

Equity Factor Insights

QUARTERLY REPORT: JANUARY 2023

FOR PROFESSIONAL INVESTORS ONLY

Value throws a lifeline in brutal 2022 selloff

Value prevails in 2022 tumult, Quality struggles

Most factors fared better than their respective benchmarks in the 2022 rout, with robust Q4 rebounds extending Value/Yield leadership. Though a modest outperformer in most markets, Quality generally trailed other factors.

Tech, Energy and Financials stocks call the shots

Differing exposures to Energy, Financials and the 'tech wreck' were among the biggest return drivers, helping Value and Yield and weighing on Quality.

UK Size a massive underperformer

Deviating from global trends, Size hugely underperformed in the UK, reflecting the market's bigger tilt to outperforming large-cap Energy, Staples and Materials.

EM factor returns top the charts globally

Though generally in step with global trends, EM factors held up far better than the benchmark in 2022 and most outperformed developed-market peers, especially in Size.

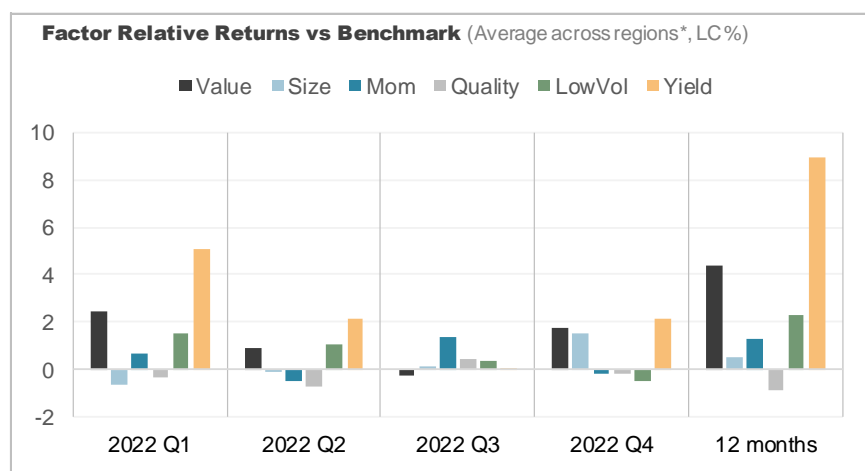
Factor P/Es tick up with Q4 rally

Despite big Q4 re-ratings, forward P/Es remain below 10-year averages across markets. Quality/Value premiums are mostly in line with historical norms.

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Regional Factor Performance Highlights — Full year 2022 relative returns

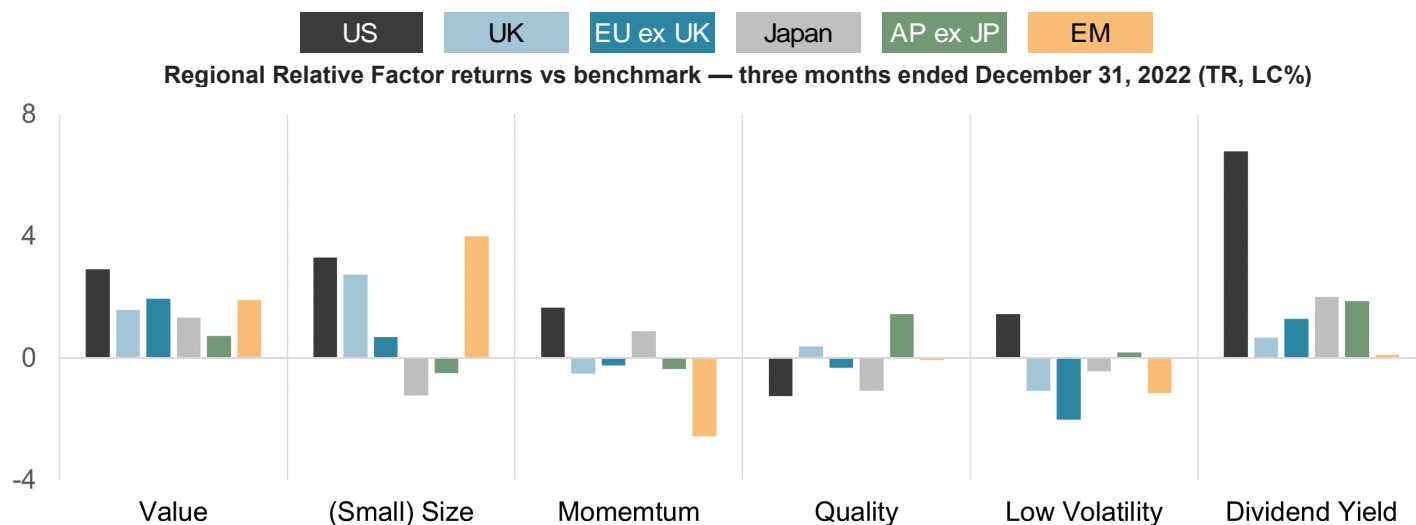


+5.9% US Value	+1.3% UK Value
-1.2% US Quality	-17.5% UK Size
+5.8% Japan Value	+4.4% Europe ex UK Value
-4.3% Japan Quality	+1.1% Europe ex UK Quality

Source: FTSE Russell / Refinitiv. *Combined average of factor performance across FTSE USA, FTSE UK, FTSE Europe ex UK, FTSE Japan, FTSE Asia Pacific ex Japan and FTSE Emerging regional indexes. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. This report should not be considered 'research' for the purposes of MIFID II. Please see Appendices at the end and FTSE Russell website for important legal disclosures and details on rules-based factor indicator calculations and construction methodology.

Global View – Factor and Benchmark Performance Highlights – Q4 2022

Value, Yield (and Size in most markets) regained supremacy in the global Q4 equity rally, while more defensive Quality and Low Vol wavered. As in previous quarters, return dispersion was most striking in Size, which was the best-performing factor in EM and the biggest laggard in Japan. Size also took the lead in the UK, in a major reversal from trends of the past year.

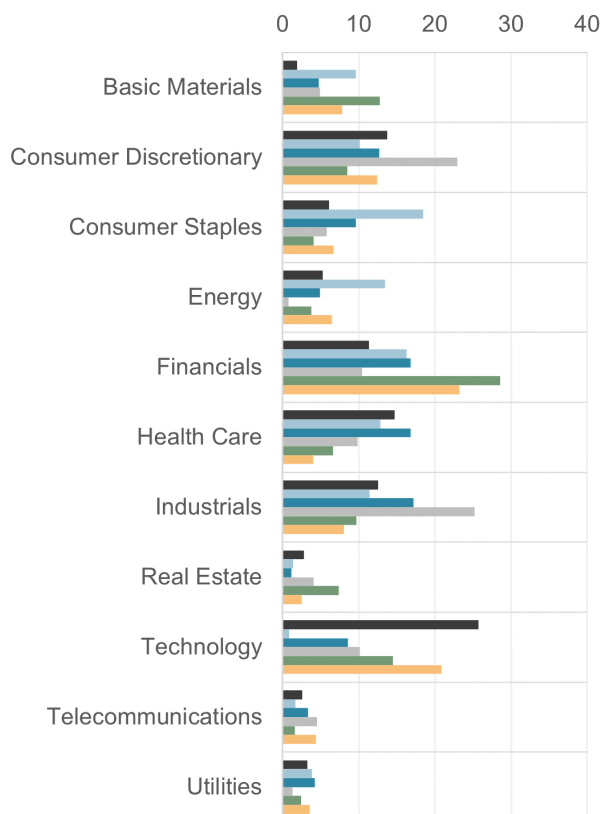


Regional Equity Market Returns Q4 2022 (TR, LC %) – Europe leads Q4 relief rally

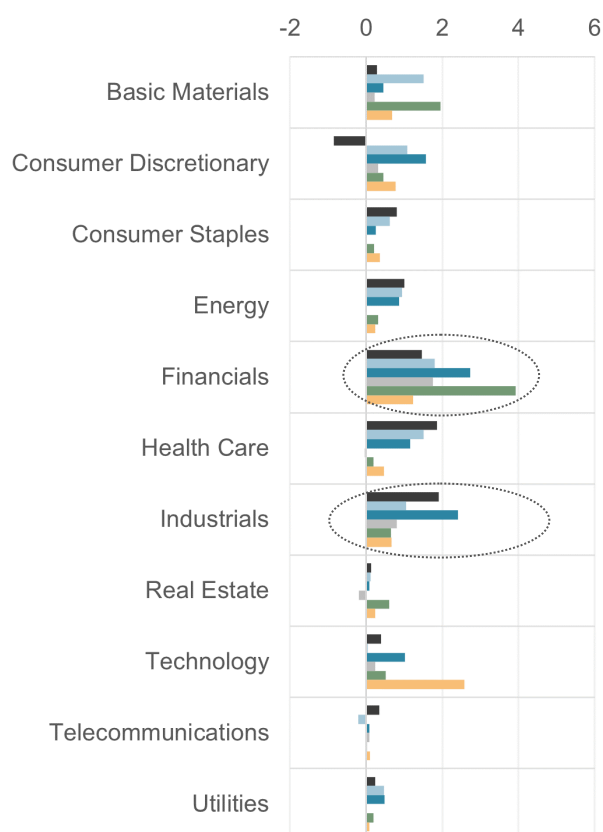
Europe led the global equity rally in Q4, followed closely by the UK and Asia Pac. Financials and Industrials were the top performers in most markets, while Telecom, Real Estate, Utilities & Tech broadly lagged. Discretionary was a notable drag on US returns.



Benchmark Industry Weights, 3M average (%)



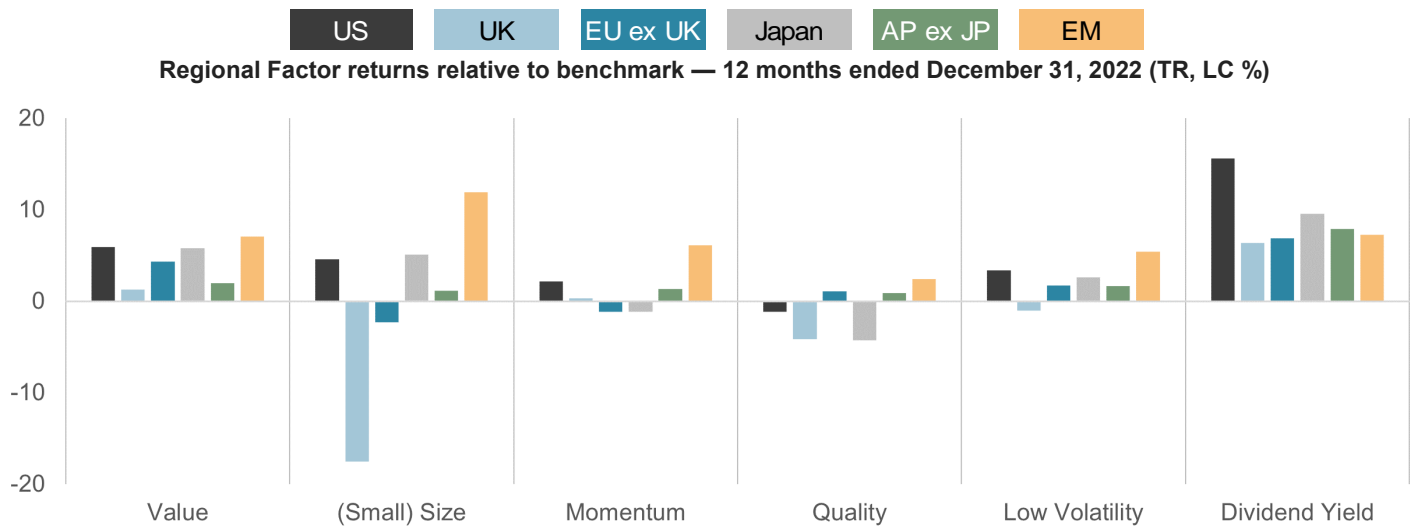
3M – Contributions to Total Benchmark Returns (%)



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Industry results based on Industry Classification Benchmark (ICB) data. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

Global View – Factor and Benchmark Performance Highlights – Full Year 2022

Value, Yield and Low Vol were the top-performing factors in 2022, as investors favored stabler, less cyclically sensitive stocks over pricier growth stocks amid the extreme volatility plaguing global markets for the past year. All EM factors outperformed, led by (small) Size and Yield. The biggest underperformers were Size and Quality in the UK, Size in Europe, and Quality in Japan.

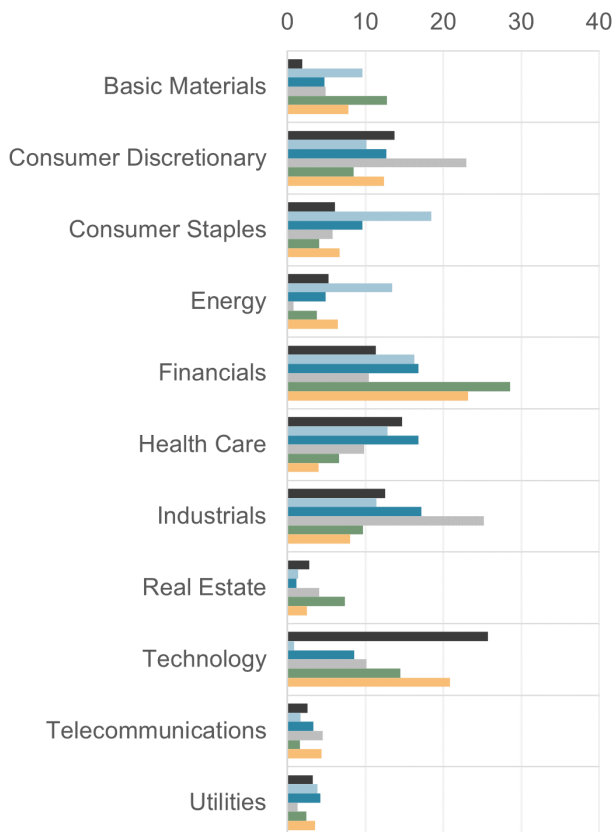


Regional Equity Market Returns 12M (TR, LC %) – Only the UK ends 2022 with gains

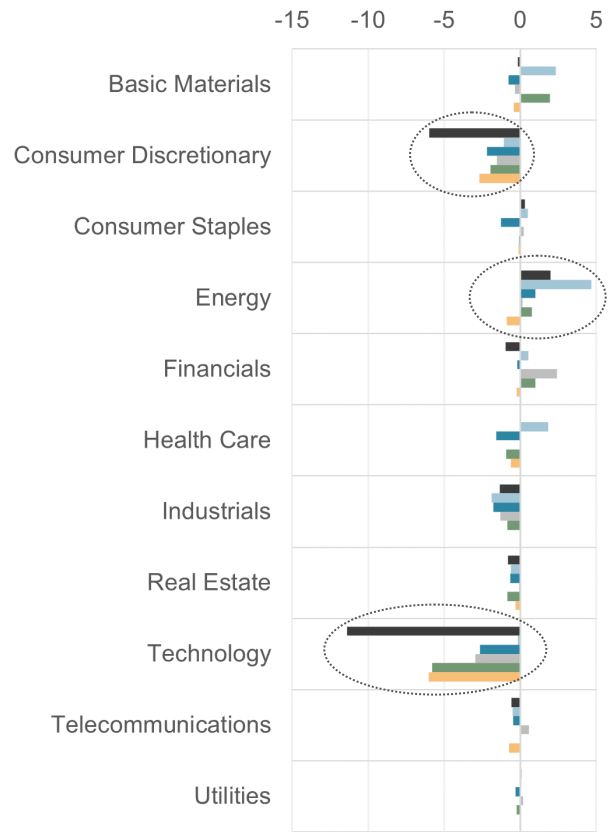
The UK was the only market to post a positive return for the full year, bolstered by its large exposures to outperforming Energy, Materials & Health Care. The US, Emerging and Asia Pac were hurt most by the slump in Tech and Discretionary stocks.



Benchmark Industry Weights, 3M average (%)



12M – Contributions to Total Benchmark Returns (%)



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Industry results based on Industry Classification Benchmark (ICB) data. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

Global View – Factor rotation

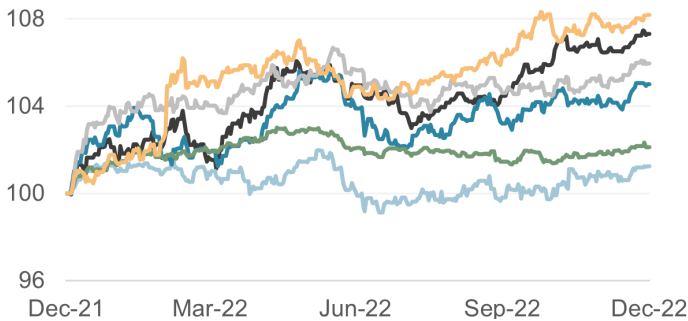
Value rotation resumes in Q4 relief rally

After wobbling in Q3, Value staged a robust comeback in Q4 globally, strongly outperforming Quality as ebbing recession fears fueled an investor rush into cheaper, cyclical beneficiaries (top charts). Both factors have been whipsawed by the extreme shifts in investor expectations for inflation, the pace of monetary tightening and the likely impact of those efforts on global growth. Both short and long US Treasury yields eased over the summer months amid rising hopes that deteriorating economic indicators would prompt an earlier end to central bank rate hikes, only to surge higher (middle, left) as policymakers remained resolute in their fight against inflation. Though the US yield curve remains inverted, a classic recession signal, spreads have widened recently (middle, right).

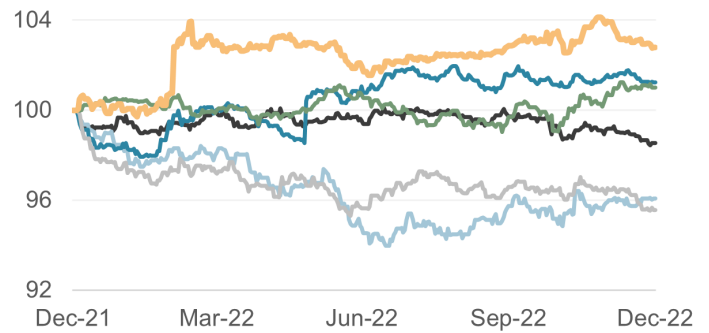
As the bottom chart shows, 24-month correlations between Value and shifts in the slope of the US yield curve have generally been positive and have grown more so recently, particularly in the US. Though the US yield curve remains inverted, the widening in yield spreads in Q4 was a tailwind for Value.



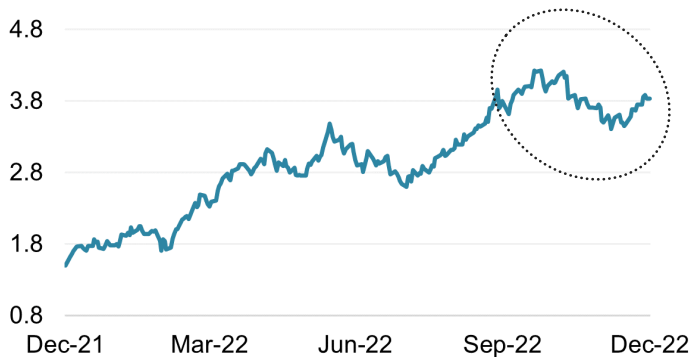
Value relative to benchmark (LC, rebased)



Quality relative to benchmark (LC, rebased)



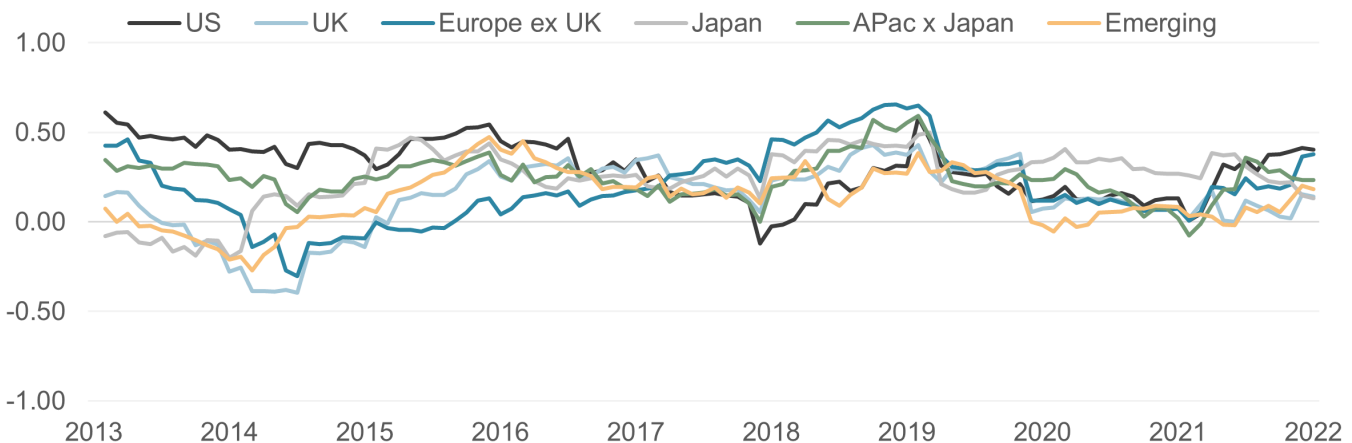
US Treasury bond yields (%)



Select US Treasury yield curves (%)



24-month correlations of Value to 1-month changes in slope of the US Treasury yield curve (10yr minus 2yr)

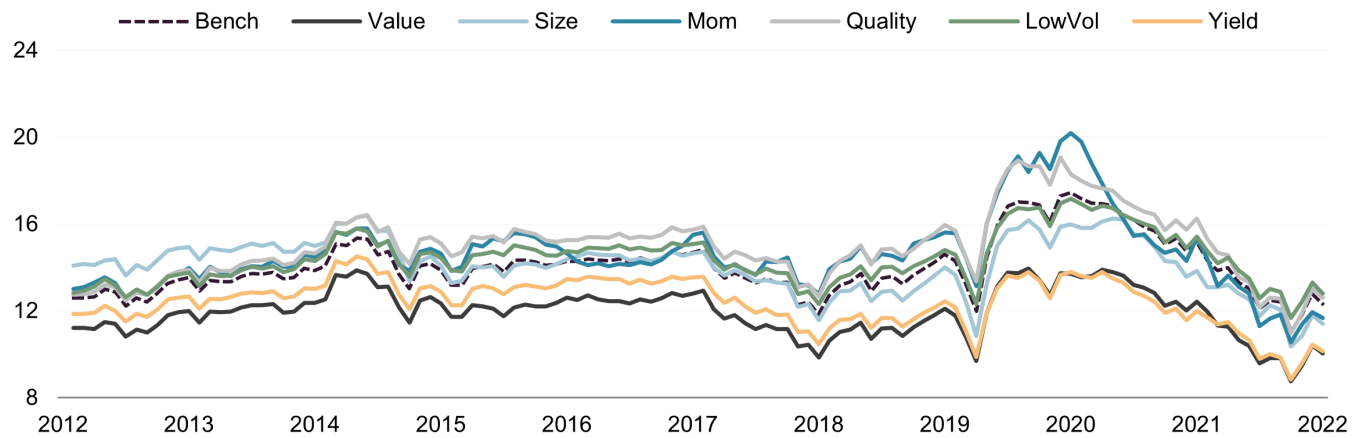


Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

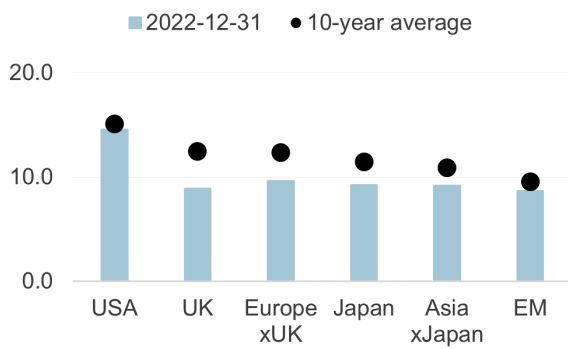
Global View – Factor Valuations

Despite a strong Q4 rebounds, forward P/E's across factors remain well below 10-year averages in most markets (except Value and Low Vol in the US). Most factors (except Quality and Low Vol) continue to trade at discounts to the global benchmark, particularly Value and Yield. As has long been the case, US factors are the most expensive globally.

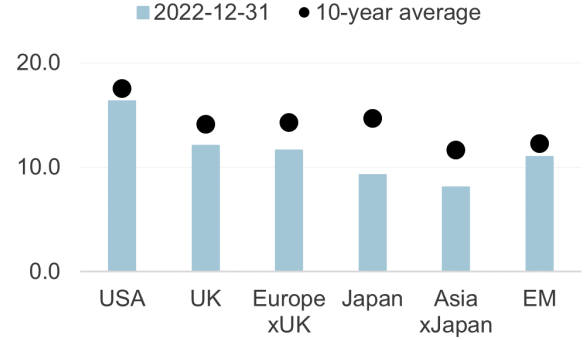
12-month forward factor P/E ratios, average of six regions*



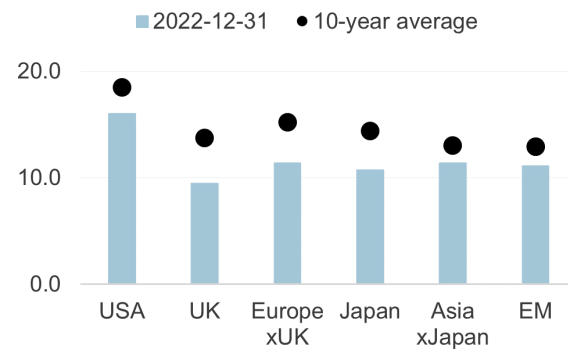
Value - 12M forward P/E



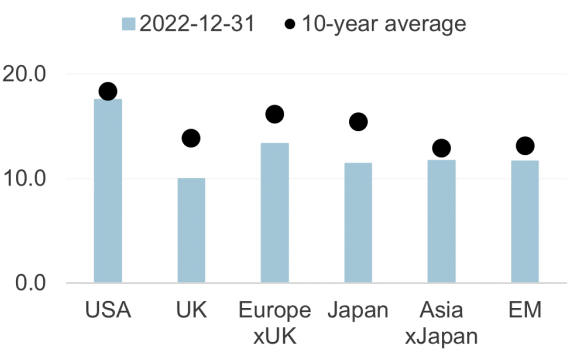
Size - 12M forward P/E



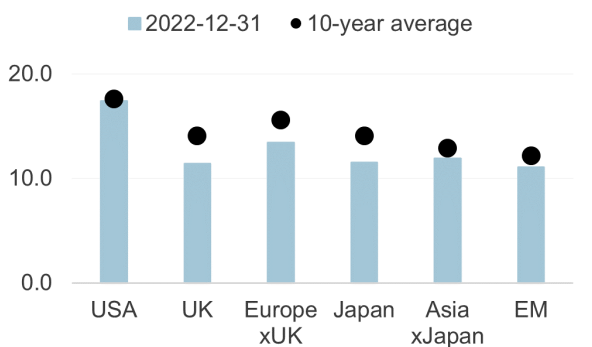
Momentum - 12M forward P/E



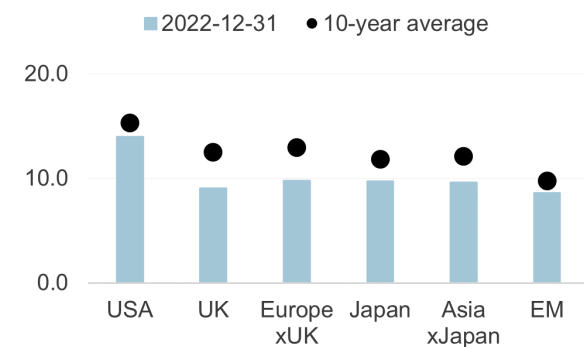
Quality - 12M forward PE



Low Volatility - 12M forward PE



Yield - 12M forward PE



Source: FTSE Russell/Refinitiv. All data as of December 31, 2022. *Combined average 12M forward P/E's for FTSE USA, FTSE UK, FTSE Europe ex UK, FTSE Japan, FTSE Asia Pacific ex Japan and FTSE Emerging regional indexes. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please refer to important disclosures and information on factor calculations. For professional investors only.

US Equity Factor Insights

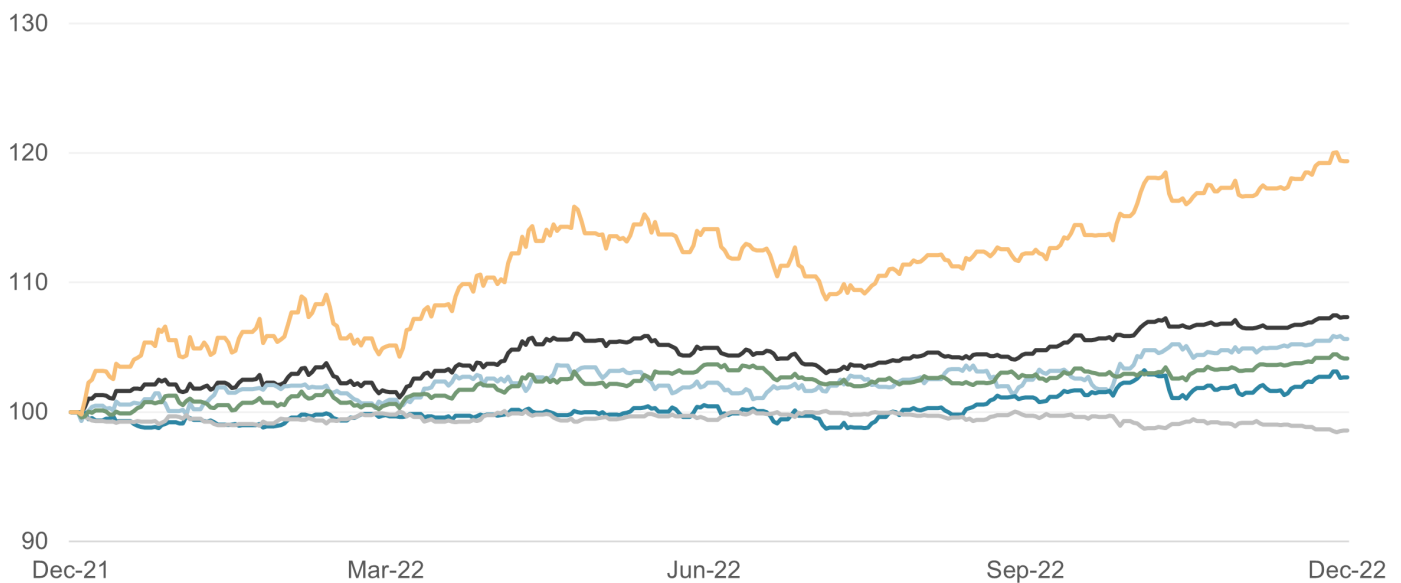
Full Year 2022

Key Observations

- Most factors fared better than the broad market in the 2022 sell-off, with robust Q4 rebounds extending Yield and Value leadership and Quality the sole underperformer.
- Escaping the carnage in long-popular Tech and other pricey growth stocks was the primary driver of Yield and Value outperformance for the year. Its large Tech exposure was the biggest drag on Quality.
- Yield also got an extra lift from stock selection within Health Care and its overweight in outperforming Energy stocks, two prominent dividend payers.
- All but Low Vol benefited from the huge gains in Energy last year.
- Following Q4 re-ratings, forward P/Es for most factors are at or modestly below 10-year averages. Recent outperformance has returned Value's discounts versus the market and Quality to their long-term norms. Yield is the least expensive factor in both absolute and relative terms.



Factor returns relative to benchmark (rebased)



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

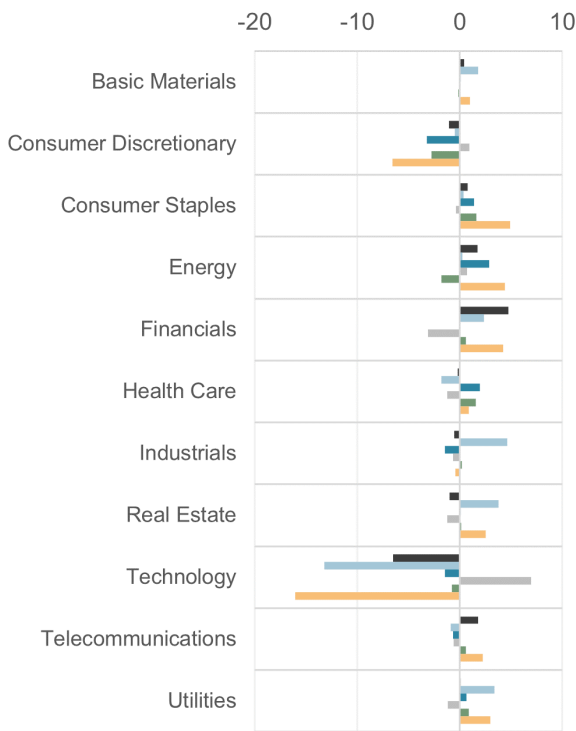
US Factor Performance & Industry Attributions — Full Year 2022

Exposures to ‘tech wreck’ dominate US factor performance

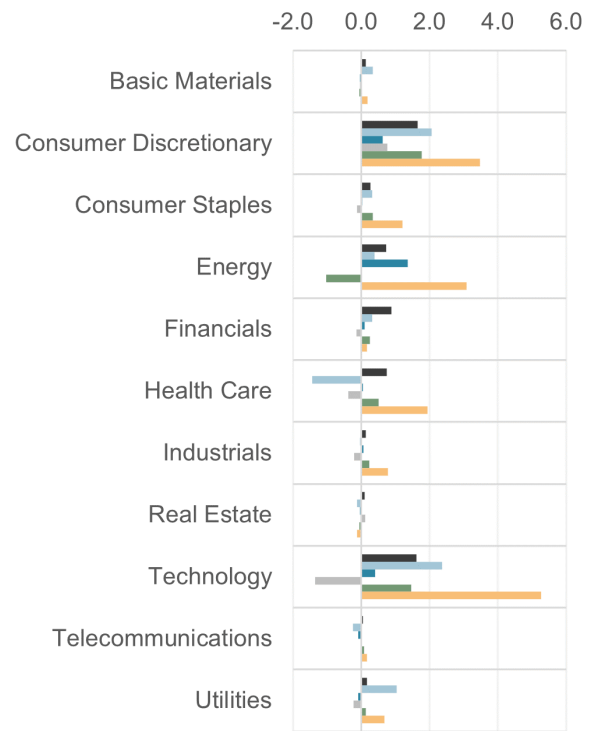
Yield, Value and Size benefited most from their underweights and stock selection within pricey Technology and Discretionary stocks in 2022, by far the worst-performing industries for the year, while overweights to both hurt Quality. Yield and Value got a extra boost from stock selection within Health Care and overweights in outperforming Energy stocks.

Full Year 2022	Relative to Benchmark (TR %)					
	Value	Size	Mom	Quality	Low Vol	Yield
FTSE USA	5.9	4.6	2.2	-1.2	3.4	15.6

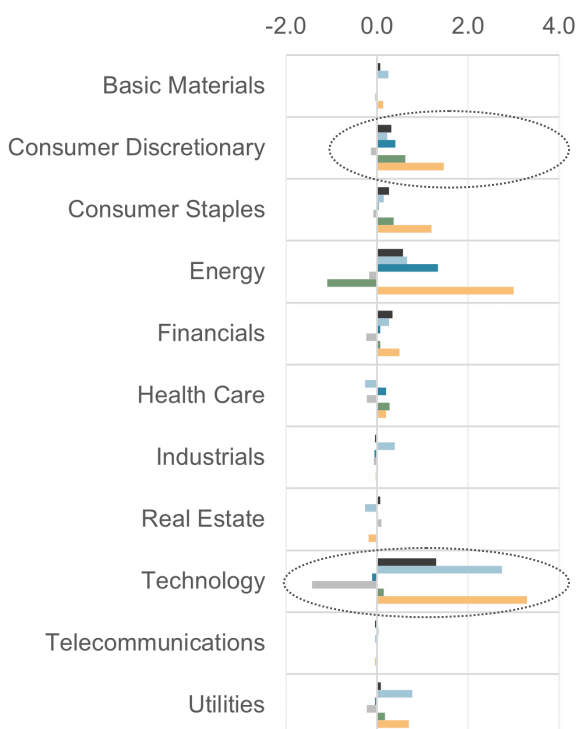
Industry active weights, full year 2022 average



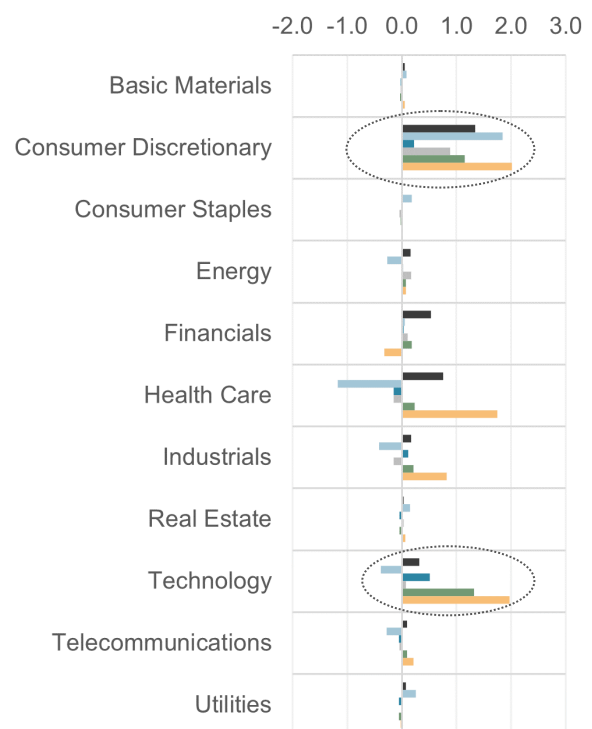
Total industry effects, full year 2022



Industry allocation effects, full year 2022



Stock selection within industry, full year 2022

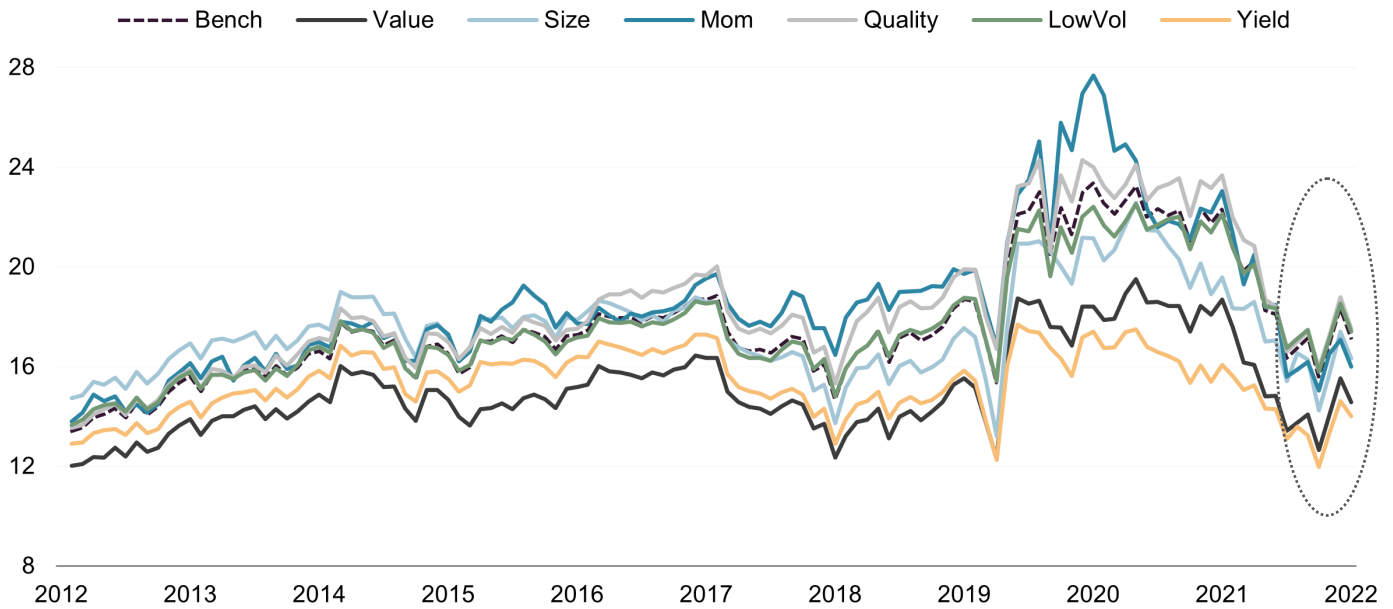


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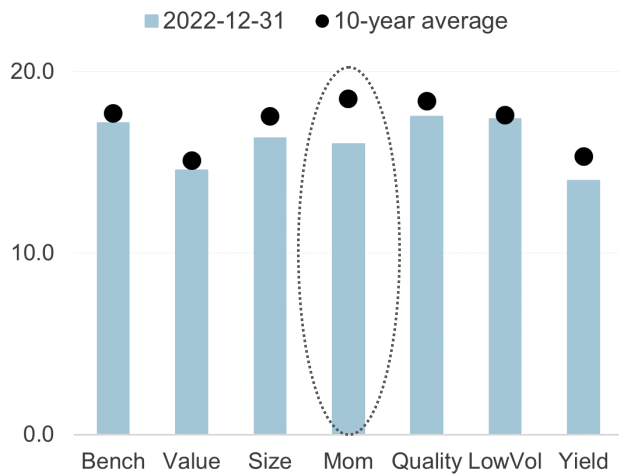
US Factor Valuations

Forward P/E's rebounded across US factors in Q4, stanching the seemingly unrelenting retrenchment since early 2021. All but Low Vol now stand close to or modestly below the historical averages in absolute terms. Recent outperformance has returned Value's discount to the market to its 10-year average, while Yield remains well below the norm on that basis. The Quality premium to Value has narrowed significantly this year, to 2.9 points currently, or roughly in line with the long-term average of 2.5 points.

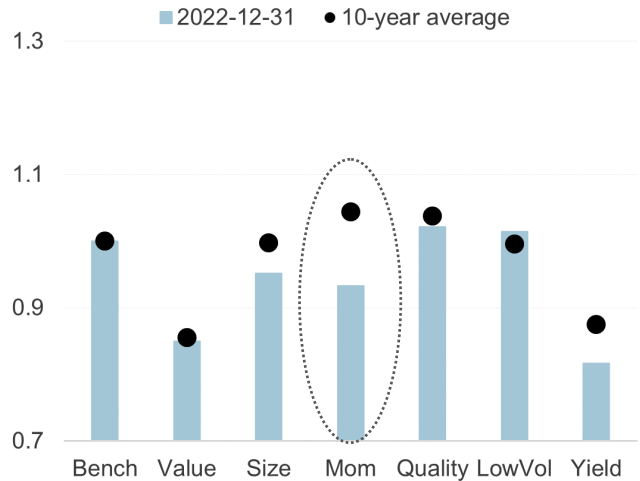
FTSE USA – Absolute 12M forward P/E's



Current Absolute 12M forward P/E vs history



Current Relative 12M forward P/E vs history



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

UK Equity Factor Insights

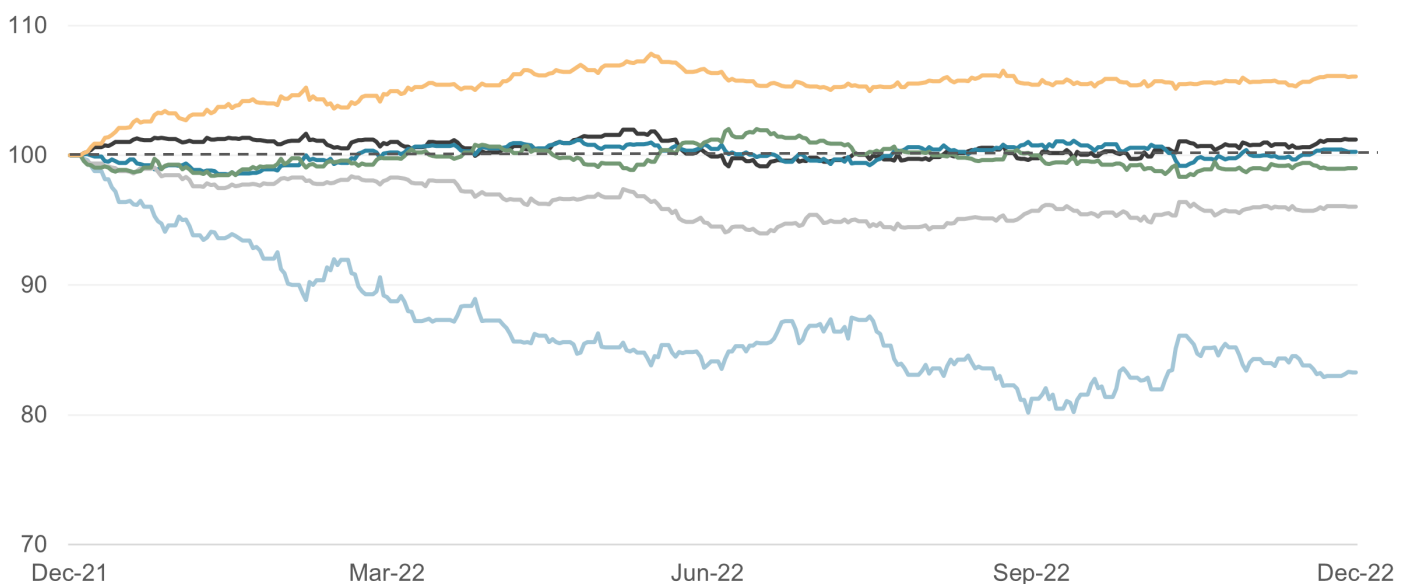
Full Year 2022

Key Observations

- Yield and Value were best performers in 2022, lifted by Q4 rallies. But the massive selloff in small-cap stocks dominated UK factor performance in 2022, a complete unwinding of Size outperformance in 2021.
- Size was hurt most by its large underweight in outperforming Energy, overweights in Industrials and Discretionary, and the strong investor preference for larger players across most industries.
- Yield and Value benefited most from overweights in Energy and Materials, underweights in Discretionary and stock selection within Staples and Industrials.
- Even after strong Q4 upticks, forward P/Es for most factors remain well below 10-year averages, particularly Quality and Momentum. Despite recent underperformance, Size remains the most expensive factor, trading at an even larger premium to the market vs history. The Quality/Value premium has narrowed significantly.



Factor returns relative to benchmark (rebased)



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

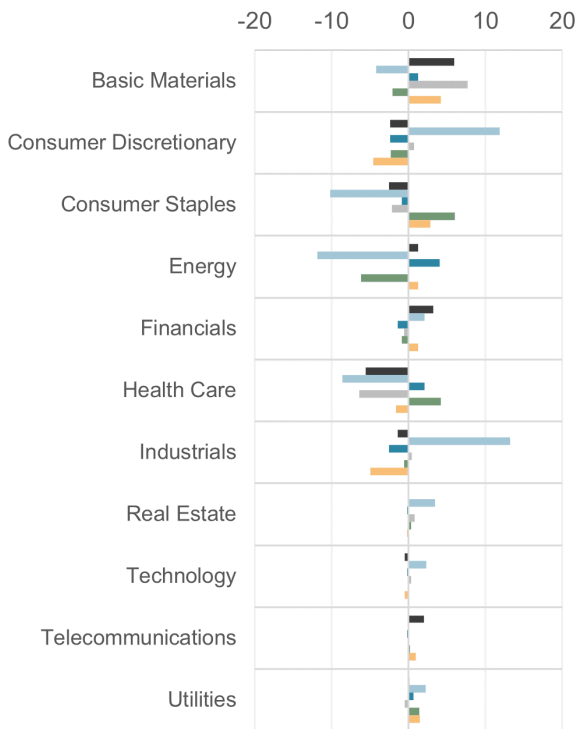
UK Factor Performance & Industry Attribution — Full Year 2022

Energy exposures hold sway over UK factor performance, especially for Size

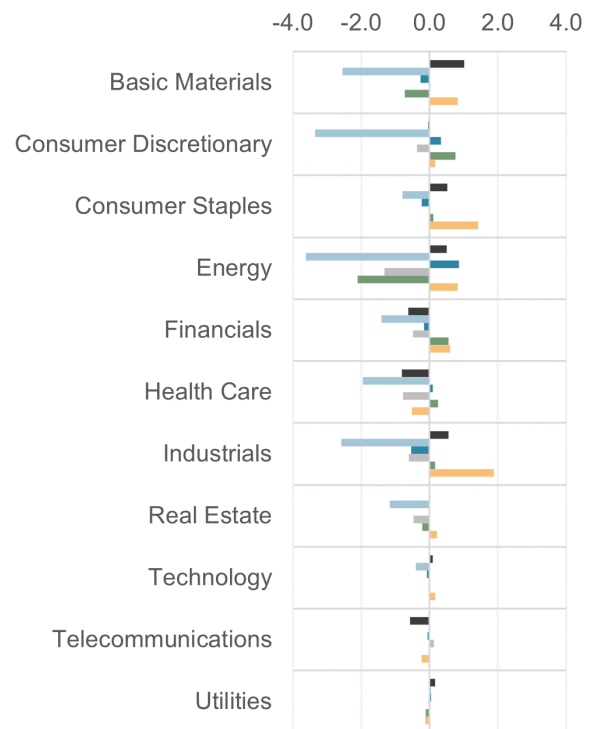
Despite rallying in Q4, the massive underperformance of (small) Size remained the dominant theme among UK factors in 2022, with its large underweight in outperforming Energy and large overweight in lagging Industrials. Best-performing Yield and Value benefited from overweights in Materials and Energy and stock selection within Staples. Energy underweight hurt Quality.

Full Year 2022	Relative to Benchmark (TR %)						
	Value	Size	Mom	Quality	Low Vol	Yield	
FTSE UK	4.9%	1.3	-17.5	0.3	-4.1	-1.0	6.4

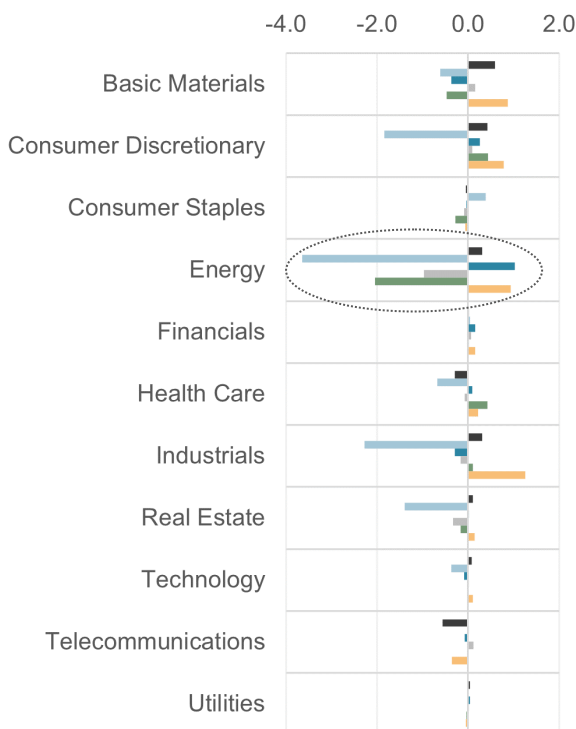
Industry active weights, full year 2022 average



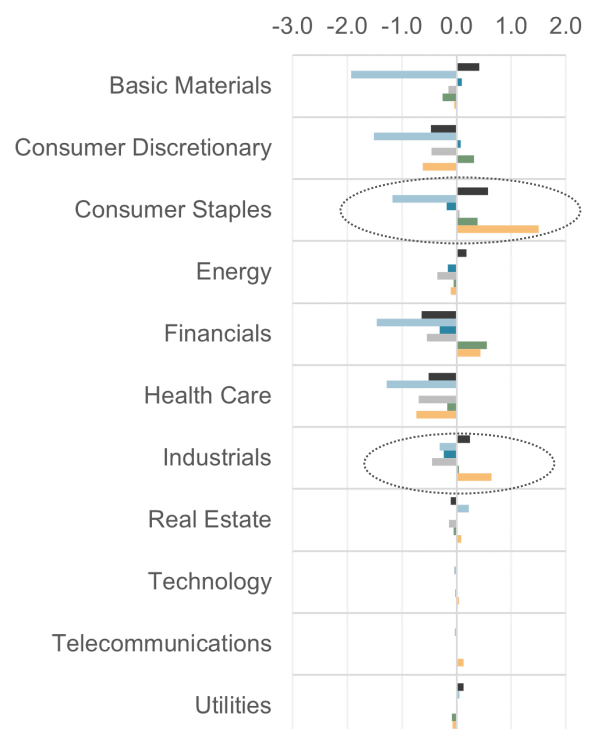
Total industry effects, full year 2022



Industry allocation effects, full year 2022



Selection effect within industry, full year 2022

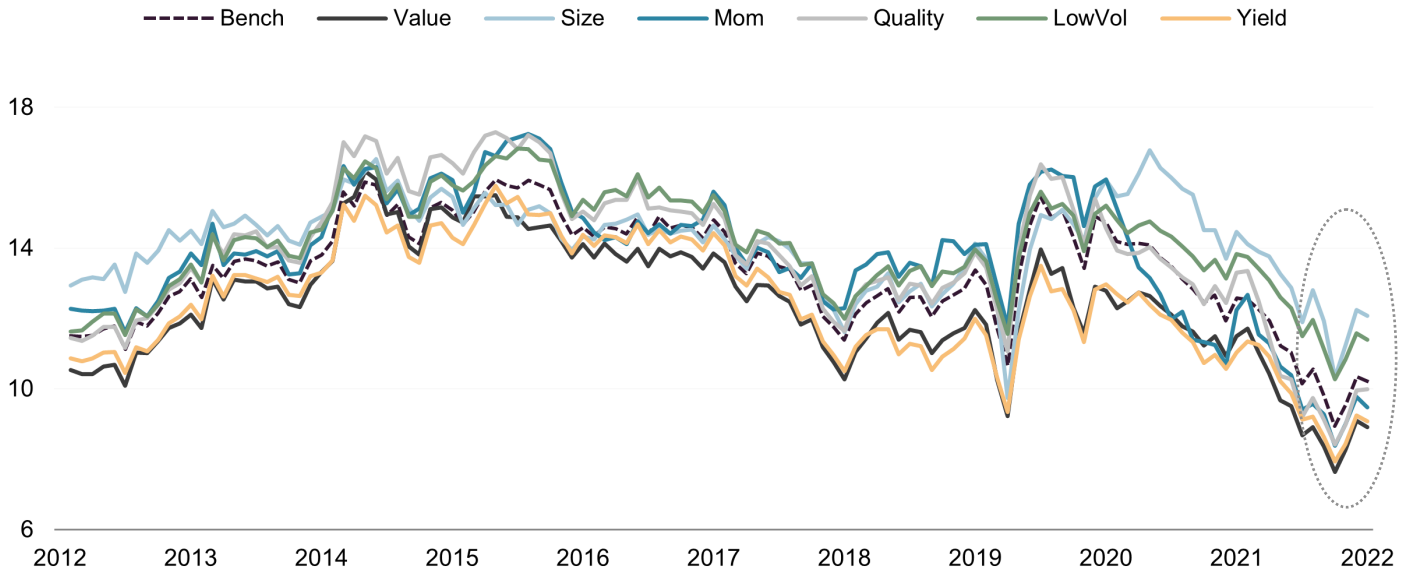


Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Industry results based on Industry Classification Benchmark (ICB) data. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

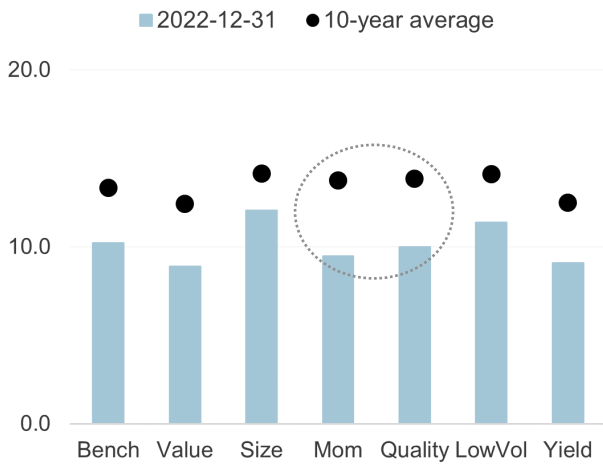
UK Factor Valuations

Despite strong Q4 re-ratings, forward P/E's for most factors remain well below 10-yr averages in both absolute and relative terms, particularly Quality and Momentum. Despite its recent underperformance, Size remains by far the most expensive factor, followed by Low Vol; both trade at premiums to the market (versus historical discounts). The Quality/Value premium has narrowed materially this year, to 1.1 points or slightly below the historical average of 1.3 points.

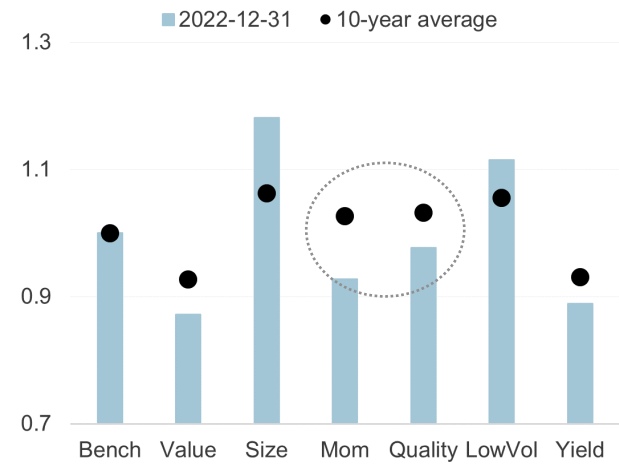
FTSE UK – Absolute 12M forward P/E's



Current Absolute 12M forward P/E's vs history



Current Relative 12M forward P/E's vs history



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

Europe ex UK Equity Factor Report

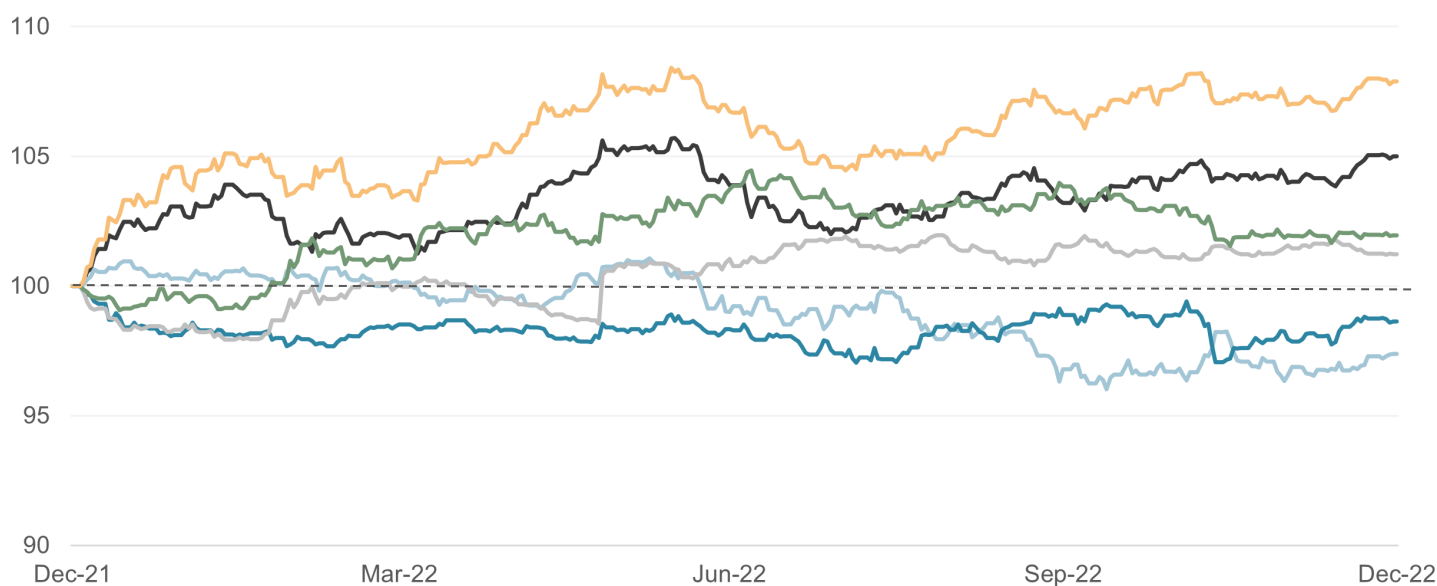
Full Year 2022

Key Observations

- Most factors held up better than the broad market in the 2022 selloff, with Q4 rebounds cementing Yield and Value leadership. Size was the worst performer.
- Factor performance for the year largely revolved around exposures to the relative resilience of Financials stocks and to the carnage in Technology — buoying Yield and Value and undermining Quality.
- Size was hurt most by the investor preference for larger players across industries, most significantly within Health Care, as well as its overweight in Real Estate.
- Despite strong Q4 re-ratings, most forward P/Es (except Low Vol) remain below 10-year averages in both absolute and relative terms.
- Value and Yield continue to trade at deeper-than-normal discounts to the broad market and other factors. The Quality premium to the market is below average and has returned to its long-term average versus Value.



Factor returns relative to benchmark (rebased)



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

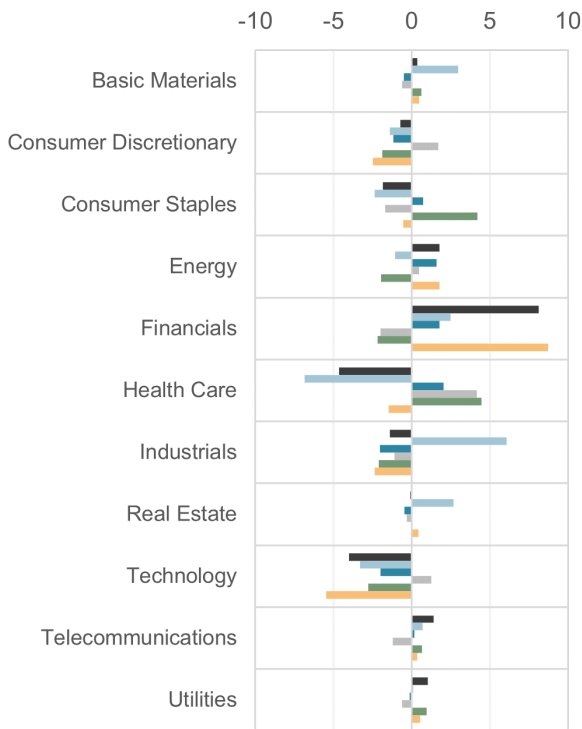
Europe ex UK Factor Performance & Industry Attribution — Full Year 2022

Financials overweight and Tech underweight give Value the leg up

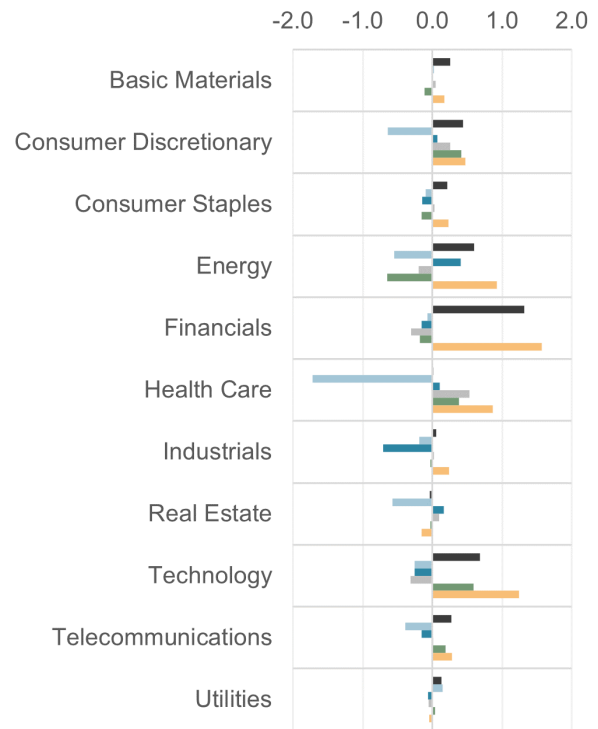
Yield and Value fared best amid the broad market sell-off in 2022, buoyed by large overweights and stock selection within relatively resilient Financials and large underweights in badly lagging Tech. Size suffered most from a shift to expensive larger-cap stocks within the Health Care, Tech and Discretionary industries and its overweight in underperforming Real Estate.

Full Year 2022	Relative to Benchmark (TR %)					
	Value	Size	Mom	Quality	Low Vol	Yield
FTSE Dev Europe ex UK	4.4	-2.3	-1.2	1.1	1.7	6.9

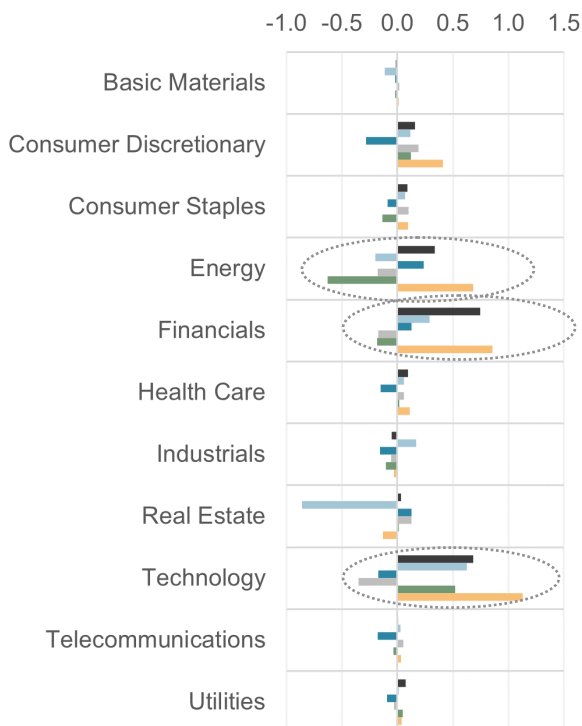
Industry active weights, full year 2022 average



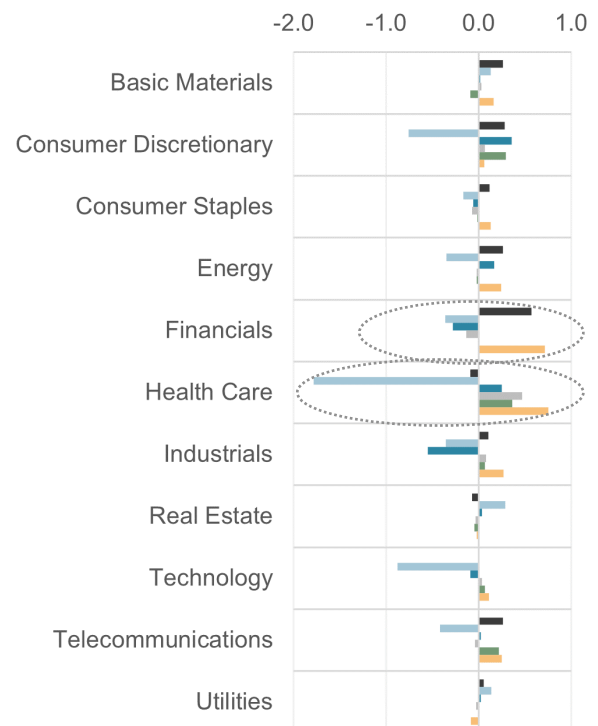
Total industry effects, full year 2022



Industry allocation effects, full year 2022



Selection effect within industry, full year 2022

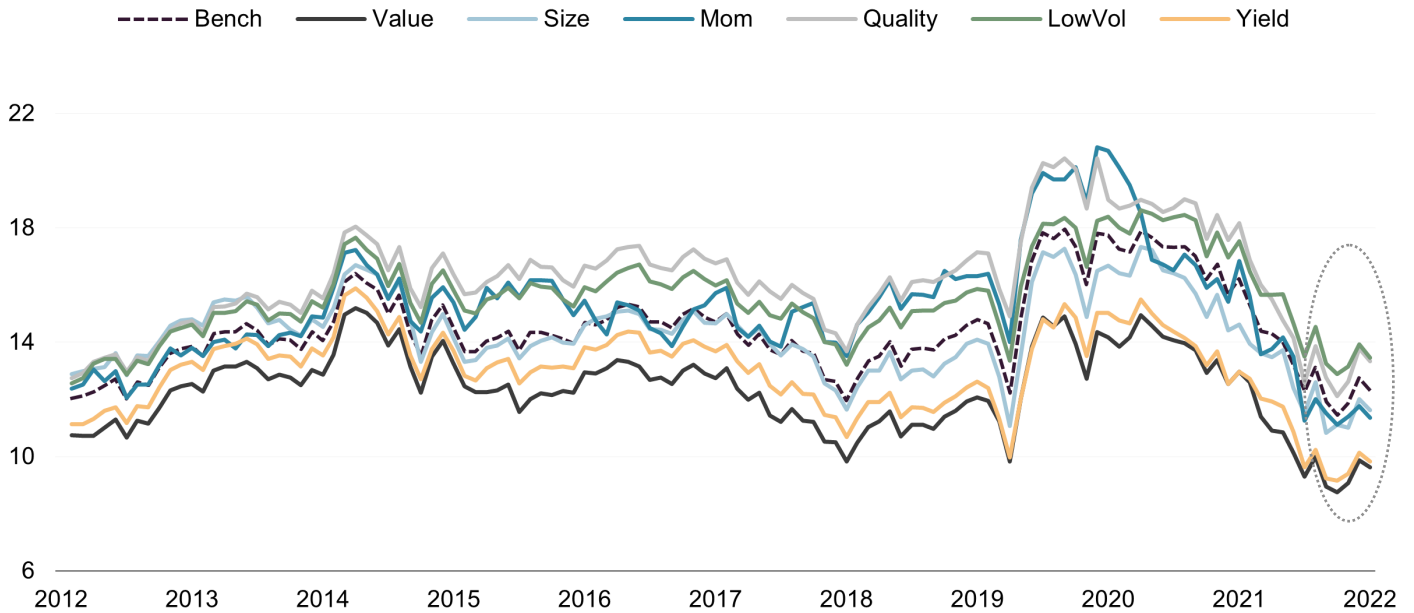


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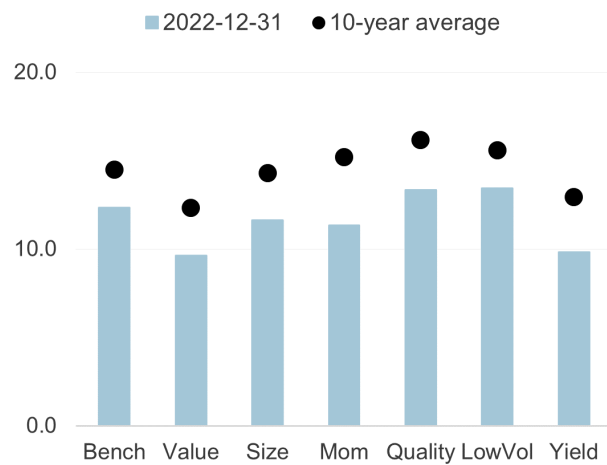
Europe ex UK Factor Valuations

Despite modest upticks in Q4, most forward P/E's (except Low Vol) remain below 10-year averages in both absolute and relative terms. Value, Yield and Momentum continue to trade at deeper-than-average discounts to the broad market and other factors. Quality's premium to the market remains below the long-term average. Versus Value, the premium has tightened significantly this year, and is now roughly in line with the 10-year average spread of 3.7 points.

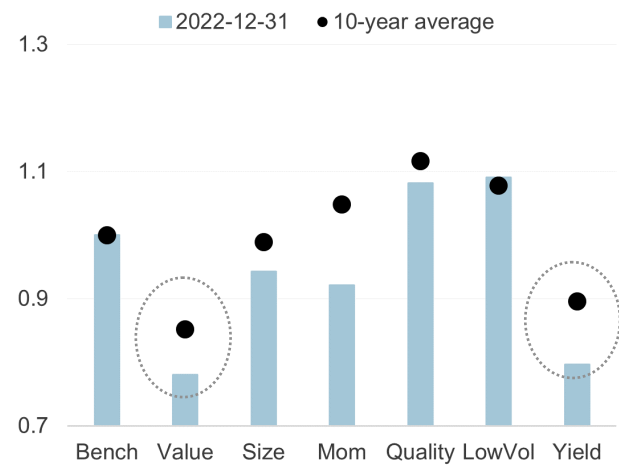
FTSE Europe ex UK – Absolute 12M forward P/E's



Current Absolute 12M forward P/E's vs history



Current Relative 12M forward P/E's vs history



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Japan Equity Factor Report

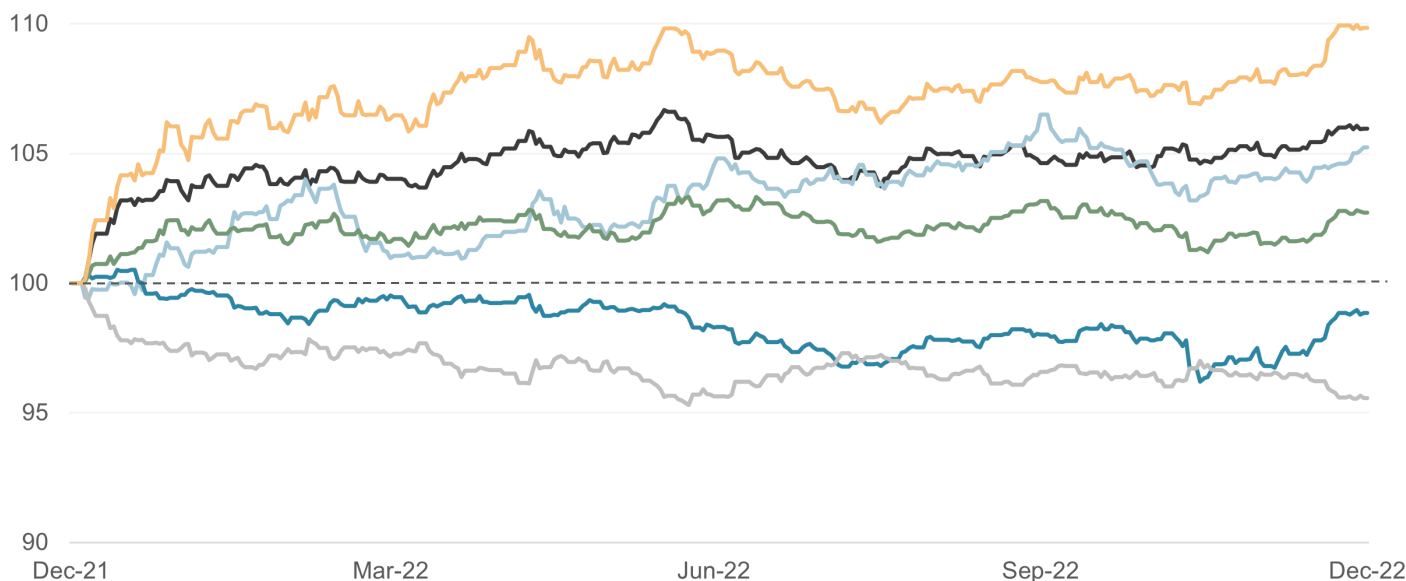
Full Year 2022

Key Observations

- Most factors outperformed the broad market in the 2022 downdraft, with Q4 rebounds extending Yield, Value and Size leadership. Quality was by far the worst performer.
- Factor performances in 2022 largely revolved around exposures to Financials (the top gainer) and Technology (which suffered the greatest losses) — helping Yield and Value and hurting Quality.
- Stock selection in Industrials was another major performance driver — a boon for Yield, Value and Size and a detractor for Quality.
- Though absolute forward P/Es remain below 10-year averages, Value, Yield and Low Vol have returned to long-term norms versus the market. Size is by far the cheapest factor in relative terms, while Quality also looks attractively valued, trading at a discount to the market (vs its historical premium) and a significantly smaller premium to Value versus history.



Factor returns relative to benchmark (rebased)



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

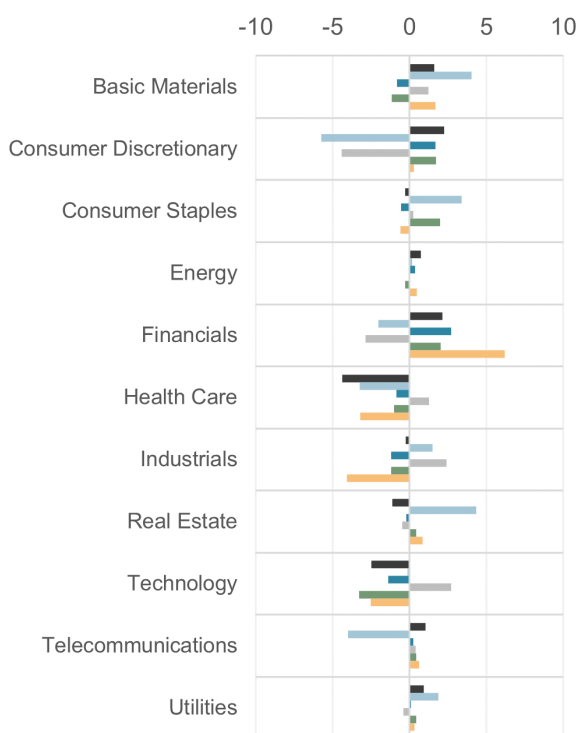
Japan Factor Performance & Industry Attribution — Full Year 2022

Financials and Tech exposures help Yield and Value, hurt Quality

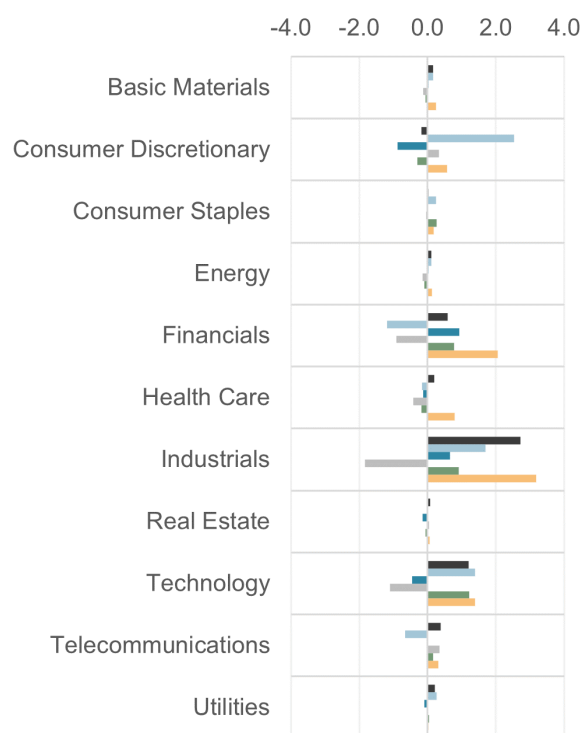
Yield and Value retained their huge leads in 2022, boosted by overweights in outperforming Financials, a shift to less expensive stocks within Industrials and underweights in lagging Tech. The shift to smaller stocks in Discretionary and Industrials bolstered Size. The Financials underweight, Tech overweight and shift away from pricey Industrials were the biggest drags on Quality.

Full Year 2022	Relative to Benchmark (TR %)					
FTSE Japan	Value	Size	Mom	Quality	Low Vol	Yield
-3.1%	5.8	5.1	-1.1	-4.3	2.6	9.5

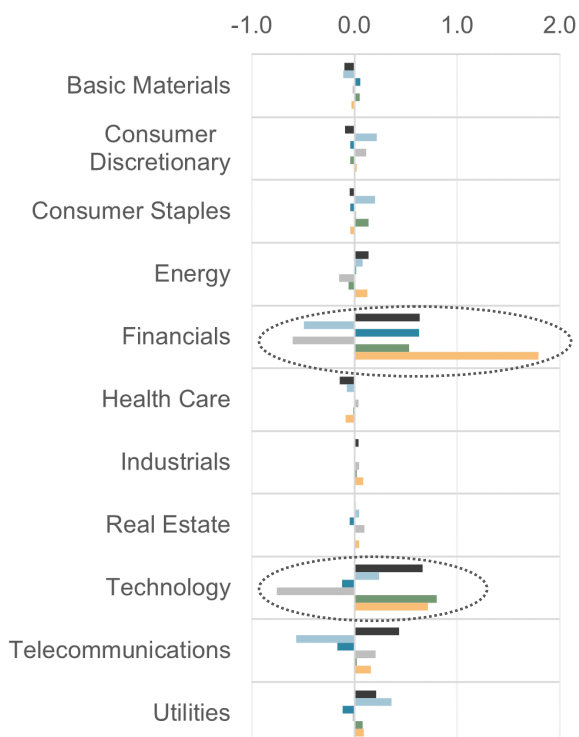
Industry active weights, full year 2022 average



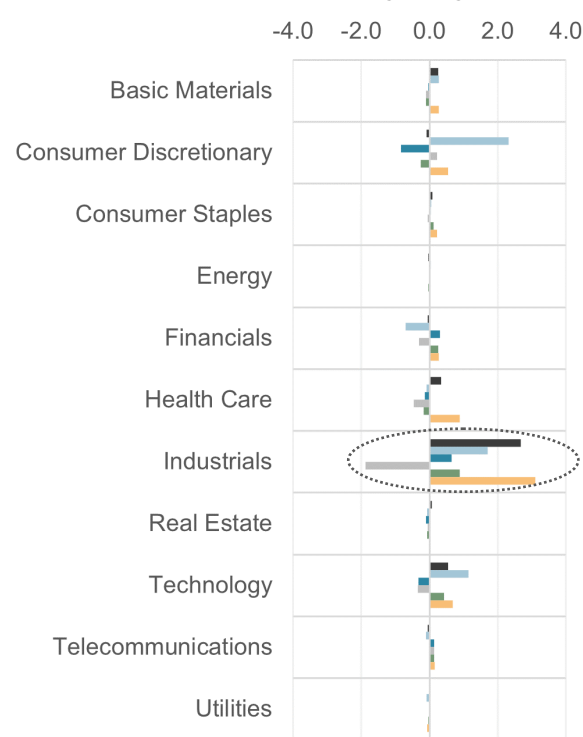
Total industry effects, full year 2022



Industry allocation effects, full year 2022



Selection effect within industry, full year 2022

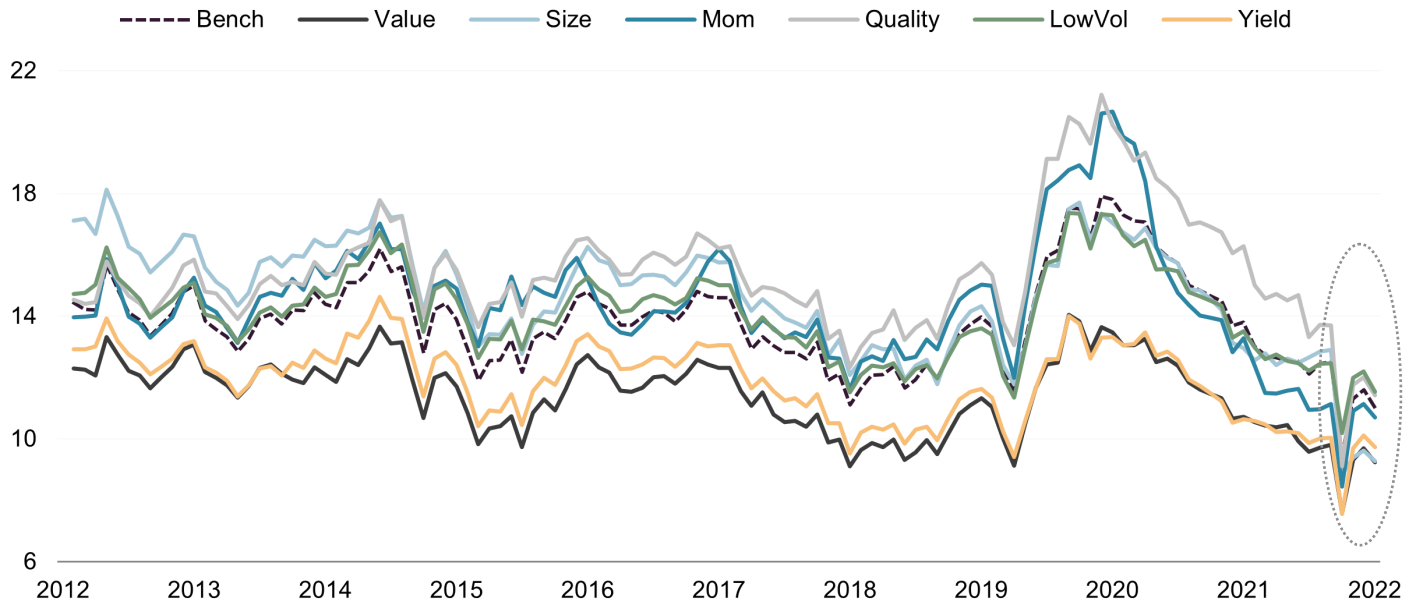


Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Industry results based on Industry Classification Benchmark (ICB) data. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

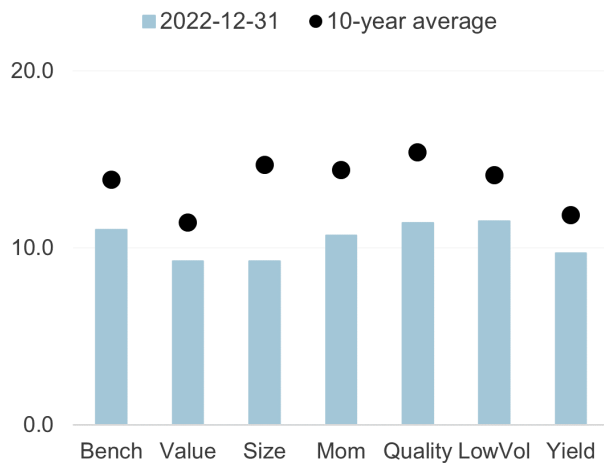
Japan Factor Valuations

Despite Q4 re-ratings, forward P/Es across factors remain below their 10-year averages in absolute terms. However, reflecting strong recent outperformances, Yield, Value and Low Vol have returned to historical norms vs the benchmark. Size is by far the least expensive factor in both absolute and relative terms. Notably, Quality trades at a discount to the market (versus its historical premium), while its premium to Value has shrunk significantly, to roughly half the 10-year average of 3.7 points.

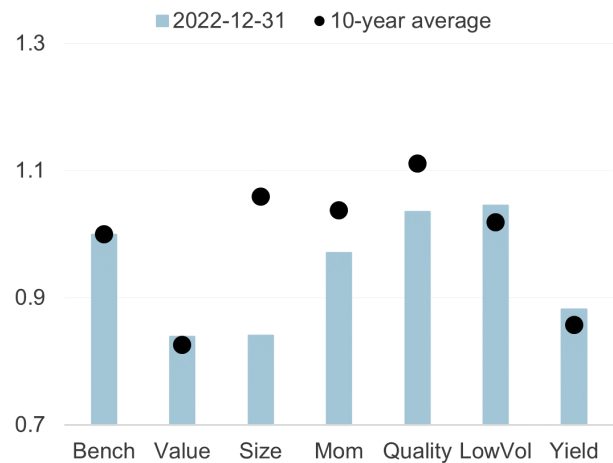
FTSE Japan – Absolute 12M forward P/Es



Current Absolute 12M P/Es vs history



Current Relative 12M P/Es vs history



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

Asia Pacific ex Japan Equity Factor Insights

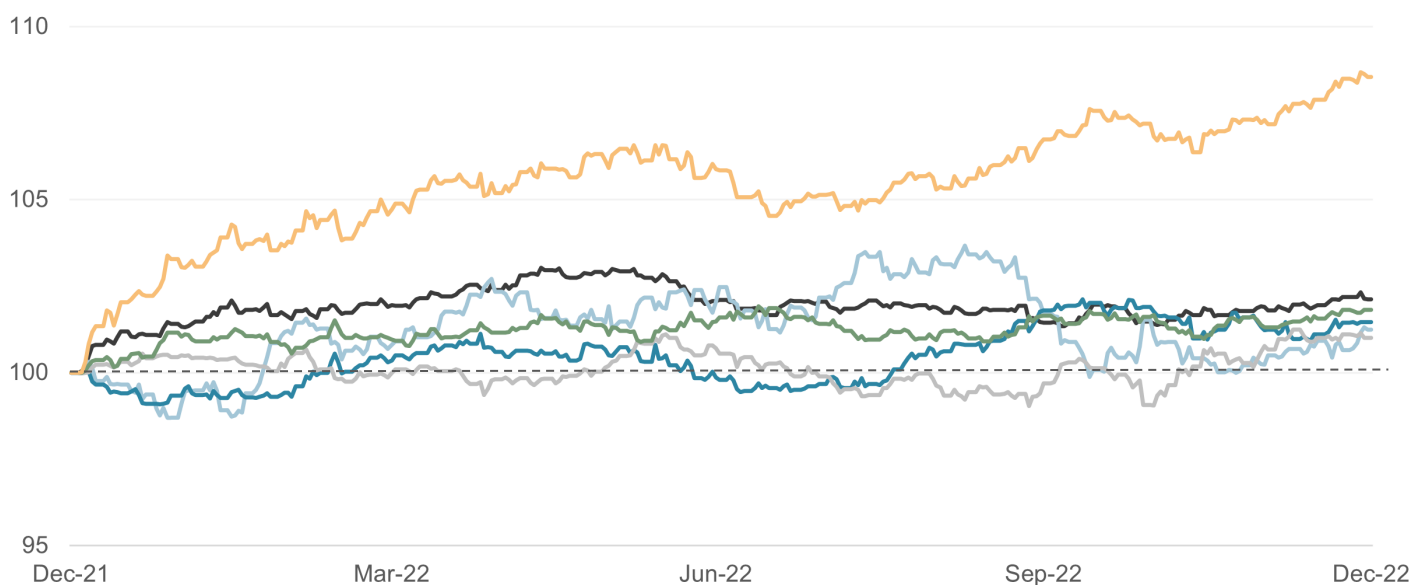
Full Year 2022

Key Observations

- Though mostly muted, all factors outperformed the broad market in the sharp 2022 selloff, with Q4 rebounds extending Yield, Value and Low Vol leadership. Despite re-entering positive territory in Q4, Quality lagged its factor peers.
- Exposures in Basic Materials, Financials and Technology were the chief drivers of factor performance in 2022, bolstering Yield and Value and dampening Quality returns.
- Lifted by a strong Q4 bounce-back, Size also gained traction for the year, as its big underweight in lagging Tech more than offset the drag from its underweight and selection effects in outperforming Financials.
- Forward P/Es for all but Low Vol remain below 10-year averages in both absolute and relative terms, particularly Size and Yield. Quality also trades at a discount to the market (versus its historical premium), and in line with its average long-term premium versus Value.



Factor returns relative to benchmark (rebased)



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

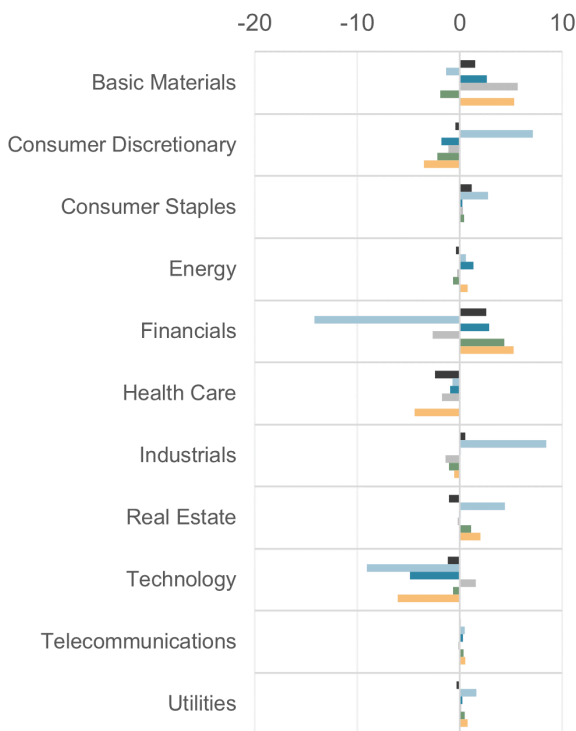
Asia Pac ex Japan Factor Performance & Industry Attribution — Full Year 2022

Yield stands out amid otherwise muted factor outperformances in 2022

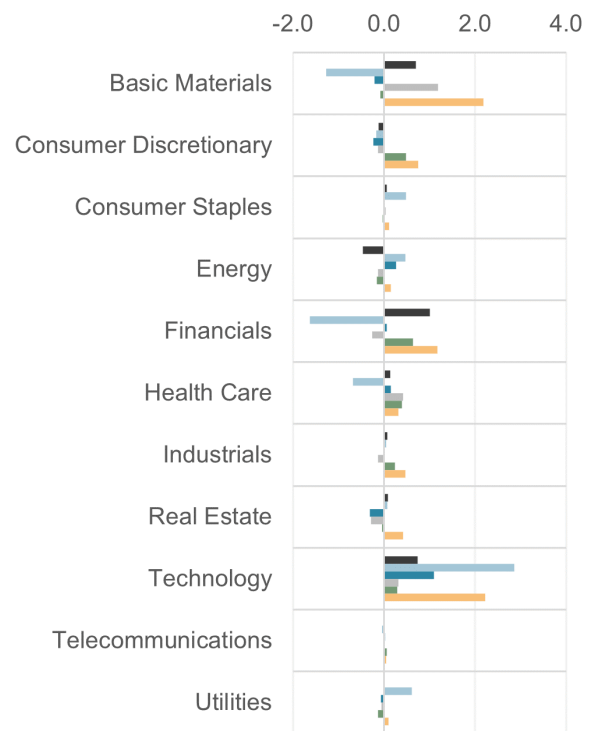
All factors fared better than the benchmark in 2022, with exposures and selection within Basic Materials, Tech and Financials the biggest return drivers, particularly for top outperformers Yield, Value and Low Vol. Quality ranked at bottom, reflecting its Tech overweight and Financials underweight. Size benefited from its Tech underweight and stock selection in Discretionary.

Full Year 2022	Relative to Benchmark (TR%)					
	Value	Size	Mom	Quality	Low Vol	Yield
FTSE Dev Asia Pacific ex JP	1.9	1.1	1.3	0.9	1.7	7.9

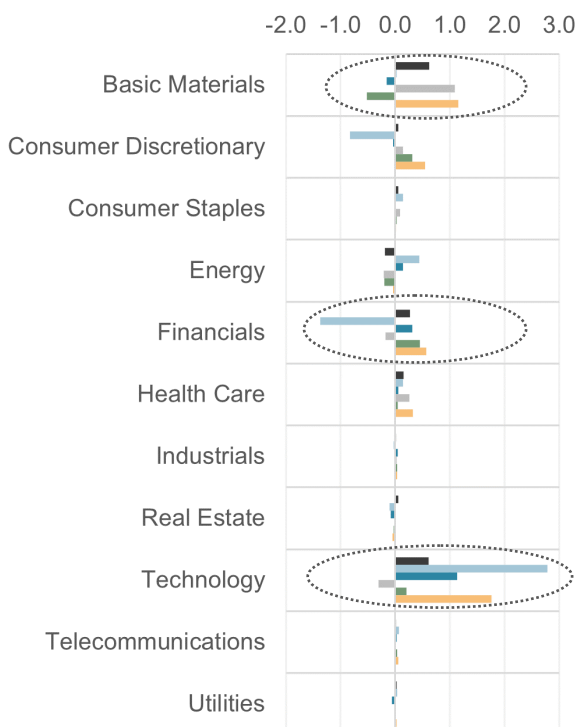
Industry active weights, full year 2022 average



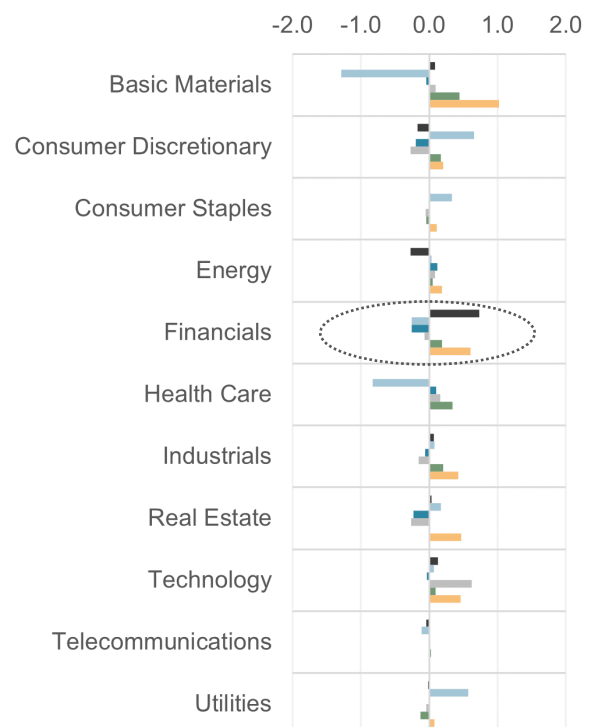
Total industry effects, full year 2022



Industry allocation effects, full year 2022



Selection effect within industry, full year 2022

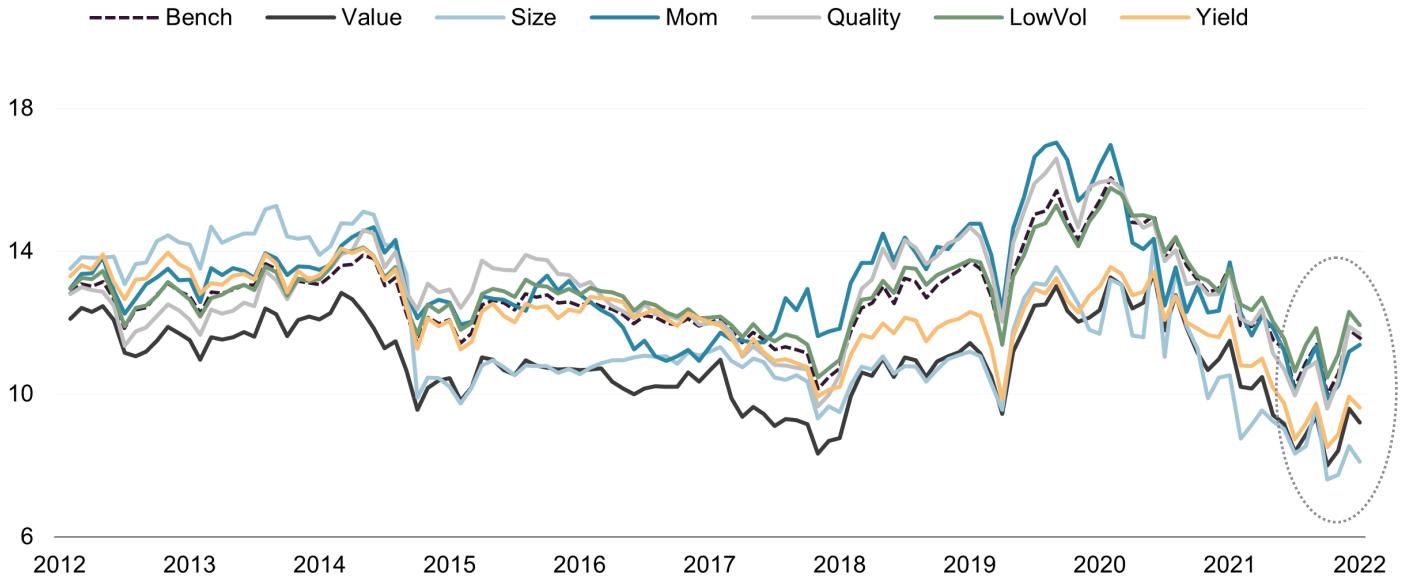


Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Industry results based on Industry Classification Benchmark (ICB) data. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

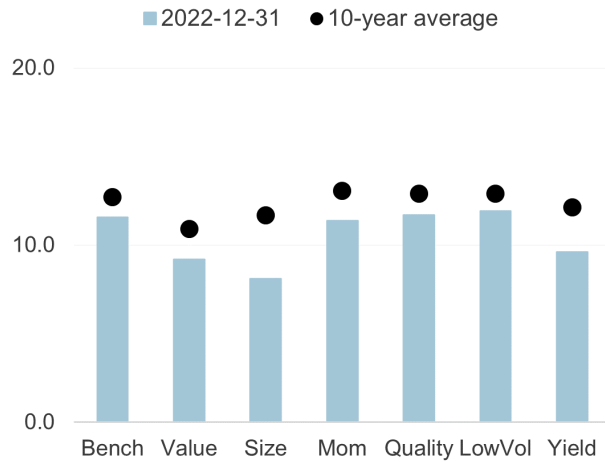
Asia Pacific ex Japan Factor Valuations

Despite big recoveries in the final quarter, forward P/E's across factors remain below 10-year averages in absolute and (except for Quality and Low Vol) relative terms. Size and Yield are the cheapest factors, trading at much deeper discounts to the benchmark and other factors versus history. Low Vol is the most expensive, trading at a higher-than-average premium to the market. The Quality/Value premium has narrowed considerably from its pandemic peak but remains above its long-term average of 1.9 points.

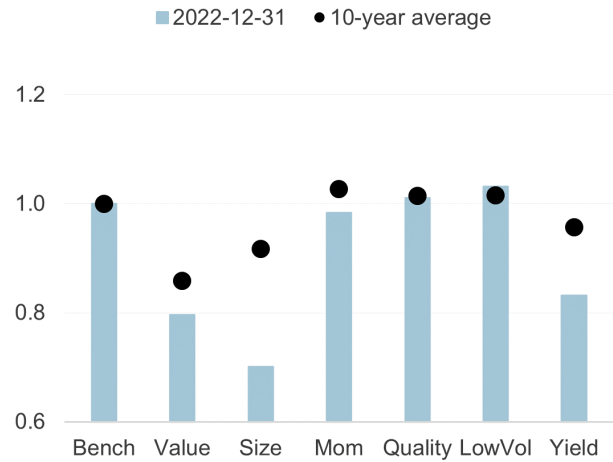
FTSE Asia Pacific ex Japan – Absolute 12M forward P/E's



Current Absolute 12M forward P/E's vs history



Current Relative 12M forward P/E's vs history



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

Emerging Markets Factor Report

Full Year 2022

Key Observations

- All EM factors fared better than the benchmark in the brutal 2022 rout. The continued outperformance of smaller stocks over large caps across industries in Q4 extended Size leadership for the year (followed by Yield and Value). Quality trailed other factors.
- Varying exposures to the massive selloffs in Discretionary and Technology accounted for most of the performance divergences — detracting from Quality (overweight) and additive for most other factors (underweights).
- Exposures to the relative resilience of Financials stocks also played a role, helping Value, Yield and Low Vol but muting Quality.
- Forward P/Es for all factors remain below 10-year averages in absolute and relative terms. Value and Yield trade at far bigger-than-normal discounts to the market, while Quality and Low Vol are roughly in line with the broad market, versus their historical premiums.



Factor returns relative to benchmark (rebased)



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

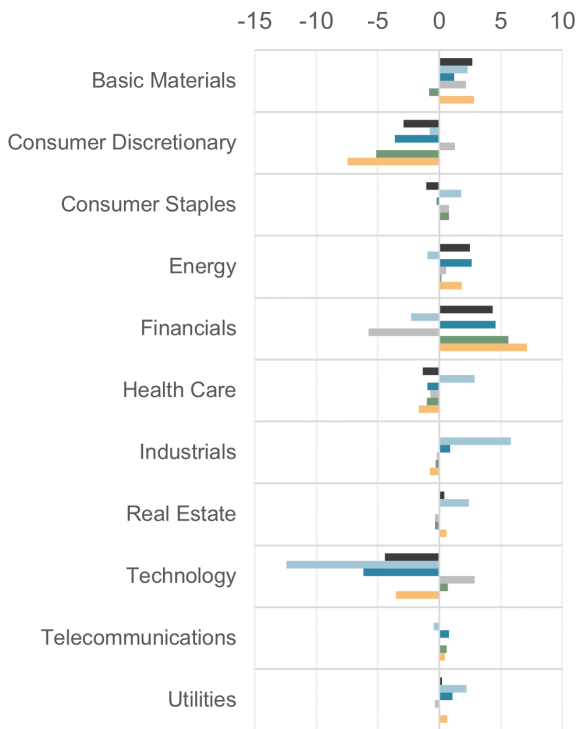
Emerging Markets Factor Performance & Industry Attribution — Full Year 2022

Escaping growth-stock carnage drives Size and Yield leadership

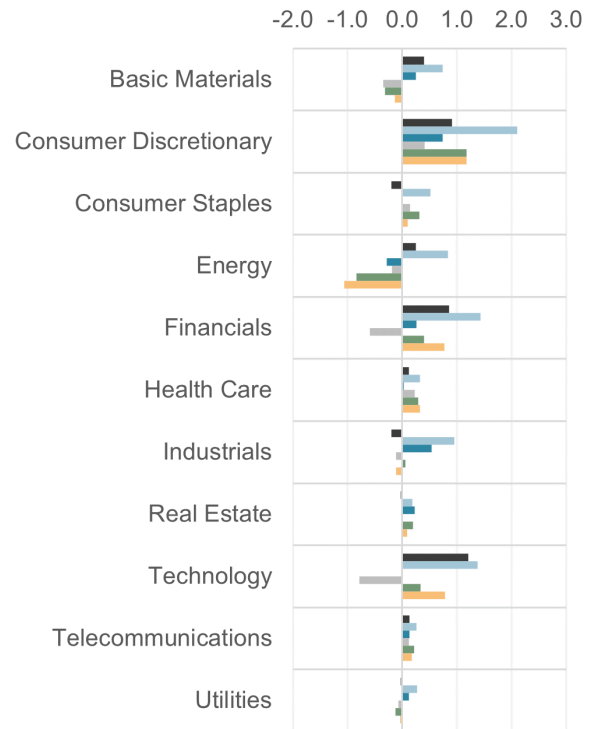
All factors held up far better than the benchmark in the 2022 rout. Size, Yield and Value topped the charts, while Quality delivered the smallest relative gain, with varying exposures to Discretionary, Financials and Tech accounting for much of the performance divergences. Selection effects in Discretionary was also universally additive, particularly for Size.

Full Year 2022	Relative to Benchmark (TR %)					
FTSE Emerging	Value	Size	Mom	Quality	Low Vol	Yield
-13.5%	7.1	11.9	6.1	2.4	5.4	7.3

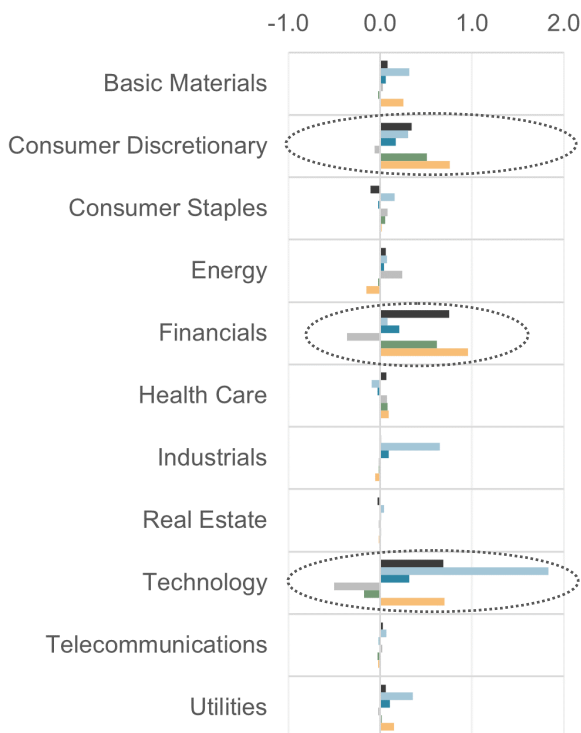
Industry active weights, full year 2022 average



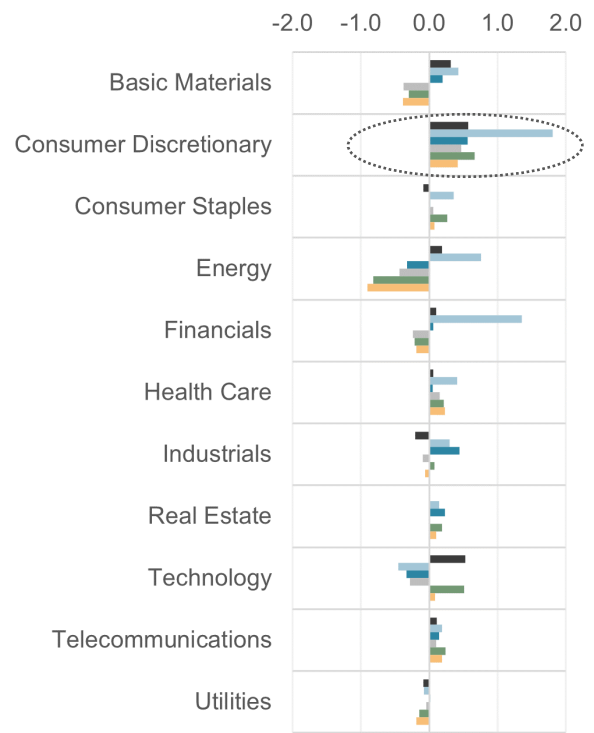
Total industry effects, full year 2022



Industry allocation effects, full year 2022



Selection effect within industry, full year 2022

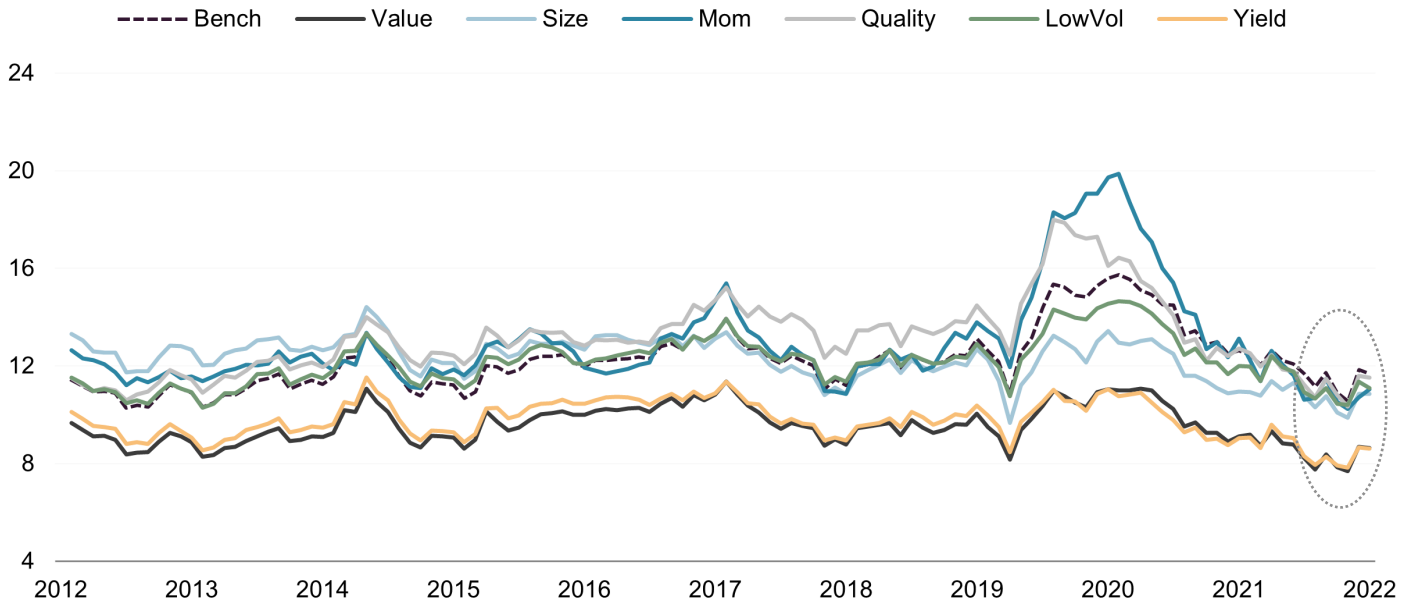


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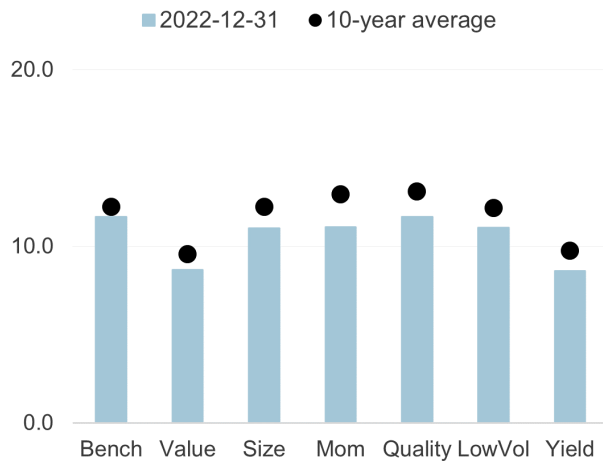
Emerging Markets Factor Valuations

The Q4 rebound in forward P/Es was more muted for EM than its developed peers. All remain well below 10-year averages in both absolute and relative terms, some significantly so. Notably, Value and Yield are the cheapest factors, trading at bigger discounts to the market and other factors versus history. Quality trades at a modest discount to the market, well below its historical premium. Its premium to Value narrowed to 2.9 points by year end, well below its 10-year average spread of 3.4 points.

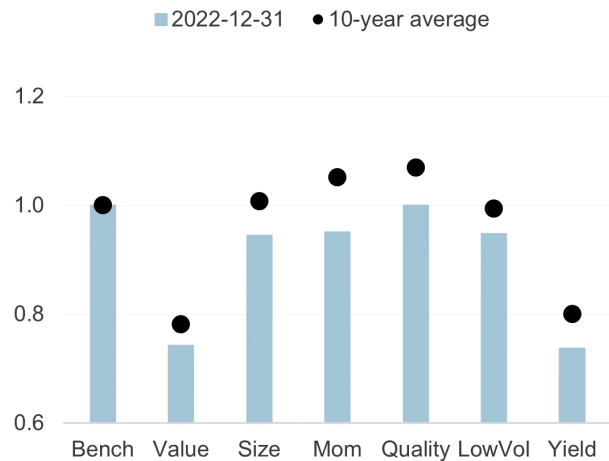
FTSE Emerging – Absolute 12M forward P/Es



Current Absolute 12M forward P/Es vs history

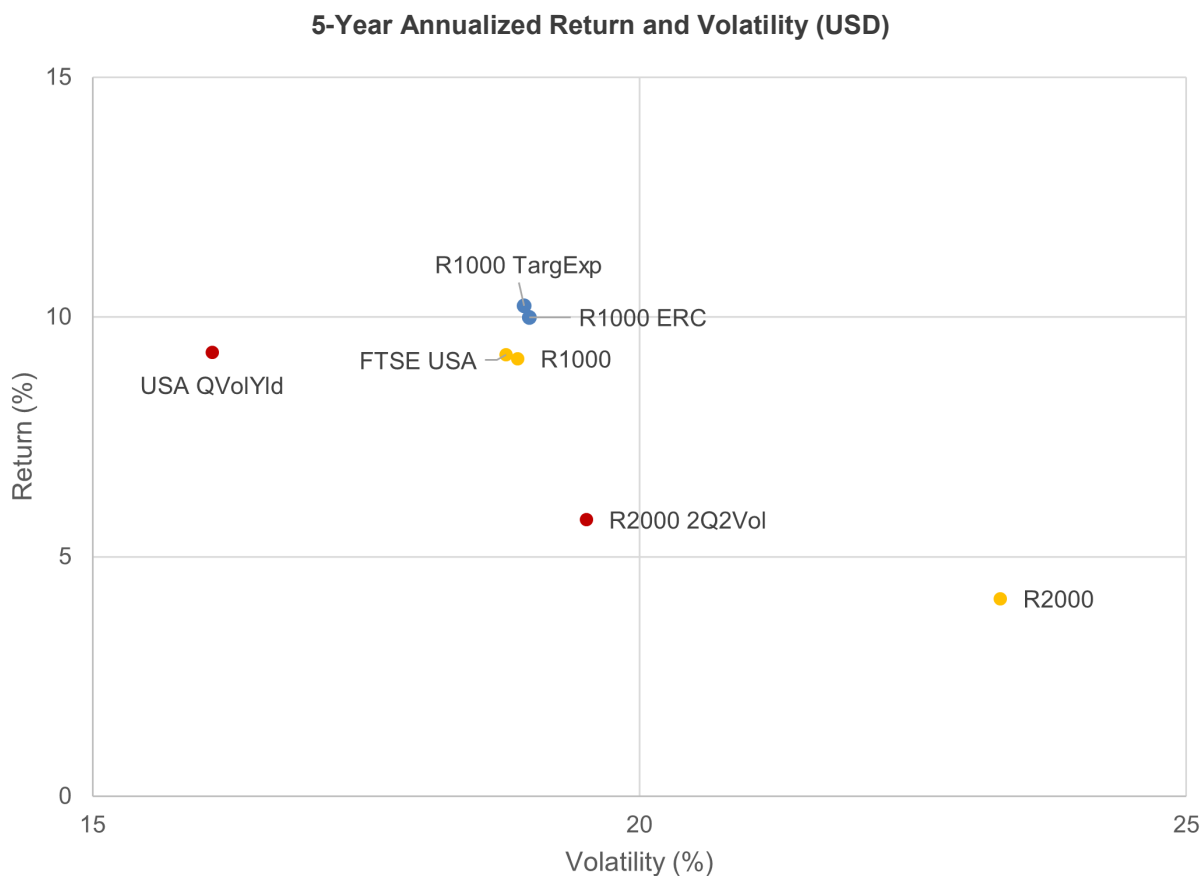


Current Relative 12M forward P/Es vs history



Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Results shown for regional factor returns represent hypothetical, historical performance, at Tilt 1, based on FTSE Global Equity Index Series and the FTSE Global Factor Index Series. Past performance is no guarantee of future results. Please see end for important disclosures and information on factor calculations. For professional investors only.

FTSE Russell US Factor Index Risk/Return Performance



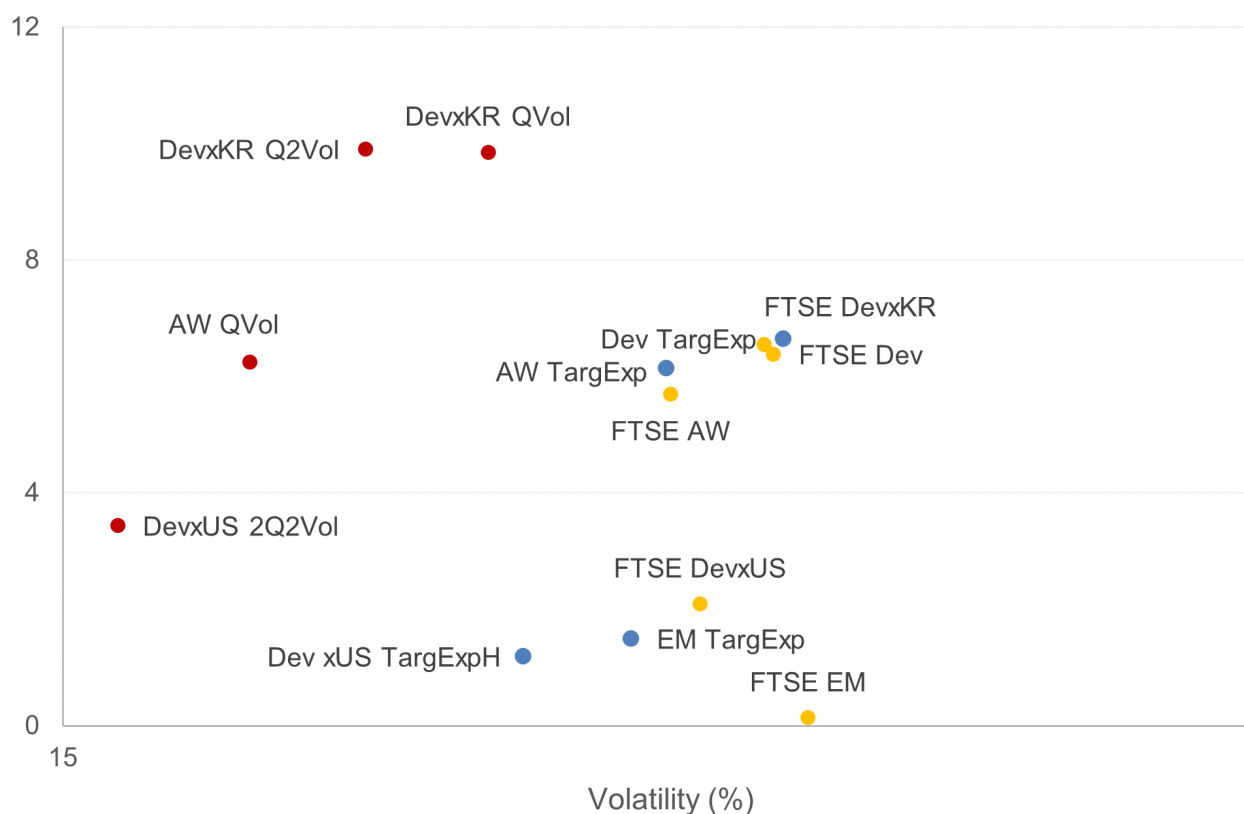
Annualized Returns and Volatility (USD %)

Label	Index	1-yr return	5-yr return	5-yr volatility
Diversified Indexes				
● R1000 ERC	Russell 1000 Comprehensive Equal Factor Risk Contribution	-17.4	10.0	19.0
● R1000 TargExp	Russell 1000 Comprehensive Target Exposure Factor Index	-15.3	10.2	18.9
Defensive Indexes				
● R2000 2Q2Vol	Russell 2000 2Qual/2Vol 3% Capped Factor Index	-13.2	5.8	19.5
● USA QVolYld	FTSE USA Qual/Vol/Yield Factor Index	-3.0	9.3	16.1
Benchmarks				
● FTSE USA	FTSE USA Index	-19.3	9.2	18.8
● R1000	Russell 1000® Index	-19.1	9.1	18.9
● R2000	Russell 2000® Index	-20.4	4.1	23.3

Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Past performance is no guarantee of future results. Please see end for important disclosures. For professional investors only.

FTSE Russell Global Factor Index Risk/Return Performance

5-Year Annualized Return and Volatility (USD)



Annualized Return and Volatility (USD)

Label	Index	1-yr return	5-yr return	5-yr volatility
Diversified Indexes				
● AW TargExp	FTSE All-World Comprehensive Target Exposure Factor Index	-19.2	6.1	17.5
● Dev TargExp	FTSE Developed Comprehensive Target Exposure Factor Index	-18.8	6.7	18.0
● Dev xUS TargExpH	FTSE Developed ex US Comprehensive High Target Exposure	-19.4	1.2	16.9
● EM TargExp	FTSE Emerging Comprehensive Target Exposure Factor Index	-15.1	1.5	17.3
Defensive Indexes				
● AW QVol	FTSE All-World Target Exposure Qual Vol Factor Index	-15.7	6.2	15.8
● DevxKR Q2Vol	FTSE Developed ex Korea Qual/2 Vol Factor Index	-15.7	9.9	16.2
● DevxKR QVol	FTSE Developed ex Korea Qual/Vol Factor Index	-17.1	9.9	16.7
● DevxUS 2Q2Vol	FTSE Developed ex US 2Qual/2Vol 5% Capped Factor Index	-17.6	3.4	15.2
Benchmarks				
● FTSE AW	FTSE All-World Index	-17.7	5.7	17.5
● FTSE DevxKR	FTSE Developed ex Korea Index	-17.6	6.5	17.9
● FTSE DevxUS	FTSE Developed Ex US Index	-14.6	2.1	17.6
● FTSE Dev	FTSE Developed Index	-17.8	6.4	17.9
● FTSE EM	FTSE Emerging Index	-16.9	0.1	18.1

Source: FTSE Russell / Refinitiv. All data as of December 31, 2022. Past performance is no guarantee of future results. Please see end for important disclosures. For professional investors only.

Important Notes and Information

Note on Market Maps Factor Data

FTSE Russell employs a bottom-up “tilting” approach to create factor indexes. Factor scores are calculated that range from 0 to 1, with higher scores being better. The underlying cap-weighted benchmark weights are multiplied by these scores, and this product is renormalized to give the factor index weights.

Intuitively, the index weights start with the benchmark weights and “tilt” towards stocks with better factor scores and away from stocks with worse factor scores. The magnitude of the index’s factor exposure can be controlled by raising the factor scores by an exponent, with higher exponents yielding higher factor exposure. All data in the Market Maps Equity Factor Insights report uses an exponent (or tilt size) of 1.

See FTSE Global Factor Index Series Ground Rules v4.4, January 2019, below for further details on rules-based factor calculations and construction methodology.

Information on Factor Index Ground Rules and Construction Methodology

[FTSE Global Factor Index Series Ground Rules v4.4, January 2019](#)

[Factor Exposure Indexes: Index Construction Methodology \(Aug 2014\)](#)

Links to FTSE Russell Factor Research Papers

[The role of diversification return in factor portfolios \(July 2021\)](#)

[Comparing Value factor performance in global equity markets \(June 2021\)](#)

[SI indexes: Top-down targets or bottom-up aesthetics? \(June 2021\)](#)

[Do factors carry information about the economic cycle, part 2 \(Feb 2021\)](#)

[Do factors carry information about the economic cycle, part 1 \(Dec 2020\)](#)

[Russell Growth and Value indexes: the enduring utility of style \(Dec 2020\)](#)

[Inverting factor strategies: No more monkey business \(Sept 2020\)](#)

[Portfolio factor allocation schemes \(March 2020\)](#)

[Target factor exposure investment applications and solutions \(February 2020\)](#)

[Factor investing considerations: questions and answers \(Nov 2019\)](#)

[Size exposure spectrum and factor tilts \(July 2019\)](#)

[Factor behavior through the cycle \(June 2019\)](#)

[Factor valuation considerations \(Feb 2019\)](#)

[Implementation considerations for defensive strategies: A look at three approaches \(Feb 2019\)](#)

[Alternative approaches to multi-factor index construction: Like-for-like comparisons \(Nov 2018\)](#)

[Factor indexes and factor exposure matching: Like-for-like comparisons \(Oct 2018\)](#)

[Multi-factor indexes: The power of tilting \(August 2018\)](#)

[Implementation considerations for factor investing \(Mar 2018\)](#)

Glossary of Terms

VALUE

Earnings Yield (E/P) – Latest reported annual earnings per share divided by full market capitalization. Earnings are based on net income from continuing operations, before amortization of goodwill and extraordinary items and after tax, minority interests, preferred dividend, at fiscal year end.

Cash-Flow Yield (CF/P) – Latest reported annual cash-flow yield is cash earnings per share divided by full market capitalization. Cash earnings are earnings plus depreciation, amortization, deferred taxes, other non-cash items, extraordinary item and changes in working capital for the most recent fiscal year.

Sales-to-Price (S/P) – Latest annual sales from continuing operations per share for the full fiscal year divided by full market capitalization. Sales values are generally as reported but occasional adjustments may be made. They are also computed for banks, insurance and other financial companies based on appropriate definitions. Sales are attributed across different share classes, where common equity is comprised of more than one share type.

MOMENTUM

Measure of changes in total stock returns in local currency terms over those of the previous year excluding the most recent month.

SIZE

Size is calculated as the natural logarithm of each company's full market capitalization in US dollars.

QUALITY

PROFITABILITY

Return on Assets (ROA) – Net income divided by average total assets, calculated relative to the regional median stock level.

Delta Turnover – Net sales revenue divided by average total assets, calculated relative to the regional median stock level.

Accruals – Net operating assets (NOA) for the most recent reporting period minus NOA from the previous reporting period, as calculated with following formula: Change in working capital + change in non-current net operating assets + change in net financial assets ([short-term investments + long-term investments] – [long-term debt + short-term debt + preferred stock]), divided by average total assets. Calculated relative to the regional median stock level.

LEVERAGE

Leverage Ratio – Operating cash flow divided by total debt. A company whose net operating cash flow is greater than total debt or has no debt is assigned a maximum Leverage Ratio of one.

VOLATILITY (LOW)

Standard deviation of five years of weekly local total returns prior to the rebalance month. A minimum of 52 weekly return observations are required to calculate volatility.

YIELD

Dividend Yield 12M – Calculated as the natural logarithm of each company's 12-month trailing dividend yield.



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