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Georg Elsaesser, Tarun Gupta,  
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# Factor Investing in Emerging Markets: From Theory to Practice

Georg Elsaesser, Tarun Gupta, Viorel Roscovan, and Hao Zou

## Georg Elsaesser

is a senior portfolio manager at Invesco Solutions in Frankfurt, Germany.

[georg.elsaesser@invesco.com](mailto:georg.elsaesser@invesco.com)

## Tarun Gupta

is head of research and investment technology and managing director at Invesco Solutions in New York, NY.

[tarun.gupta@invesco.com](mailto:tarun.gupta@invesco.com)

## Viorel Roscovan

is a director and senior researcher at Invesco Solutions in Frankfurt, Germany.

[viorel.roscovan@invesco.com](mailto:viorel.roscovan@invesco.com)

## Hao Zou

is a research analyst at Invesco Solutions in New York, NY.

[hao.zou@invesco.com](mailto:hao.zou@invesco.com)

## KEY FINDINGS

- Enhanced factor design unlocks robust alpha in emerging markets: Moving beyond generic single-signal definitions to multi-signal, risk-controlled factors improves Sharpe ratios by nearly 70% (from 0.84 to 1.43) and eliminates unintended country and sector bets common in emerging markets.
- Implementation is crucial for emerging markets portfolios: Using a model portfolio framework enables disciplined translation of theoretical factor exposures into investable long-only strategies, achieving higher alignment (transfer coefficient 0.51 versus 0.42) and better risk-adjusted returns under real-world constraints.
- Control beats chance in emerging markets investing: Enhanced implementations explain nearly 90% of active return through intended factor exposures, compared to only 60% for generic approaches, minimizing noise from unrewarded macro and regional risks that often dominate emerging markets.

## ABSTRACT

This article tests a comprehensive end-to-end framework for factor investing in emerging markets, showing that a disciplined, risk-aware approach can deliver robust and scalable portfolios. Our framework builds on widely accepted global factor principles and evaluates their robustness in the demanding context of emerging markets. Using data from 33 emerging countries between 2000 and 2025, we analyze value, momentum, and quality factors and reaffirm that, similar to developed markets, enhanced factor constructions significantly outperform generic approaches. Enhanced emerging markets multifactor portfolios achieve Sharpe ratios up to 1.43—nearly 70% higher than their generic counterparts. Long-only implementations of these enhanced strategies deliver net information ratios of 0.98 and transfer coefficients of 0.51—well above the 0.75 and 0.42 observed for generic strategies. Importantly, nearly 90% of active return in enhanced implementations is explained by factor exposures, compared to only 60% for generic approaches, underscoring better control and transparency of the enhanced portfolio outcomes. Our results highlight that when clean signals, integrated design, disciplined implementation, and robust risk controls are combined, emerging market factor investing can become a scalable and systematic source of alpha.

**E**merging markets have become an increasingly important component of global portfolios, driven by their rapid economic growth, expanding financial infrastructure, and rising representation in global indexes. These markets offer distinct risk–return characteristics, including higher volatility, stronger cyclicality, and occasionally outsize rallies compared with developed markets. For global investors, emerging market allocations thus provide both diversification benefits and exposure to

structural growth trends (Bekaert and Harvey 1995; Harvey 2000). Yet realizing these benefits remains challenging due to persistent inefficiencies, elevated transaction costs, and concentrated country, sector, and currency risks. These frictions make the design of the investment approach crucial to distinguish between winning and losing emerging markets strategies.

Broadly, three approaches dominate emerging market equity investing: passive, active, and factor-based strategies. Passive index exposure is cost-efficient and scalable but often embeds unrewarded risks such as concentration in a few large economies or sectors, while offering little control over portfolio tilts (Wurgler 2010). Active management, in principle, can exploit inefficiencies stemming from lower analyst coverage and weaker institutions (Griffin et al. 2010) yet faces challenges of high dispersion in outcomes, elevated fees, and limited transparency and capacity (Kacperczyk et al. 2005). Finally, factor investing strikes a powerful balance between passive and active strategies. It offers the transparency of passive investing, while consistently delivering active-style alpha. With scalability and explicit risk controls, factor investing provides a disciplined and cost-effective way to target the key drivers of long-term performance. This article elaborates on how investors can build meaningful exposures to emerging markets through a disciplined factor investing approach.

While factor investing has been extensively validated in developed markets, its application in emerging markets is not straightforward. Emerging markets differ structurally from developed ones, not only in liquidity, governance, and data quality but also in the magnitude of country, industry, and currency risks. These features make emerging markets both fertile ground for rewarded factor premiums and a demanding environment where poorly designed factors can be quickly overwhelmed by unrewarded exposures. Given these structural differences, a paramount question investors have is how to obtain meaningful and robust exposure to emerging markets through factors. This question is particularly relevant as most of the academic and practitioner evidence originates from developed markets, thus making emerging markets a largely out-of-sample testing environment (Harvey 2000; Asness et al. 2013). Throughout this article, we view emerging markets not as requiring a distinct factor methodology but rather as a demanding empirical setting in which multifactor portfolio design can be evaluated under higher frictions.

To this goal, a natural starting point is to select which factors can be harvested efficiently in emerging markets. The canonical set includes value, momentum, quality, low volatility, and size, which have been widely validated in the academic and practitioners literature (see, for example, Fama and French 1992; Jegadeesh and Titman 1993; Sloan 1996; among many others). Of these, we leave out low volatility as it requires special treatment—such as beta adjustment, for example—that lies outside the scope of this study. Similarly, size exposure poses implementation challenges in emerging markets due to liquidity and scalability constraints. Moreover, several studies suggest that small-cap stocks often underperform after costs and over extended periods—even in developed markets—casting doubt on the reliability of the size premium (see, for example, Gupta et al. 2022). These limitations guide our focus to value, momentum, and quality—three factors with strong theoretical foundations, consistent empirical support, and practical relevance for institutional investors.

Closely related to factor selection, factor construction is a key ingredient. Generic definitions inspired by academic literature are often noisy and embed unrewarded country or industry exposures. A more robust approach is to combine multiple correlated signals within each factor to obtain the best possible representation of the underlying premium. This multi-signal design improves stability and reduces estimation error, while also offering diversification benefits across different but related measures. Proprietary and region-specific signals can further refine these constructions, making them adaptive to emerging markets' heterogeneity. In this article, we show

that a more effective way to construct factors is the enhanced approach, which builds on the multiple signals approach but also neutralizes unrewarded exposures to beta, industry, and country effects. The enhanced approach aims to isolate and target the rewarded components of factor premiums and improve their robustness through time.

A further question concerns how to combine factors. There are multiple approaches—equal-weighting, risk-weighting, and more complex optimization-based schemes—each with their own advantages. There is no one-size-fits-all solution: While equal-weighting offers transparency and simplicity, investors may seek more tailored approaches depending on their objectives, existing allocations, and risk preferences. For the purposes of this study, we adopt an equal-weighting approach to highlight the baseline diversification benefits of combining value, momentum, and quality. Given these choices, the resulting equal-weighted multifactor model provides an ideal representation of an investable portfolio yet it still remains largely theoretical.

Once a robust multifactor model is designed, implementability is the last remaining challenge. The question is how to build investable portfolios that capture factor premiums as proxied by the multifactor model while respecting investor preferences and constraints. Beyond theoretical long–short factor definitions, institutional portfolios must address practical realities: country, industry, and currency exposures, liquidity and turnover constraints, and the choice between long-only or long–short mandates. Multiple approaches exist, but we argue that the model portfolio framework is the most effective (Feng et al. 2024). As discussed in Feng et al. (2024), the model portfolio is a transparent, theoretical representation of the desired factor exposure, constructed without real-world constraints. It serves as a blueprint for the implementable portfolio. The implementable portfolio is then optimized to track this blueprint as closely as possible while satisfying practical constraints, such as risk limits, transaction costs, and diversification requirements. This approach provides disciplined control and clear attribution of outcomes to factor design choices. It also highlights the benefits of diversification: not only from targeting multiple factors simultaneously but also from integrating them into a single portfolio rather than constructing and combining separate single-factor sleeves. As recent work has shown, integrated multifactor portfolios achieve stronger diversification and more stable performance than a collection of standalone long-only factor sleeves (see, for example, Blitz et al. 2017; Ghayur et al. 2018).

The contribution of this article is threefold. First, we document that enhanced factor definitions deliver materially stronger performance and cleaner exposures than generic benchmarks. Second, we show that combining value, momentum, and quality into integrated multifactor portfolios yields substantial diversification benefits and higher Sharpe ratios. Third, we demonstrate that these theoretical factor exposures can be translated into investable long-only portfolios using a model portfolio framework that respects institutional constraints and achieves stable factor loadings, controlled active risk, and transparent attribution.

Although our empirical setting focuses on emerging markets, the underlying methodology is widely applicable across global equity universes. Multi-signal factor construction, country and industry neutralization, and model-portfolio-based implementation have been developed and validated across global equity universes (see, for example, Asness et al. 2015; Asness et al. 2019; Aghassi et al. 2023; Feng et al. 2024). In that respect, emerging markets do represent a rigorous and high-friction empirical setting in which the robustness of widely accepted factor principles can be evaluated.

Our analysis covers the entire investment process from factor choice and construction to factor combination and implementation. This end-to-end perspective shows how theoretical factor alpha can be converted into realized outcomes through portfolios that exhibit meaningful factor exposures, disciplined risk management,

and cost-aware execution. Although the best representation of factor premiums is long–short, we show that our framework can be applied in a long-only setting with institutional constraints. Specifically, the enhanced long-only portfolio achieves a net information ratio of 0.98 and a transfer coefficient of 0.51—both materially higher than the 0.75 and 0.42 observed for the generic implementation. Moreover, performance attribution reveals that for the enhanced implementation, nearly 90% of active return is explained by factor exposures, compared to only 60% for the generic approach. These results confirm that an enhanced factor approach not only improves performance but also translates more effectively into scalable, investable portfolios. We emphasize ex ante control and ex post transparency of risk and return drivers as key features of our approach, enabling investors to trace portfolio outcomes directly to factor design and portfolio construction choices.

The remainder of the article is structured as follows. The first section reviews the theoretical foundations of factor investing and motivates their extension to emerging markets. The next section describes our data and factor construction approaches. The section that follows presents empirical results across generic, multi-signal, and enhanced factors. The next section discusses implementation considerations and the role of model portfolio construction and shows how we build a real investment portfolio that targets the relevant factors and meets the investor objectives and constraints. The last section concludes.

## THEORETICAL FOUNDATIONS FOR EMERGING MARKET FACTORS

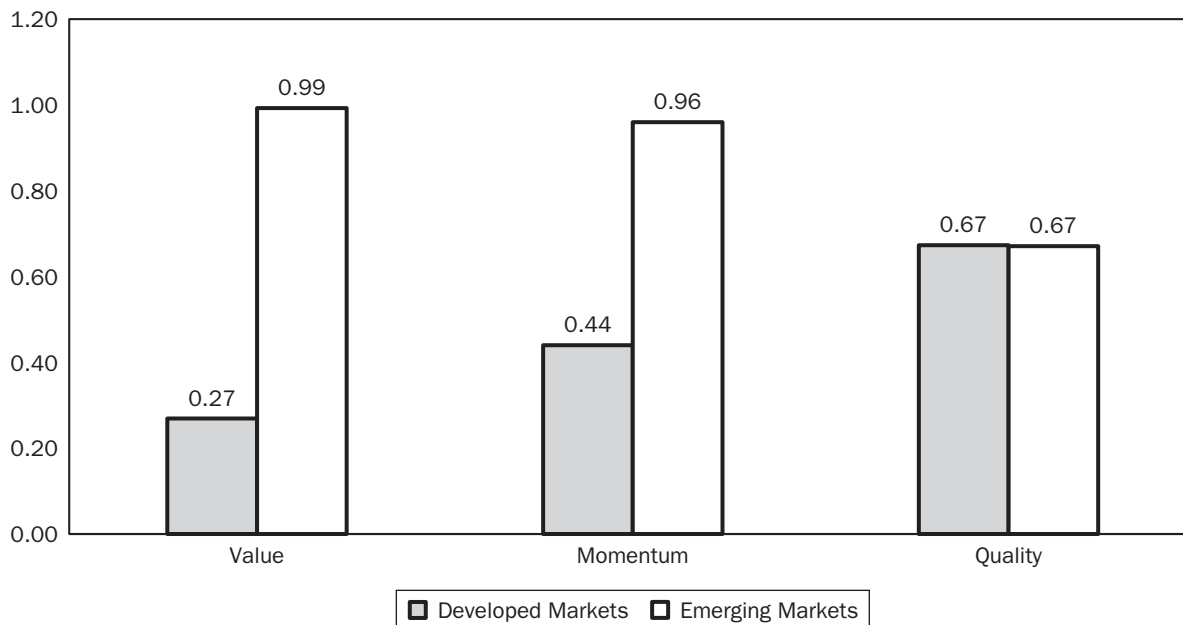
Factor investing rests on a well-documented foundation in developed markets. Seminal work by Fama and French (1992, 1993, 1995, 1996, 1998, 2015, 2016) establishes the value and size factors as systematic drivers of returns, showing that high book-to-market and small-cap stocks generate returns not explained by the CAPM. Jegadeesh and Titman (1993) introduce momentum, documenting the persistence of relative stock performance. Sloan (1996) highlights the role of accruals, while Novy-Marx (2013) emphasizes gross profitability as a proxy for quality. Haugen and Baker (1996), Ang et al. (2006), and Blitz and van Vliet (2007) document the low-volatility effect. Together, these studies provide a multidimensional view of expected returns that challenges the single-beta view of risk.<sup>1</sup>

Two broad explanations motivate these return patterns. The first emphasizes risk compensation: Factors reward investors for bearing macroeconomic or liquidity risks (Fama and French 1993; Petkova and Zhang 2005; Amihud and Mendelson 1986). The second emphasizes behavioral biases, such as investor underreaction or over-extrapolation, which sustain anomalies like momentum or quality premiums (Daniel et al. 1998; Novy-Marx 2013). Regardless of explanation, the empirical robustness of these premiums across decades and geographies makes them central to institutional portfolio design (Carhart 1997; Ang 2014).

In this article, we focus on value, momentum, and quality as robust and implementable factors in emerging markets. The case for size is weak: Small caps underperform for long stretches, even in developed markets (Asness et al. 2015; Hou et al. 2015), and are particularly difficult to scale in emerging markets given liquidity and capacity constraints (Cakici et al. 2013; Gupta et al. 2022). Low volatility is well-documented in both developed and emerging markets (Haugen and Baker 1996; Ang et al. 2006; Blitz and van Vliet 2007), but it requires specialized modeling—such

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<sup>1</sup>This review is by no means exhaustive. For a comprehensive review on the literature evaluating factor investing in both developed and emerging markets and across both equities and fixed income markets, we refer to Gupta et al. (2022).

**EXHIBIT 1****Performance Characteristics for Fama–French Factors in Developed and Emerging Markets**

**NOTES:** This exhibit plots Sharpe ratios for the following factors in developed and emerging markets: value, defined as high-minus-low Fama–French factor portfolios; momentum, defined as winners-minus-losers factor portfolios; and quality, defined as the average between robust-minus-weak and conservative-minus-aggressive Fama–French factor portfolios. The underlying returns are in USD and the sample runs from July 1992 to June 2025.

**SOURCE:** Based on Ken French database.

as beta normalization and volatility targeting—to make it investable. These complexities are especially acute in emerging markets, where leverage constraints and trading frictions limit practical implementation. For these reasons, we restrict our analysis to value, momentum, and quality—factors with strong theoretical foundations, consistent empirical support, and direct relevance for institutional investors.

Emerging markets provide a natural out-of-sample test for the global validity of these factors. Harvey (2000) argues that emerging markets—with weaker institutions, lower liquidity, and higher political and currency risks—represent a true stress test for factor models. Exhibit 1 shows that generic factor premiums, as captured in the Fama–French database, not only survive but in some cases appear stronger. For example, the value factor delivers Sharpe ratios of 0.99 and 0.27 for emerging and developed markets, respectively; momentum shows 0.96 and 0.44, while quality shows 0.67 and 0.67. These results suggest that emerging markets are not only fertile ground for rewarded premiums but also provide at least as strong evidence for factor persistence as developed markets.

The correlation structure of factors also appears consistent across regions. Exhibit 2, Panels A and B show that value and momentum are negatively correlated ( $-0.11$  and  $-0.27$  for emerging and developed markets, respectively), while momentum and quality exhibit low positive correlations ( $0.24$  and  $0.05$ , respectively). This persistence of correlation patterns indicates that factors capture underlying commonalities in investor behavior and risk across markets. At the same time, emerging market factors diversify developed market factors. Exhibit 2, Panel C shows that cross-region factor correlations remain positive but low—typically between  $0.2$  and  $0.5$ —while cross-region and cross-factor correlations cluster around zero. This implies

**EXHIBIT 2****Correlation Coefficients between Fama–French Factors in Developed and Emerging Markets**

		Developed Markets		
		Value	Momentum	Quality
Developed Markets	Value	1.00		
	Momentum	−0.27	1.00	
	Quality	0.56	0.05	1.00

		Emerging Markets		
		Value	Momentum	Quality
Emerging Markets	Value	1.00		
	Momentum	−0.11	1.00	
	Quality	−0.01	0.24	1.00

		Emerging Markets		
		Value	Momentum	Quality
Developed Markets	Value	0.50	−0.19	0.09
	Momentum	−0.15	0.19	0.19
	Quality	0.27	0.10	0.29

**NOTES:** This exhibit shows time-series factor correlations within and across developed and emerging markets. The factors considered are value, defined as high-minus-low Fama–French factor portfolios; momentum, defined as winners-minus-losers factor portfolios; and quality, defined as the average between robust-minus-weak and conservative-minus-aggressive Fama–French factor portfolios. The underlying returns are in USD and the sample runs from July 1992 to June 2025.

**SOURCE:** Based on Ken French database.

that emerging market exposures reduce factor crowding and improve resilience to regional shocks, providing meaningful diversification for global multifactor portfolios.

At the same time, caution is warranted. Several studies show that generic factor definitions in emerging markets embed unintended bets. Griffin et al. (2010) find that momentum strategies in emerging markets display high volatility and inconsistent performance. Cakici et al. (2013) show that value results vary substantially across countries, with some subsamples yielding weak or negative returns. More broadly, Bekaert et al. (2007) document that local liquidity and market segmentation can distort factor performance in ways not observed in developed markets. In practice, simple long–short factors often load heavily on individual countries or industries. For example, value portfolios tilt toward resource-heavy markets such as Russia, while momentum portfolios frequently concentrate in export-oriented economies like China and South Korea. These exposures may drive short-term performance but largely reflect unrewarded macro and regional risks rather than the intended factor premiums. Importantly, these differences do not alter the theoretical foundations of value, momentum, or quality. Rather, they influence how clearly these premiums can be observed in realized returns. As several studies emphasize, emerging markets serve as a rigorous out-of-sample environment in which global factor evidence can be tested under higher frictions.

Finally, it is critical to recognize that the standard Fama–French factor portfolios discussed so far are primarily theoretical constructs. They rely on universes that include micro caps, assume frictionless long–short trading, and ignore transaction costs or turnover. While useful benchmarks to guide factor investing approaches,

these factors are not investable as such. Translating them into real portfolios requires attention to implementability—defining investable universes, controlling liquidity and country risks, and accounting for trading costs. These considerations motivate the next section, where we turn to data design and factor construction tailored to the realities of emerging markets.

## DATA AND FACTOR CONSTRUCTION

To analyze factor performance in emerging markets, we construct a comprehensive dataset of investable equities spanning from December 2000 to April 2025. The dataset covers monthly returns, accounting data, and firm-specific characteristics for listed companies across 33 emerging economies (as defined by MSCI classifications). The final sample comprises 4,594 unique stocks with more than 370,000 stock-month observations. Return data are sourced from Datastream, while quarterly accounting data are drawn from Worldscope. Firms are included in the investable universe if they have available market capitalization data for December of year  $t$ , which ensures consistent rebalancing and screening from December  $t$  through December  $(t + 1)$ . Exhibit 3 summarizes the details of our final sample.

Exhibit 3 provides an overview of the equity universe by country, detailing the number of securities and average market capitalization. China contributes the largest number of firms (1,597), followed by India (369) and South Korea (350). At the other end of the spectrum, smaller markets such as Kuwait and Sri Lanka each contribute fewer than 10 securities. In terms of market capitalization, Saudi Arabia leads with an average firm size of approximately US\$ 61.7 billion, followed by Russia (US\$ 22.0 billion) and the United Arab Emirates (US\$ 17.8 billion). In contrast, Venezuela and Jordan record the smallest average market capitalizations at US\$ 0.33 billion and US\$ 0.60 billion, respectively. These statistics underscore the economic and structural heterogeneity that characterizes emerging markets, which in turn might influence factor behavior and, respectively, portfolio construction.

Nevertheless, the broad coverage and regional diversity of the dataset make it well-suited for examining factor-based strategies across varying macroeconomic environments, liquidity profiles, and regulatory regimes. To ensure practical relevance for institutional investors, we restrict our analysis to large-cap and midcap stocks by excluding small-cap names from the investable universe. This decision reflects real-world constraints on liquidity and investability, particularly for scaled portfolio implementation. Notably, this diverges from the standard Fama–French methodology, which includes small caps and sometimes relies on equally weighted portfolios. However, our approach is consistent with Gupta et al. (2022), who argue that the size premium in emerging markets has historically exhibited weak and unstable performance, often accompanied by poor risk-adjusted characteristics.

Focusing on large-cap and midcap stocks imposes a higher hurdle for factor efficacy, as empirical evidence (e.g., Blitz and Vidojevic 2019; Baltussen and van Vliet 2024) suggests that factor premiums tend to be more pronounced in the small-cap segment. Nevertheless, we adopt this design choice to ensure that our findings are aligned with the practical realities of institutional implementation, where capacity and trading constraints often render small-cap strategies infeasible.

In addition, our sample includes financial sector stocks, which are frequently excluded from academic studies due to their distinct balance sheet structure and regulatory treatment. We deliberately include financials in order to align our analysis with the broader opportunity set available to institutional investors and to better reflect on how factor strategies would be applied in practice. This comprehensive and

**EXHIBIT 3****Sample Description**

Region/Country	Total Number of Stocks	Average Market Capitalization (US\$ billion)
<b>Emerging Markets</b>	<b>4,594</b>	<b>7.24</b>
Argentina	38	0.93
Brazil	232	6.83
Chile	64	4.46
China	1,597	9.81
Colombia	23	6.46
Czech Republic	26	4.58
Egypt	33	2.34
Greece	84	2.08
Hungary	14	3.7
India	369	9.1
Indonesia	113	5.5
Israel	89	1.69
Jordan	22	0.6
Korea	350	6.37
Kuwait	7	12.43
Malaysia	178	3.83
Mexico	119	6.99
Morocco	16	3.09
Pakistan	39	0.69
Peru	19	2.61
Philippines	68	3.99
Poland	72	3.81
Portugal	28	1.16
Qatar	18	10.19
Russia	94	21.97
Saudi Arabia	53	61.73
South Africa	207	4.58
Sri Lanka	9	0.002
Taiwan	320	5.44
Thailand	177	4.59
Turkey	77	3.59
United Arab Emirates	27	17.82
Venezuela	13	0.33

**NOTES:** This exhibit presents summary statistics for our equity sample. Country/region classifications are following MSCI. Column 2 reports the total number of unique securities for each country/region throughout the entire sample period. Column 3 reports average market capitalization for equities in each country/region. The sample period runs from December 2000 to April 2025.

realistic construction of the investment universe serves as the basis for the factor definitions and portfolio strategies examined in the next section.

Having described our sample, we adopt a three-step framework for constructing value, momentum, and quality factors in emerging markets, each step reflecting increasing levels of refinement and robustness. First, we define each factor using a single, academically validated signal—such as book-to-price for value or 12-month price change excluding the last month for momentum (12-1M price momentum)—providing a transparent but coarse representation of the underlying premium. We refer to these factor variants as *generic factors* and stress that they serve as agnostic benchmarks for the enhanced versions that follow.

**EXHIBIT 4****Factor Correlations in an Investable Universe**

Panel A: Generic Factors			
	Value	Momentum	Quality
Value	1.00		
Momentum	-0.68	1.00	
Quality	-0.62	0.55	1.00
Panel B: Multi-Signal Factors			
	Value	Momentum	Quality
Value	1.00		
Momentum	-0.35	1.00	
Quality	-0.14	0.46	1.00
Panel C: Enhanced Factors			
	Value	Momentum	Quality
Value	1.00		
Momentum	-0.25	1.00	
Quality	0.24	0.16	1.00
Panel D: Average Signal Correlations within Factor Buckets			
	Multi-Signal	Enhanced	
Value Signals	0.32	0.51	
Momentum Signals	0.62	0.61	
Quality Signals	0.15	0.18	

**NOTES:** This exhibit presents correlation coefficients for the generic, multi-signal, and enhanced value, momentum, and quality signal returns. The multi-signal and enhanced versions include book yield, dividend yield, earnings yield, and free cash flow yield signals for value, 12-1M price momentum, risk-adjusted momentum, idiosyncratic momentum, earnings revision magnitude, and sales revision signals for momentum, and gross profits to assets, share buybacks, accruals, and investments for quality. Panel A shows correlations for generic factors, Panel B—for multi-signal factors, and Panel C—for enhanced factors. Panel D shows average signal correlations within each factor bucket for multi-signal and enhanced factors. The sample period runs from December 2000 to April 2025.

Next, we construct *multi-signal factors* by aggregating several complementary signals within each factor category. This approach improves stability and mitigates idiosyncratic noise, particularly relevant in emerging markets where data quality<sup>2</sup> and structural heterogeneity pose challenges (Ikeda et al. 2023). Third, we implement a risk-controlled factor specification. These *enhanced* factors build on the multi-signal design but explicitly neutralize exposures to market beta, country, and industry effects. This final step isolates the rewarded component of each factor and ensures that performance is not driven by unintended macro or regional tilts. Technical details for each of these factor construction variants are provided in Appendix, while Exhibit 4 presents correlation statistics for each factor variant described above.

Exhibit 4 provides empirical support for this tiered construction approach. Panels A–C show that cross-factor correlations are relatively low across all three specifications—generic, multi-signal, and enhanced—suggesting that value, momentum, and quality factors capture distinct dimensions of firm characteristics. For example, value and momentum factors remain negatively correlated even under enhanced construction, reinforcing their diversification potential. Specifically, combining these factors can help mitigate risks associated with relying on a single type of signal or

<sup>2</sup>Although international convergence in standards has improved data reliability over time, inconsistencies in reporting frequency, firm coverage, and data accuracy remain prevalent (Bushman and Piotroski 2006).

even a single factor, as they are likely to perform differently under various market conditions. These findings are consistent with those observed for developed markets, where the diversification benefits between value, momentum, and quality signals are similarly documented.

Panel D further shows that return correlations among signals within each factor group are positive and notably high, particularly for value and momentum factors. For instance, value signals have an average correlation of 0.32 in the multi-signal case, which still allows diversification and justifies the use of multiple signals for the value factor. Most importantly, removing the market, country, and industry effects does not eliminate the structural relationship between these signals, as the average signal correlations within each factor remain largely the same and sometimes are even higher in the enhanced factor variants. These findings validate our design choices and highlight the robustness of the enhanced factor definitions in emerging markets.

In the next section, we evaluate the performance of these factors and highlight the benefits of improving factor definitions while being cautious about the structural risks associated with emerging markets.

## ENHANCING FACTOR PERFORMANCE IN EMERGING MARKETS

While value, momentum, and quality factors are well-established sources of excess return, particularly in developed markets, their application in emerging markets presents unique challenges. Generic factor definitions often embed unintended country and industry exposures, which can distort performance and amplify drawdown risk. In this section, we evaluate how increasingly refined construction methodologies—generic, multi-signal, and enhanced—affect the robustness of factor premiums in emerging markets.

Exhibit 5 provides a comprehensive comparison of performance metrics for value, momentum, and quality factors across three construction methodologies. Even under the generic specification, results are economically meaningful: Value and momentum factors deliver annualized returns of 7.4% and 5.3%, respectively, while quality, proxied by gross profitability, achieves an average of 0.9% per annum. Sharpe ratios, however, still remain modest, ranging from –0.10 for quality to 0.45 for value, reflecting elevated volatility and noise in the generic specification.

### EXHIBIT 5

#### Factor Performance for Generic, Multi-Signal, and Enhanced Factors

	Generic	Multi-Signal	Enhanced
<b>Panel A: Value Factors</b>			
Return	7.4%	13.0%	6.8%
Volatility	12.6%	10.0%	6.3%
Sharpe Ratio	0.45	1.13	0.81
<b>Panel B: Momentum Factors</b>			
Return	5.3%	9.5%	6.9%
Volatility	17.1%	13.9%	6.2%
Sharpe Ratio	0.21	0.56	0.84
<b>Panel C: Quality Factors</b>			
Return	0.9%	4.6%	2.2%
Volatility	7.9%	8.1%	3.4%
Sharpe Ratio	–0.10	0.36	0.15

**NOTES:** This exhibit presents performance characteristics for generic, multi-signal, and enhanced value, momentum, and quality factors. The sample period runs from December 2000 to April 2025.

**EXHIBIT 6****Average Country and Industry Bets for Generic, Multi-Signal, and Enhanced Factors**

	Generic	Multi-Signal	Enhanced
<b>Panel A: Average Industry Bets</b>			
<b>Value</b>			
= max.	23.7%	30.7%	0.0%
= min.	-10.4%	-11.4%	0.0%
<b>Momentum</b>			
= max.	15.8%	16.5%	0.0%
= min.	-21.2%	-16.0%	0.0%
<b>Quality</b>			
= max.	19.7%	22.9%	0.0%
= min.	-42.5%	-34.5%	0.0%
<b>Panel B: Average Country Bets</b>			
<b>Value</b>			
= max.	45.2%	27.4%	0.0%
= min.	-26.1%	-26.8%	0.0%
<b>Momentum</b>			
= max.	44.9%	47.4%	0.0%
= min.	-71.3%	-58.9%	0.0%
<b>Quality</b>			
= max.	22.0%	23.9%	0.0%
= min.	-21.5%	-33.6%	0.0%

**NOTES:** This exhibit presents time-series and cross-sectional industry and country average bets for generic, multi-signal, and enhanced value, momentum, and quality factors. Average values are taken over absolute country and industry bets through time. The sample period runs from December 2000 to April 2025.

A central observation from Exhibit 5 is that the underlying factor premiums are economically meaningful in emerging markets, even before any refinements are applied. Generic value and momentum factors deliver substantial long-run returns, and quality exhibits positive performance despite being constructed in its simplest academic form. This reinforces a key point: Emerging markets do not merely require sophisticated implementation; they also display strong rewarded factor premiums in their own right. The subsequent improvement from multi-signal design and enhanced specifications, therefore, build on an already robust foundation.

Moving to multi-signal construction, we observe a clear improvement in return and risk-adjusted performance. Annualized returns rise to 13.0% for value and 9.5% for momentum, while quality improves to 4.6%. Sharpe ratios increase substantially, reaching 1.13 for value, 0.56 for momentum, and 0.36 for quality. These gains stem primarily from signal diversification: Combining complementary measures reduces idiosyncratic noise and improves the stability of factor definitions.

The most substantial improvement, however, comes from the enhanced specification. While returns remain relatively strong—6.8% for value, 6.9% for momentum, and 2.2% for quality—volatility drops sharply across all factors. For instance, momentum volatility declines from 17.1% in the generic case to just 6.2% in the enhanced version. As a result, Sharpe ratios improve relative to the generic case: 0.81 for value, 0.84 for momentum, and 0.15 for quality. These improvements are not driven by hidden tilts but by

cleaner extraction of the intended premiums. In short, returns increase due to signal diversification, while risk declines due to the removal of unrewarded exposures.

Exhibit 6 highlights the structural risks embedded in generic factor portfolios. Panels A and B show that both generic and multi-signal factors exhibit substantial unintended country and industry bets. For example, generic momentum portfolios display industry tilts from -21.2% to 15.8% and country tilts from -71.3% to 44.9%.<sup>3</sup> These extreme exposures are not systematically rewarded and make performance vulnerable to macro shocks and regime changes—particularly acute in emerging markets. Multi-signal portfolios, while more robust, still carry residual structural risks. The aggregation of signals improves factor quality but does not eliminate country or industry biases. For instance, multi-signal momentum portfolios continue to show significant industry overweights from -16.0% to 16.5% and country overweights from -58.9% to 47.4%.

By contrast, the enhanced specification fully neutralizes these exposures. As shown in Exhibit 6, country and industry tilts are eliminated across all three factors. This ensures that factor returns stem from stock-level characteristics rather than macro or regional bets. The result is a cleaner, more reliable representation of the

<sup>3</sup>Not explicitly shown here, but generic momentum portfolios have displayed large over- or underweights in China, South Korea, South Africa, Russia, Malaysia, and Saudi Arabia, as well as oil and gas, semiconductors, and telecommunication services. On the other hand, generic quality portfolios are heavily exposed to Russia and to financials. Similarly, generic value can place significant bets on China and Russia, as well as oil and gas, banks, and telecommunications services.

## EXHIBIT 7

### Performance of Theoretical Multifactor Portfolios

	Generic	Multi-Signal	Enhanced
Return	10.8%	15.6%	9.0%
Volatility	10.8%	10.5%	5.1%
Sharpe Ratio	0.84	1.32	1.43

**NOTES:** This exhibit presents performance characteristics for equal-weighted multifactor combinations using generic, multi-signal, and enhanced value, momentum and quality factors. The sample period runs from December 2000 to April 2025.

underlying premiums—particularly valuable in emerging markets, where exogenous shocks are frequent and not compensated.

Beyond individual factor performance, combining value, momentum, and quality into multifactor portfolios yields substantial diversification benefits. Exhibit 4 previously showed that cross-factor correlations are low or negative, especially between value and momentum. This implies that multifactor portfolios can reduce overall portfolio risk relative to single-factor allocations.

Exhibit 7 confirms this intuition. When combining factors using equal weights, Sharpe ratios improve across all construction variants. The generic multifactor portfolio achieves a Sharpe ratio of 0.84, the

multi-signal version reaches 1.32, and the enhanced multifactor portfolio delivers the highest Sharpe ratio of 1.43. These results reflect the dual benefit of combining diversified signals and controlling unrewarded risks. The enhanced multifactor portfolio maintains high returns while significantly reducing volatility, making it the most robust and scalable design.

While these results are compelling, they remain largely theoretical. All factor portfolios are constructed using long–short designs, and while the universe is investable—limited to large-cap and midcap stocks and inclusive of financials—real-world implementation requires additional considerations. Institutional investors must account for transaction costs, liquidity constraints, turnover limits, and benchmark-relative risk. Moreover, portfolio construction must integrate risk models and optimization frameworks that respect mandate-specific constraints. These practical realities can materially affect realized performance and must be addressed before theoretical alpha can be translated into investable outcomes.

We turn to these implementation challenges in the next section, where we show how the model portfolio framework enables disciplined and transparent translation of theoretical factor exposures into implementable institutional portfolios.

## IMPLEMENTATION CONSIDERATIONS

The previous section highlights that multifactor portfolios, particularly those constructed using enhanced specifications, deliver superior performance and cleaner exposures in emerging markets. However, these results are largely theoretical as the resulting long–short model portfolios do not account for real-world considerations. The challenge now is to translate these theoretical model portfolios into meaningful, real-world, investable strategies that respect institutional constraints and objectives and provide sensible exposures to targeted factors.

To address this, we adopt the model portfolio approach discussed in Feng et al. (2024), who emphasize the advantages of such an approach in light of desired ex ante control of factor exposures and ex post transparency of portfolio outcomes. At its core, this framework reflects strong theoretical rigor: start by constructing a transparent theoretical model portfolio that uses the entire opportunity set to achieve maximum diversification and minimize idiosyncratic risk—essentially the “perfect world” representation of intended factor exposures. Then, make this portfolio implementable by sampling or optimizing it under real-world constraints, preserving as much of the original design as technically possible. This two-step process ensures transparency (inputs are clearly defined), control (final portfolios remain aligned with intended exposures), and facilitates unambiguous attribution of portfolio outcomes to factor

## EXHIBIT 8

### Backtest Settings

Sample Period	December 2000–April 2025
Investment Universe	Emerging market, large-mid cap
Benchmark	MSCI Emerging Market Index
Risk Target	1%
Constraints	Long-only, fully invested: 100% Max. turnover: 10%, two-way Min. position and trade size: 5 bps Sector limits: +/-1% Industry limits: +/-1% Country limits: +/-1%

**NOTE:** This exhibit presents the simulation setup for an implementable, long-only, multifactor portfolio.

design choices. The model portfolio approach is particularly well-suited for emerging markets, where liquidity, turnover, and country/sector limits are binding and where transparency and control are paramount.

As discussed in Exhibit 7, we construct three variants of multifactor model portfolios—generic, multi-signal, and enhanced—each combining corresponding value, momentum, and quality factors with equal weights. These portfolios serve as model portfolios, representing the idealized exposures that investors aim to implement. To highlight the benefits of factor enhancement and risk mitigation, we focus on two extreme cases: the generic multifactor (model) portfolio, which serves as a generic multifactor benchmark, and the enhanced (model) multifactor portfolio, which reflects our preferred specification.

Although these model portfolios are constructed as long–short theoretical benchmarks, investors can use the model portfolio approach to design both long–short and long-only strategies depending on their preferences. For simplicity, we leave the long–short implementation to a different discussion. Here, we focus on the implementation of long-only portfolios benchmarked to the MSCI Emerging Markets Index. While simpler, this case reflects the reality that many institutional investors operate under long-only mandates and must manage exposures relative to a benchmark.

Exhibit 8 summarizes the simulation settings used to construct the long-only implementable portfolio. The optimization seeks to replicate the active exposures of the model portfolio while satisfying practical constraints. These include a 1% active risk target relative to MSCI EM as well as turnover limits (10% two-way per month), minimum trade and position sizes, and country/industry/sector bounds of +/-1%. We also rely on a generic transaction cost and risk model to ensure that optimization balances alpha, risk, and trading costs in a realistic manner. The full simulation setup is summarized in Exhibit 8.

The results of this implementation are shown in Exhibit 9. The generic multifactor implementation delivers a gross active return of 1.2% and a net active return of 0.9%, with an IR of 1.05. The enhanced multifactor implementation achieves a gross active return of 1.4% and a net active return of 1.1%, with a higher IR of 1.30. Volatility remains similar across both portfolios (~20.3%–20.5%), but the enhanced version achieves higher return with lower tracking error (1.1% versus 1.2%), confirming the benefits of cleaner signal construction and risk control. Both strategies show similar levels of turnover, transaction costs, and roughly the same number of names. These performance differences are further illustrated in Exhibit 10, which plots cumulative returns for both portfolios against the MSCI EM benchmark. The enhanced portfolio consistently delivers value added while maintaining tight tracking, demonstrating that factor premiums can be harvested without incurring excessive benchmark deviation, which is key for institutional mandates.

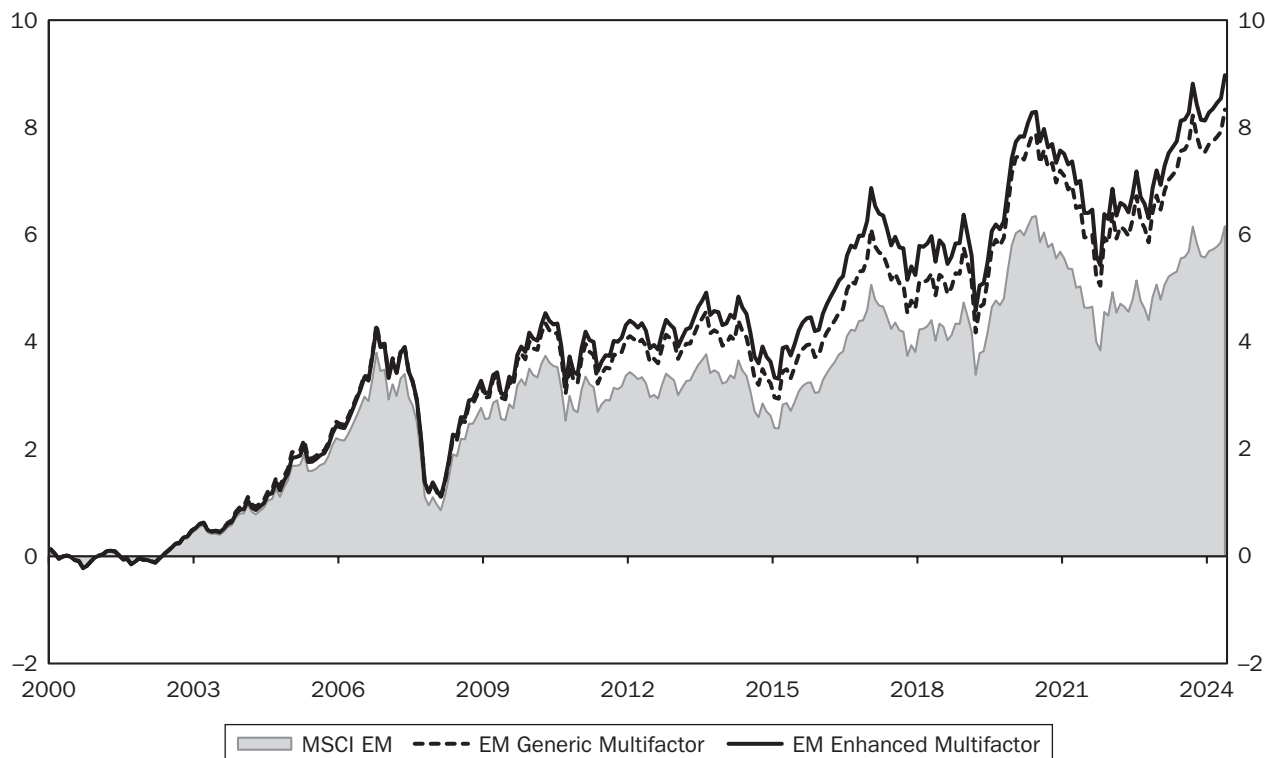
To assess the effectiveness of the model portfolio approach, we use transfer coefficients and factor loadings attribution, both of which relate the corresponding implementable portfolio to its model portfolio counterpart. Specifically, the transfer coefficient measures the correlation between model portfolio holdings and active holdings in the implementable portfolio. It ranges from 0 to 1, with higher values indicating better alignment. A value of 1 implies perfect replication of the model portfolio, while lower values reflect the impact of constraints. For example, long-only constraints will certainly lower the transfer coefficient well below 1. As shown in Exhibit 9, the enhanced implementation achieves, on average, a transfer coefficient

**EXHIBIT 9**  
**Simulated Performance**

	MSCI EM	Generic Multifactor	Enhanced Multifactor
Return (ann.)	8.4%	9.6%	9.8%
Volatility (ann.)	20.6%	20.5%	20.3%
Sharpe Ratios	0.33	0.39	0.40
Outperformance (ann.)		1.2%	1.4%
Tracking Error (ann.)		1.2%	1.1%
Information Ratio		1.05	1.30
Net Return (ann.)		9.3%	9.5%
Net Outperformance (ann.)		0.9%	1.1%
Net Tracking Error (ann.)		1.2%	1.1%
Net Information Ratio		0.75	0.98
Turnover (ann., one-way)	5%	37.00%	38.06%
Transaction Costs (ann., bps)		22.6	23.4
Nr. of Long Positions	945	494	440
Transfer Coefficients		0.42	0.51

**NOTES:** This exhibit shows performance characteristics for a simulated investable long-only multifactor portfolio and its benchmark: MSCI Emerging Markets Index. Returns are in USD and simulation period runs from December 2000 to April 2025.

**EXHIBIT 10**  
**Cumulative Performance for Long-Only Multifactor Portfolios and MSCI Emerging Markets Index**

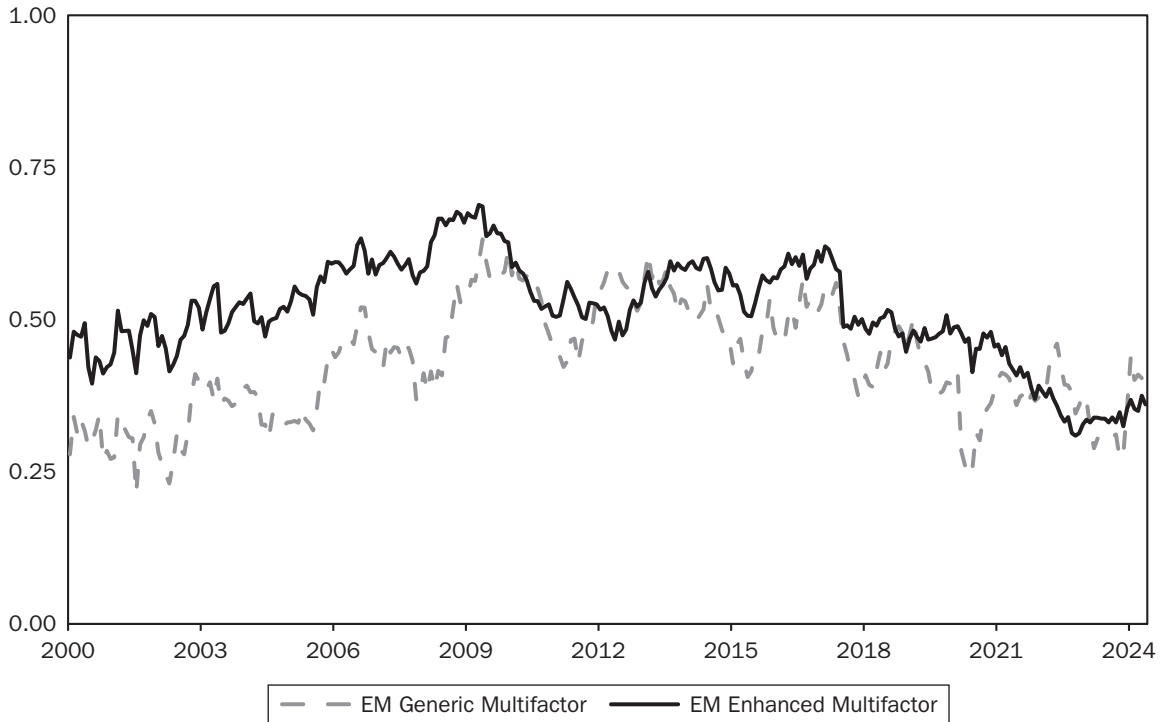


**NOTES:** This exhibit plots the cumulative performance for the simulated long-only, multifactor portfolio and MSCI Emerging Markets Index. Returns are in USD, and the sample period runs from December 2000 to April 2005.

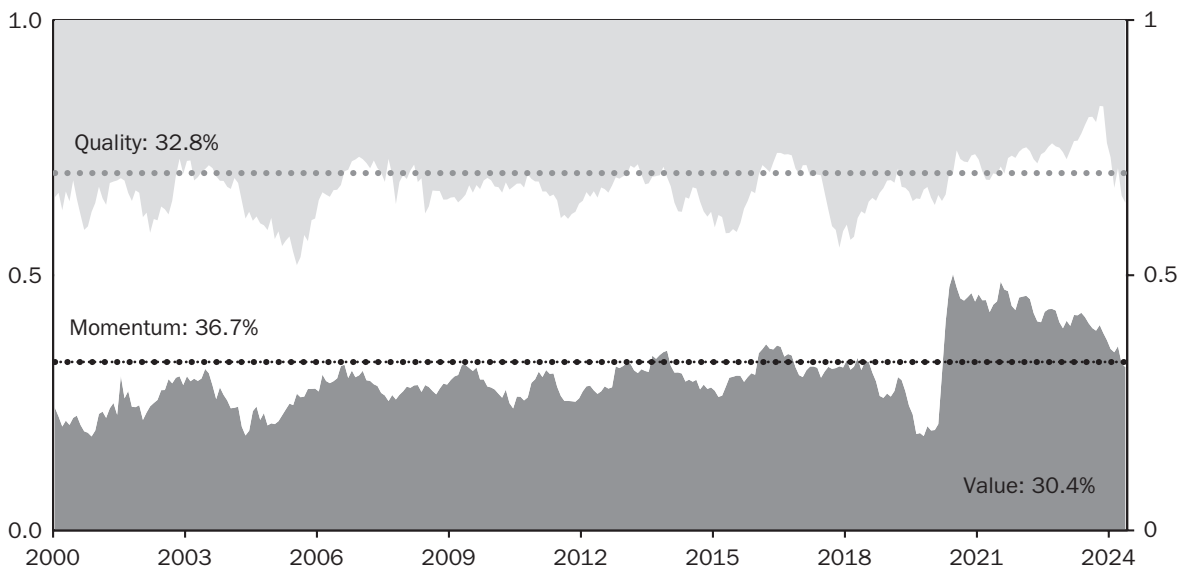
of 0.51, compared to 0.42 for the generic version—an improvement of over 20%. This reflects the cleaner and more scalable nature of the enhanced model portfolio and, consequently, better subsequent alignment of the implementable portfolio. Exhibit 11, Panel A shows that this difference persists consistently throughout most of the sample period.

**EXHIBIT 11**  
Implementation Analytics

Panel A: Transfer Coefficients



Panel B: Factor Loadings Attribution for Generic Long-Only Multifactor Strategy

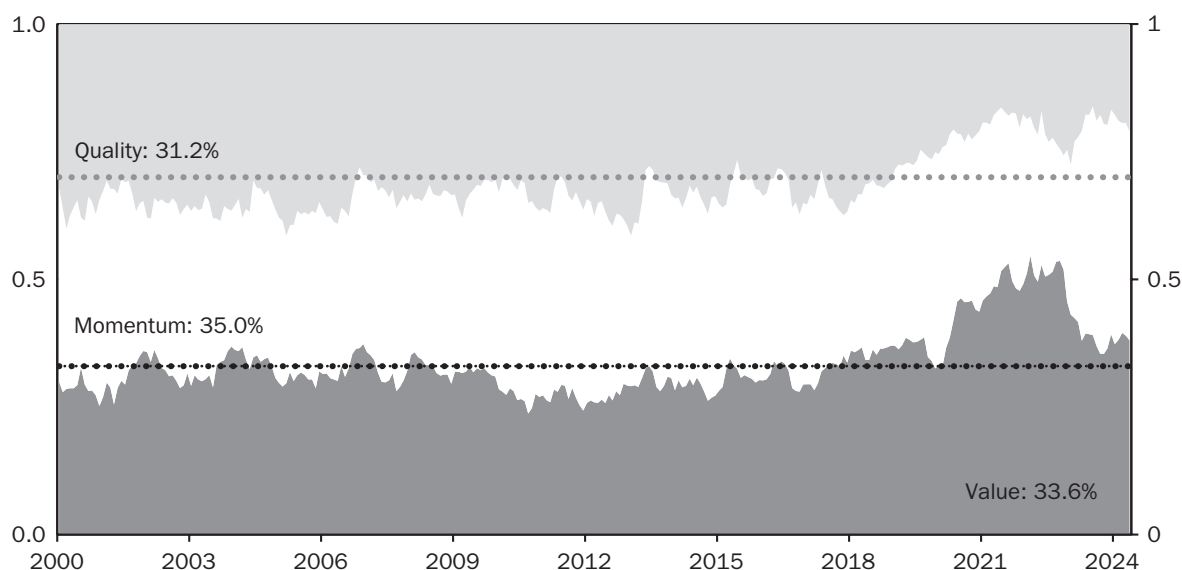


(continued)

## EXHIBIT 11 (continued)

### Implementation Analytics

Panel C: Factor Loadings Attribution for Enhanced Long-Only Multifactor Strategy



Panel D: Active Return Attribution

	Generic Long-Only Multifactor		Enhanced Long-Only Multifactor	
	Absolute Contribution	Relative Contribution	Absolute Contribution	Relative Contribution
Value Factor	0.34%	28.1%	0.52%	37.1%
Momentum Factor	0.35%	28.3%	0.61%	43.3%
Quality Factor	0.05%	4.3%	0.17%	11.9%
Residual	0.48%	39.3%	0.11%	7.7%
<b>Total</b>	<b>1.22%</b>	<b>100.0%</b>	<b>1.41%</b>	<b>100.0%</b>

**NOTES:** This exhibit plots implementation analytics for the simulated long-only, multifactor portfolio. Panel A shows transfer coefficients, defined as the correlation between model portfolio holdings and active holdings in the implementable portfolio (adjusted for stock-level covariance). Panels B and C show the factor loadings attribution (“ex ante”), where dotted lines display average loadings over time. Panel D shows active return (“ex post”) attribution, where the numbers show absolute and relative contributions to active return from each component.

Next, factor loadings attribution quantifies how closely the implementable portfolio replicates the intended factor exposures. Exhibit 11, Panel B shows the ex ante factor loadings calculated based on active holdings of the implementable portfolio relative to the factor portfolio holdings, at each time period. Consistent with the 33.3% equal-weight target, the enhanced portfolio maintains balanced loadings across value, momentum, and quality (33.6%, 35.0%, 31.2%, respectively), while the generic version exhibits more dispersion (e.g., momentum dominates at 36.7%). This consistency reinforces the transparency and control offered by the model portfolio framework.

Lastly, return attribution analysis (see Exhibit 11, Panel D) decomposes active returns into factor-driven and residual components (hence can be considered “ex post”).<sup>4</sup> For the enhanced implementation, roughly 92.3% of the total active

<sup>4</sup>We attribute returns by running a time-series regression of active returns on single-factor portfolio returns. For each factor, we calculate its contribution as the product of its regression slope and corresponding factor return. We treat the regression residual as the unexplained (residual) return.

return comes from factor contributions and only 7.7% from the residual component. In contrast, for the generic implementation, factor contributions are at 60.7% and residual contributions are as large as 39.3%. This residual component corresponds to contributions from unrewarded country and sector risks. These risks were relatively benign during our sample period and contributed positively to the performance of the generic approach. However, for investors seeking strategies driven by true return sources rather than chance, our enhanced framework offers a compelling alternative that delivers returns more consistently aligned with intended factor exposures.

Taken together, these results demonstrate that the enhanced specification not only delivers stronger performance but also enables more precise and reliable implementation. The model portfolio framework provides a disciplined and scalable way to translate theoretical factor exposures into long-only institutional portfolios that preserve transparency, control, and diversification.

## CONCLUSIONS

This article revisits factor investing in emerging markets, offering a comprehensive framework that spans factor design, portfolio construction, and real-world implementation. While factor premiums are well-documented in developed markets, emerging markets present a more complex and less studied environment, characterized by structural inefficiencies, elevated macro risks, and limited scalability. We show that despite these challenges, factor premiums are equally present and economically significant in emerging markets, providing a strong foundation upon which enhanced and implementable strategies can be designed.

A central contribution of this work is documenting the efficiency gains from the construction of enhanced factor definitions tailored to emerging markets. Rather than relying on generic constructions, which can serve as useful but coarse benchmarks, we adopt an enhanced multi-signal and risk-controlled approach that isolates the true drivers of factor premiums. These refined factors exhibit materially stronger performance and greater stability, with Sharpe ratios reaching 1.43 in the multifactor portfolio, significantly above the Sharpe ratio of 0.84 observed for the generic single-signal counterpart.

Equally important is our implementation framework, which translates theoretical factor exposures into investable portfolios. Using a model portfolio approach, we construct long-only strategies that respect institutional constraints while maintaining alignment with the intended factor exposures. The enhanced implementable portfolio achieves a net information ratio of 0.98 and a transfer coefficient of 0.51, both substantially higher than the 0.75 and 0.42 observed for the generic implementation. Moreover, performance attribution reveals that for the enhanced implementation, nearly 90% of active return is explained by factor exposures, compared to only 60% for the generic approach. This reflects the cleaner and more scalable nature of the enhanced model portfolio and, consequently, better subsequent alignment of the implementable portfolio.

Finally, this article contributes an end-to-end empirical validation of factor investing in emerging markets. From data design and signal construction to portfolio optimization and performance attribution, we demonstrate that disciplined factor strategies can be implemented at scale, with transparency and control. The framework we propose is not only theoretically sound but also practically viable, offering a blueprint for institutional investors seeking to expand their factor allocations into emerging markets.

Our results underscore three key insights. First, factor investing is not only viable but also rewarding in emerging markets, offering diversification benefits relative to

developed markets. Second, careful attention to factor construction—moving beyond generic definitions toward multi-signal and risk-controlled approaches is essential for extracting clean and robust premiums. Third, implementation matters: Without addressing liquidity, costs, and constraints, theoretical alpha cannot be reliably realized.

Taken together, our framework builds on widely accepted global factor principles and evaluates their robustness in the demanding context of emerging markets. Just like in the context of developed markets, clean signal construction, integrated multi-factor design, disciplined implementation, and robust risk management are essential. When these elements are aligned, factor investing in emerging markets becomes a feasible, scalable, and systematic source of benchmark-relative alpha.

## APPENDIX

### FACTOR CONSTRUCTION DETAILS

Factor Variant	Signals Used for Each Factor	Factor Construction Method
Generic Factors	<p><b>Value:</b> Book-to-price ratio</p> <p><b>Momentum:</b> Past 12-month returns, excluding the most recent month (12-1M price momentum)</p> <p><b>Quality:</b> Gross profitability (gross profits to assets)</p>	Sort stocks by individual standardized signal; form long–short portfolios using top and bottom halves; each stock is score-weighted in the corresponding long and short legs
Multi-Signal Factors	<p><b>Value:</b> Book-to-price, dividend yield, earnings yield, and free cash flow yield</p> <p><b>Momentum:</b> 12-1M price momentum, idiosyncratic momentum (residual momentum orthogonal to the market), earnings revision magnitude, and sales revision magnitude</p> <p><b>Quality:</b> Gross profitability, asset growth (investments), accruals, and share buybacks</p>	Standardize each signal, average signals within each factor, sort stocks by composite score; form score-weighted long–short portfolios
Enhanced Factors	<p><b>Value:</b> Book-to-price, dividend yield, earnings yield, and free cash flow yield</p> <p><b>Momentum:</b> 12-1M price momentum, idiosyncratic momentum (residual momentum orthogonal to the market), earnings revision magnitude, and sales revision magnitude</p> <p><b>Quality:</b> Gross profitability, asset growth (investments), accruals, and share buybacks</p>	Each signal is standardized within country and industry; average signals within each factor, then regress composite scores on market beta and country and industry dummies; use residuals to form long–short portfolios with unit leverage

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Past performance is not a guarantee of future results.

Simulations presented were created to consider possible results of various strategies (not previously managed by Invesco for any client). These performance results are hypothetical. It may not be possible to replicate these results. The hypothetical results were derived by back-testing using simulated portfolios. There can be no assurance that the simulated results can be achieved in the future. Simulated results do not factor in all the economic and market conditions that can impact results. Transaction cost estimates used for simulations are based on a proprietary transaction cost model, which provides point-in-time, stock level estimates that consider market impact based on variables such as return volatility and trading volume.

Invesco cannot assure that the simulated performance results shown would be similar to the firm's experience had it actually been managing portfolios using the approach presented. In addition, the results actual investors might have achieved would vary from those shown because of differences in the timing and amounts of their investments. The simulated performance results do not reflect the deduction of investment advisory fees. Returns shown for this simulation would be lower when reduced by advisory fees and any other expenses incurred in the management of an investment advisory account.

For Exhibits 9, 10, and 11:

Results shown are hypothetical in nature and are for illustrative purposes only. There is no guarantee that the simulated results will be achieved in the future.