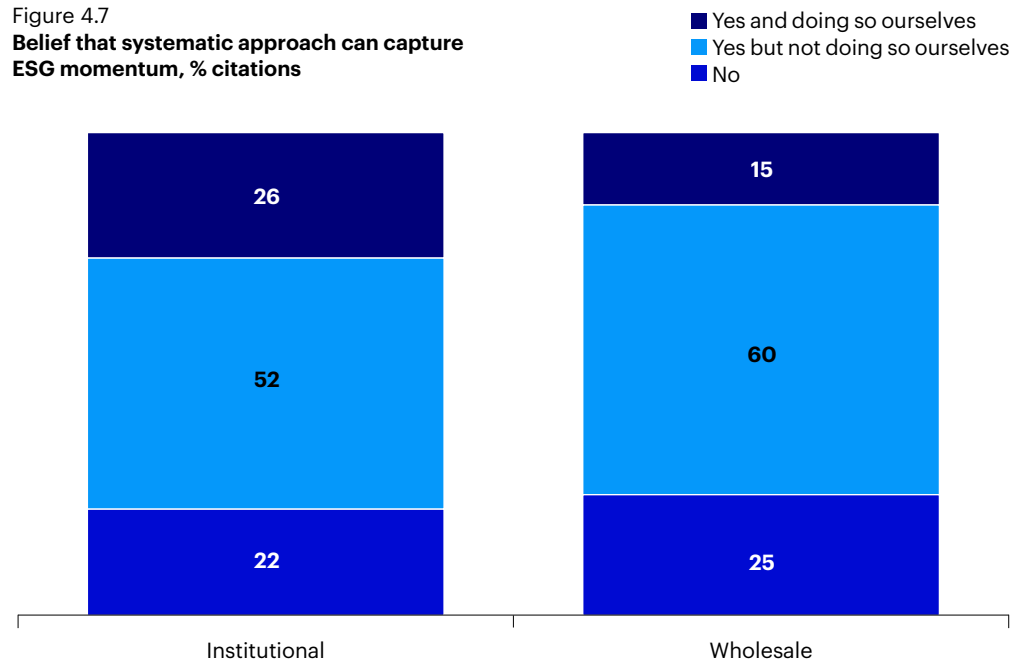
## Capturing ESG momentum: a new frontier in customization

As investors seek more sophisticated ways to tailor their ESG strategies, there's growing interest in capturing ESG momentum. Around three-quarters of investors are either already doing so or believe it is possible, seeing it as a way to create more dynamic and forward-looking ESG portfolios (figure 4.7).

Trend signals in ESG scores and emissions data lead investor interest, with 81% and 63% of respondents citing these as valuable momentum metrics respectively (figure 4.8). An institutional investor from North America explained the rationale: "Momentum data shows where the market is going and allows you to get ahead of the trends. It's another layer of customization that allows us to align our portfolio with improving ESG practices."

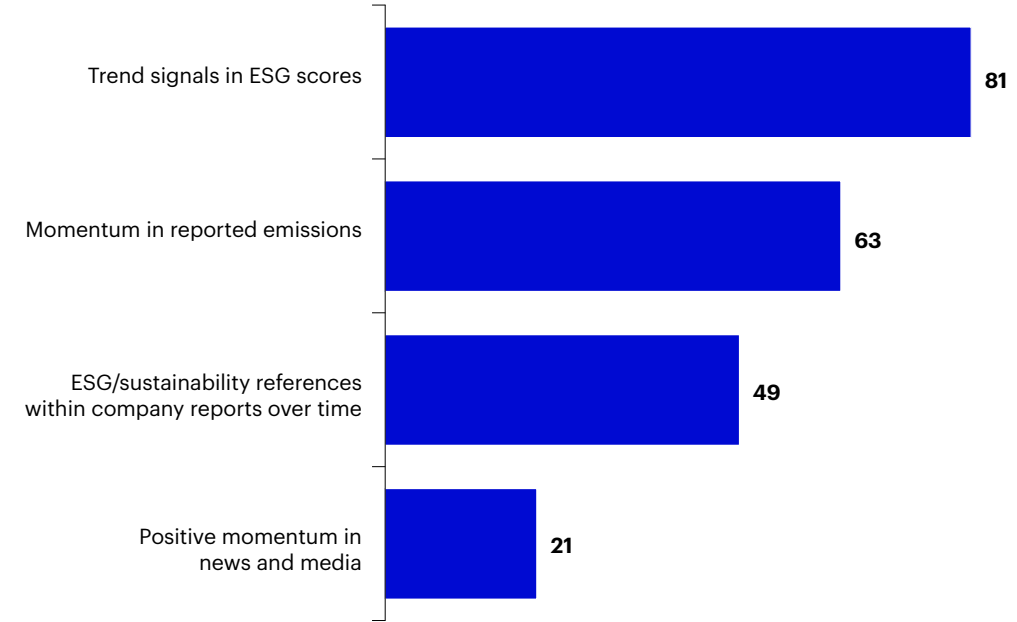
ESG momentum is increasingly seen as predictive of future financial performance and an indicator of management quality, potentially offering alpha generation opportunities. This represents a shift from static ESG assessments to more dynamic, forward-looking approaches that can be tailored to each investor's view on the relationship between ESG improvement and financial performance.

Figure 4.7  
Belief that systematic approach can capture ESG momentum, % citations



Do you think a systematic approach can be used to capture momentum in ESG metrics?

Figure 4.8  
Momentum metrics seen as valuable for ESG, % citations



Which of the following momentum metrics are likely to be valuable?

## Systematic strategies in ESG portfolio construction and analysis

In building ESG portfolios, investors value a variety of systematic methods. Setting minimum portfolio-level ESG scores, restricting investments in undesired sectors and limiting exposure to low-rated companies are seen as the most useful, with 55% describing each as very valuable (figure 4.9).

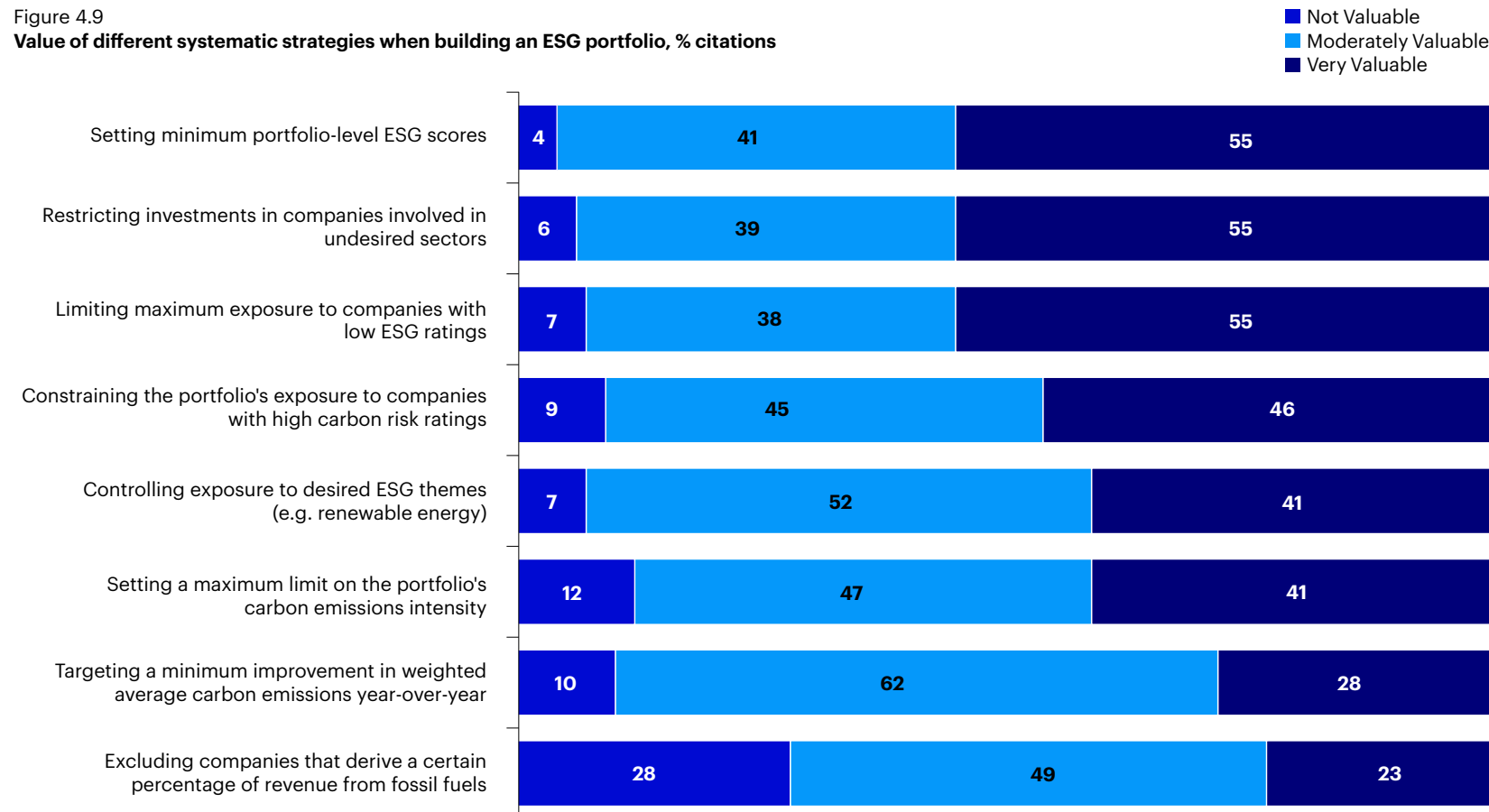
Other popular strategies include constraining exposure to companies with high carbon risk ratings (46% finding it very valuable) and controlling exposure to desired ESG themes such as renewable energy (41%). These methods reflect the growing importance of climate-related factors in ESG investing and the desire for thematic alignment in sustainable portfolios.



By excluding high-risk companies and setting ESG thresholds, we aim to capture long-term value while adhering to our sustainability principles.

Institutional Investor  
Europe

Figure 4.9  
Value of different systematic strategies when building an ESG portfolio, % citations



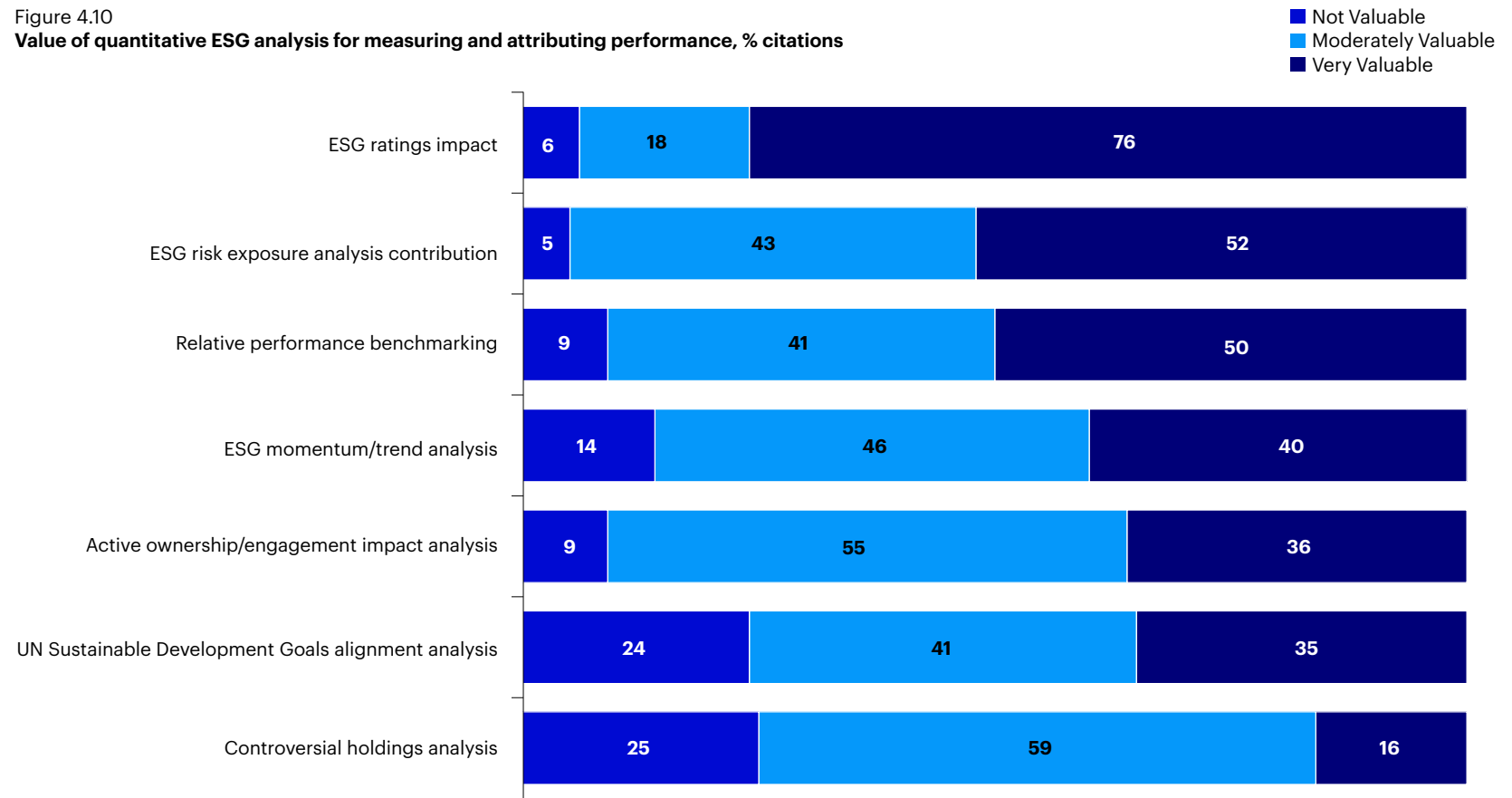
How valuable do you think the following approaches are when building an ESG portfolio?

Investors are employing equally sophisticated systematic approaches for analyzing and attributing the impact of ESG integration. The most valued method is assessing the impact of ESG ratings on performance, with 76% of respondents finding this very valuable (figure 4.10). This underscores the increased belief ESG factors can materially influence financial outcomes, both positively and negatively, highlighting the critical role of systematic analysis in understanding, and potentially mitigating, this impact.

The diversity and sophistication of these systematic strategies in both portfolio construction and performance analysis reflect the maturing nature of ESG investing. As the field evolves, investors are increasingly able to tailor their ESG approaches to specific objectives, whether that's risk mitigation, performance enhancement, or alignment with particular sustainability themes. This customization, enabled by systematic methods, is seen as key to the continued growth and effectiveness of ESG integration.

As systematic ESG strategies continue to evolve, they promise to offer new possibilities for creating highly customized, bespoke sustainability solutions. The future of ESG investing looks likely to be increasingly data-driven and integrated into core investment processes, with each investor able to precisely tailor their approach to their specific needs and beliefs.

Figure 4.10  
Value of quantitative ESG analysis for measuring and attributing performance, % citations



How valuable do think the following approaches are for analyzing and attributing performance for an ESG portfolio?

# Sample and methodology

The fieldwork for this study was conducted by NMG Consulting. Invesco chose to engage a specialist independent firm to ensure high-quality objective results. Key components of the methodology include:



A focus on the key decision makers conducting interviews using experienced consultants and offering market insights



In-depth (typically one hour) face-to-face interviews using a structured questionnaire to ensure quantitative as well as qualitative analytics were collected



Results interpreted by NMG's strategy team with relevant consulting experience in the global asset management sector



In this study, all respondents were 'systematic investors', defined as investors that employ structured, rules-based quantitative models and algorithms to make investment decisions and build portfolios. We deliberately targeted a mix of investor profiles across multiple markets, with a preference for those that were larger and/or more experienced.

In 2024 we conducted interviews with 131 different pension funds, insurers, sovereign investors, asset consultants, wealth managers and private banks globally. Together these investors are responsible for managing \$22.3 trillion in assets (as of 31 March 2024). This core study was supplemented with 20 additional in-depth interviews with highly experienced systematic investors. The breakdown of the core interview sample by investor segment and geographic region is displayed in **figures 5.1, 5.2 and 5.3**.

Institutional investors are defined as pension funds (both defined benefit and defined contribution), sovereign wealth funds, insurers, endowments and foundations.

Wholesale investors are defined as discretionary managers or model portfolio constructors for pools of aggregated retail investor assets, including discretionary investment teams and fund selectors at private banks and financial advice providers, as well as discretionary fund managers serving those intermediaries.

Invesco is not affiliated with NMG Consulting.

Figure 5.1  
Assets under management by segment (\$ trillion, as of 31 March 2024)

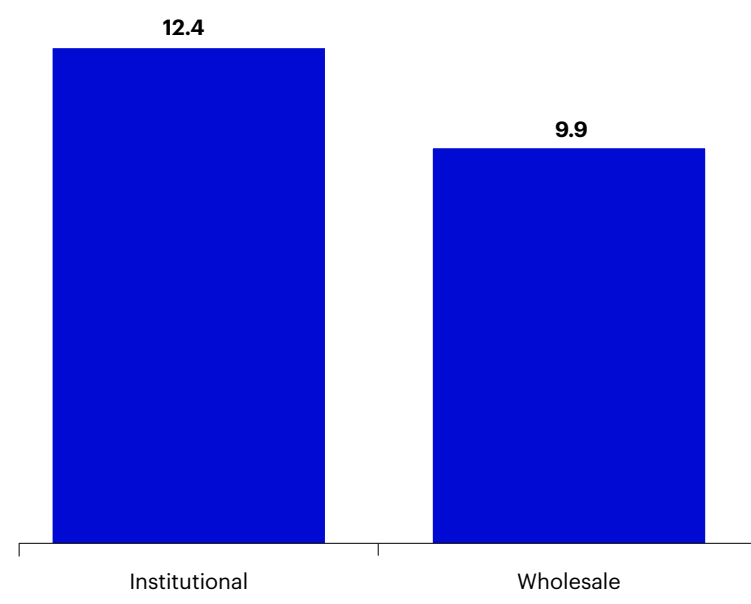


Figure 5.2  
Sample by segment

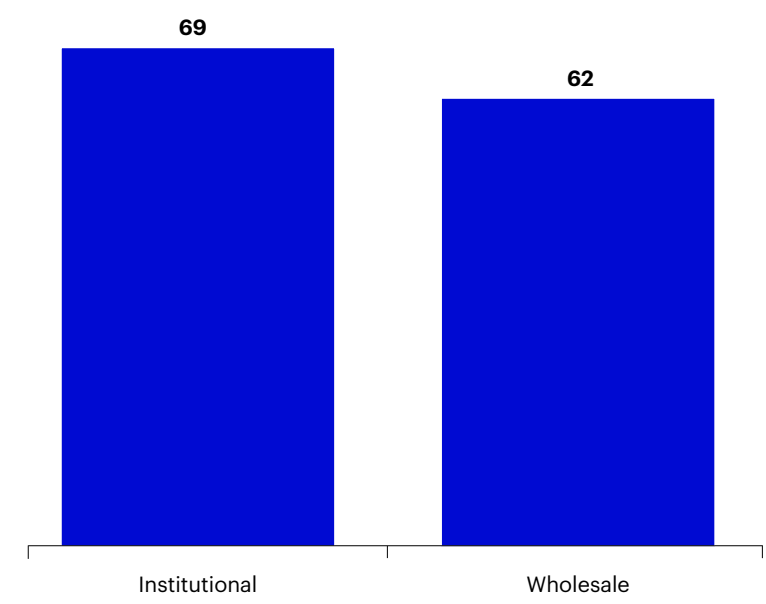
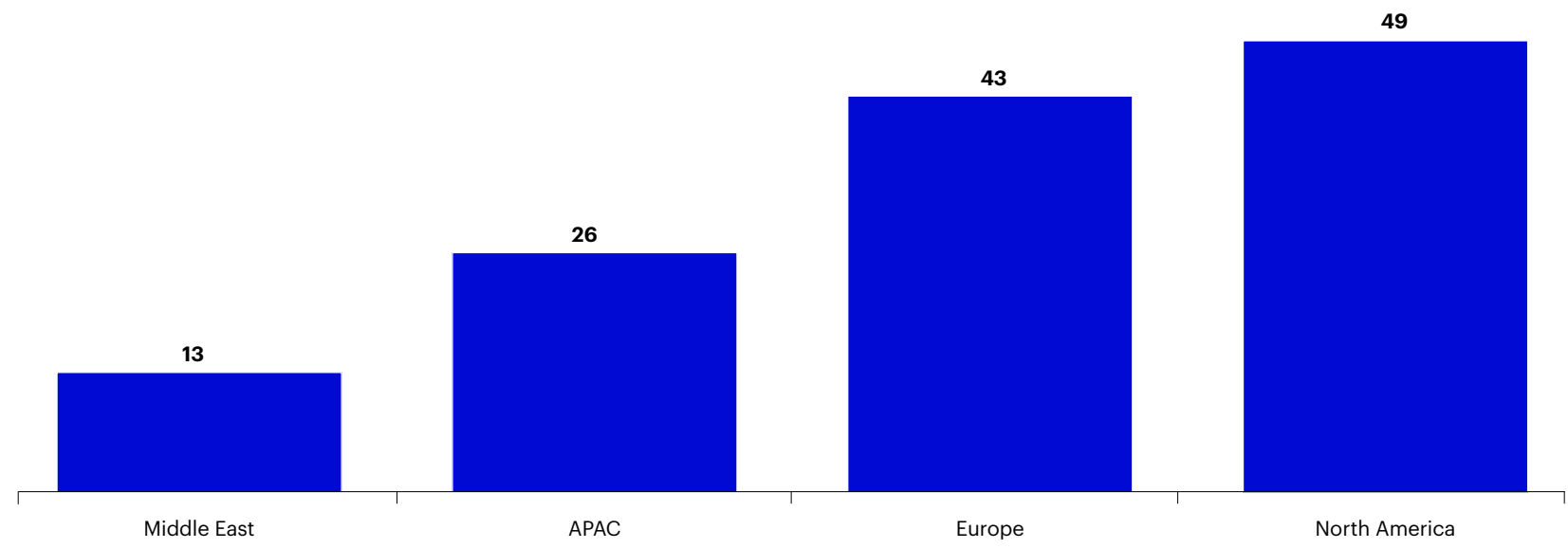


Figure 5.3  
Sample by region





## Risk warnings

The value of investments and any income will fluctuate (this may partly be the result of exchange rate fluctuations) and investors may not get back the full amount invested.

Factor investing (as known as smart beta or active quant) is an investment strategy in which securities are chosen based on certain characteristics and attributes that may explain differences in returns. Factor investing represents an alternative and selection index-based methodology that seeks to outperform a benchmark or reduce portfolio risk, both in active or passive vehicles. There can be no assurance that performance will be enhanced or risk will be reduced for strategies that seek to provide exposure to certain factors. Exposure to such investment factors may detract from performance in some market environments, perhaps for extended periods. Factor investing may underperform cap-weighted benchmarks and increase portfolio risk. There is no assurance that the investment strategies discussed in this material will achieve their investment objectives.

A value style of investing is subject to the risk that the valuations never improve or that the returns will trail other styles of investing or the overall stock markets.

Companies that issue quality stocks may experience lower than expected returns or may experience negative growth, as well as increased leverage, resulting in lower than expected or negative returns to Fund shareholders.

Momentum style of investing is subject to the risk that the securities may be more volatile than the market as a whole or returns on securities that have previously exhibited price momentum are less than returns on other styles of investing.

Of course, low volatility cannot be guaranteed.

Stocks of small-capitalization companies tend to be more vulnerable to adverse developments, may be more volatile, and may be illiquid or restricted as to resale than large companies.

Interest rate risk refers to the risk that bond prices generally fall as interest rates rise and vice versa. An issuer may be unable to meet interest and/or principal payments, thereby causing its instruments to decrease in value and lowering the issuer's credit rating.

In general, stock values fluctuate, sometimes widely, in response to activities specific to the company as well as general market, economic and political conditions.

Commodities may subject an investor to greater volatility than traditional securities such as stocks and bonds and can fluctuate significantly based on weather, political, tax, and other regulatory and market developments.

Investments in real estate related instruments may be affected by economic, legal, or environmental factors that affect property values, rents or occupancies of real estate. Real estate companies, including REITs or similar structures, tend to be small and mid-cap companies and their shares may be more volatile and less liquid.

Alternative investment products, including hedge funds and private equity, involve a high degree of risk, often engage in leveraging and other speculative investment practices that may increase the risk of investment loss, can be highly illiquid, are not required to provide periodic pricing or valuation information to investors, may involve complex tax structures and delays in distributing important tax information, are not subject to the same regulatory requirements as mutual funds, often charge high fees which may offset any trading profits, and in many cases the underlying investments are not transparent and are known only to the investment manager. There is often no secondary market for hedge funds and private equity, and none is expected to develop. There may be restrictions on transferring interests in such investments.

Investment in infrastructure-related companies may be subject to high interest costs in connection with capital construction programs, costs associated with environmental and other regulations, the effects of economic slowdown and surplus capacity, the effects of energy conservation policies, governmental regulation and other factors.

Cryptocurrency is considered a highly speculative investment due to its lack of guaranteed value and limited track record. Because of its digital nature, cryptocurrency poses risk from hackers, malware, fraud, and operational glitches. Cryptocurrency is not legal tender and are operated by a decentralized authority, unlike government-issued currencies. Cryptocurrency exchanges and accounts are not backed or insured by any type of federal or government program or bank. Currently, there is relatively limited use of cryptocurrency in the retail and commercial marketplace, which contributes to price volatility.

There are risks involved with investing in ETFs, including possible loss of money. Index-based ETFs are not actively managed. Actively managed ETFs do not necessarily seek

to replicate the performance of a specified index. Both index-based and actively managed ETFs are subject to risks similar to stocks, including those related to short selling and margin maintenance.

The use of environmental, social and governance factors to exclude certain investments for nonfinancial reasons may limit market opportunities available to funds not using these criteria. Further, information used to evaluate environmental, social and governance factors may not be readily available, complete or accurate, which could negatively impact the ability to apply environmental, social and governance standards.

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