Bond-linked equity signals

September 2022

Research Signals

The bond market has long been considered a leading indicator of future economic conditions, yet the relationship between corporate bonds and the underlying company stock price is a less researched topic. However, this connection has become more acute in the current environment characterized by inflation running above central bank objectives and hawkish messaging in several key regions. Using data provided by the IHS Markit Corporate and Sovereign Bond Pricing team, now a part of S&P Global, Research Signals tests the use of corporate bond pricing data as a predictor of future stock returns. Using this rich dataset, we introduce 19 base factors (and seven variants to extend coverage) using bond return and curve data to predict equity price movement.

- Robust average monthly performance between buy- versus sell-rated stocks was found for factors such as 60-Day Normalized 5-Year Z-spread With Substitution (0.68%) in the US Total Cap universe, Twist in Bond Z-Spread Curve (0.69%) in Emerging Markets and Bond Value Divergence in Developed Europe (0.69%) and Developed Pacific (0.33%)

- Rank correlations between three main bond pricing factors and various thematic signals from the Research Signals factor library suggests low commonality in general, confirming the uniqueness of the signals which is a beneficial feature in many quantitative and fundamental settings

- We provide a use case of bond pricing factors as an overlay with our proven Value Momentum Analyst Model, demonstrating additional monthly alpha in the US Total Cap (25 bps), Developed Europe (2 bps), Developed Pacific (8 bps) and Emerging Markets (3 bps) universes, with negligible impact on turnover

Contacts
Research Signals · MK-ResearchSignals@ihsmarkit.com

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Introduction and methodology

The IHS Markit Corporate and Sovereign Bond Pricing team, now a part of S&P Global, is an independent provider of daily bond pricing data including price, spread, duration and liquidity in addition to entity level data such as yield to maturity on the yield curve. The team prices over 200,000 Government, Sovereign, Agency, Money Market and Corporate bonds across 62 currencies daily on both hourly and 15-minute snap intervals. Market data is acquired from key market participants and is used by pricing analysts to generate spread curves that are used to manufacture prices.

More than 8 million pricing quotes are used from a variety of sources and fed into a dynamic model to produce a price validated against a number of parameters. The team also provides a liquidity score, a measure of observable market data, that reflects the frequency and breadth of pricing along with comprehensive analytics, with full transparency on the depth of price sources used.

Three main approaches are used when manufacturing evaluations:

- Rules Based Points - used for bonds with direct observable data

- Spread/Curve setting - benchmarks for bonds that are quoted as a spread over local currency benchmark curves are assigned based on the tenor of that bond

- Hand Priced mode - Grid Mode is used for bonds with limited observable data and is an approach in which analysts can customize to better mirror how the issue trades

The example below provides a sample of the Corporate Bond Pricing data we use to build factors:

Table 1

S&P Global Inc bond, February 28, 2022					
Description	**Maturity** 15 Jun 2025	**Type** Fixed	**Tier** SNRFOR	**Classification** Financials	**Region** Americas	**Currency** USD
Characteristics	**Coupon** 4% annual	**Frequency** 6-month	**Mid-price** 105.38	**Accrued Interest** 0.86	**Defaulted** 0	**Liquidity Score** 1
Date	**6-month** 3 Sep 2022	**1-year** 3 Mar 2023	**2-year** 3 Mar 2024	**3-year** 3 Mar 2025	**4-year** 3 Mar 2026	**5-year** 3 Mar 2027
Z-spread*	27.52	37.91	29.30	35.38	52.31	64.11

Source: IHS Markit · © 2022 IHS Markit

*Z-spread is reported at the entity level, not the security level

To map bonds to equities, we use our Entity Link reference dataset which provides entity information across multi-asset classes. Entity Link is concentrated on the most liquid entities, focusing on our Evaluated Bonds, CDS and iBoxx universes. Each entity is linked to its related loans, equity, bonds and CDS utilizing identifiers such as RED Codes, LXID, ISIN and other third-party IDs. Moreover, entity reference data are also mapped to their immediate parent and ultimate parent along with percent ownership, so we are able to enhance the equity coverage by using the link between the special purpose entity bond issuers and their parent companies.

In contrast to the equity market, the bond market offers numerous instruments with varying maturities and debt covenants. In order to compare across a universe of companies, we first standardize the bond data. We use computed bond returns and curve data of senior unsecured bonds as the basis of factor formulations. The bond return is computed for maturities between three and seven years and aggregated on an equal-weighted basis. The

curve z-spread is defined as the amount of parallel shift applied to the zero rates along the yield curve for the clean present value of the bond to equal the market price.

We introduce 19 factors using various terms and three construction methodologies - basic, principal component analysis and linear regression - described below. To extend coverage, we include a substitution rule applied to seven factors built from 5-year and 1-year z-spreads.

More specifically, if a stock has bond Z-spread data but doesn't have curve Z-spread data, we aggregate the bond Z-spread with weights based on the maturity and liquidity. With this substitution, we are able to enhance coverage, especially for the US and Developed Europe constituents.

Basic

Six factors are directly defined using curve data and a seventh factor uses computed bond return data. In addition, we calculate a second version of the curve factors using the substitution rule. In general, we expect that the smaller the relative 5-year z-spread, the lower the credit risk, which could result in higher equity return:

- 5-Year Z-spread (additional factor constructed with substitution rule)

- 60-Day Normalized 5-Year Z-spread (additional factor constructed with substitution rule)

- Industry Relative 5-Year Z-spread (additional factor constructed with substitution rule)

- 60-Day Change in 5-Year Z-spread (additional factor constructed with substitution rule)

- 20-Day 5-Year Z-spread Volatility (additional factor constructed with substitution rule)

- 120-Day Average of Relative Term Spread (additional factor constructed with substitution rule)

- 20-Day Aggregated Bond Return

Principal component analysis

Principal component analysis is a statistical technique that reduces the dimensionality of a large multivariate dataset into a smaller set of independent representative factors that capture a majority of the variation in the original data set. We use this procedure to summarize movement in the Z-spread curve into its first three principal components that define three aspects of the movements:

1) Shift - represents the level or parallel change

2) Tilt - characterizes the slope change or steepness

3) Twist - captures the curvature change

The market data we consider are the z-spreads along each company's yield curve with maturities of 6 months, 1 year, 2 years, 3 years, 4 years, 5 years, 7 years, 10 years, 15 years, 20 years, 30 years and 40 years. We construct ten factors using this method of principal component analysis on the movement of z-spread curve data. Our three hypotheses are (1) the smaller the shift in bond z-spread curve, the smaller the credit risk level increase; (2) the smaller the tilt in bond z-spread curve, the smaller the term premium increase; and (3) the larger the twist in bond z-spread curve, the smoother the bond z-spread curve becomes, each of which could result in higher equity return:

- Shift in Bond Z-spread Curve

- 60-Day Normalized Shift in Bond Z-spread Curve

- 60-Day Change of Shift in Bond Z-spread Curve

- 60-Day Volatility of Shift in Bond Z-spread Curve

- 60-Day Average of Tilt in Bond Z-spread Curve

- Tilt in Bond Z-spread Short-term Curve

- 60-Day Average of Tilt in Term Spread

- 60-Day Change of Tilt in Bond Z-spread Curve

- Twist in Bond Z-spread Curve

- 120-Day Average of Short-term Twist in Bond Z-spread Curve

Linear regression

Two factors (and one substitution rule variant) are based on a proprietary model using linear regression to link equity returns with bond data, capturing the level of divergence across the equity market and bond market via the residual between actual equity returns and those predicted by the models. Our hypothesis is that the more negative the divergence, the lower the market equity return compared to the estimated equity return, increasing the likelihood of an increase in the market equity price, which could result in higher equity return:

• Bond Value Divergence (additional factor constructed with substitution rule)

• Bond Return Divergence

The full list of factor definitions can be found in the Appendix.

To test factor efficacy, we calculate simulated long-short decile portfolio returns using the following method. First, percentile ranks for each factor are computed across each universe by sorting according to the underlying factor interpretation. We begin with the percentile ranks at the beginning of each month and divide the universe into ten deciles, with the top ranked, or buy-rated, names assigned to decile 1 (D1) and the bottom ranked, or sell-rated, names in decile 10 (D10). At the end of each month, we then compute the equal-weighted decile return using USD total returns and report the return spread between D1 and D10, simulating a long-short portfolio. Note that we use quintiles rather than deciles for emerging markets due to smaller universe sizes. We also report the information coefficient (IC), which is a cross-sectional measure of correlations between factor ranks and subsequent returns ranks, along with the hit rate computed as the percent of months with positive performance.

Factors were backtested over the Research Signals standard universes. The US Total Cap universe represents 98% of the cumulative market cap, or approximately 3,000 names, while the developed and emerging markets universes represent 95% of cumulative market cap for each member country subject to minimum market caps of USD 250 million and 100 million, respectively.

We use 5-Year Z-spread With Substitution (Figure 1) to demonstrate coverage for each region over the analysis period[1]. Average daily coverage is highest for the US (973), followed by Developed Pacific (498) and Developed Europe (417), and, while initially more limited for Emerging Markets (299), coverage increased three-fold by early 2018. The US coverage is skewed towards larger market cap stocks, with an average daily coverage of 692 for US Large Cap and 281 for US Small Cap. On a percentage basis, US (29%) and Developed Europe (29%) have similar average daily coverage percentage, followed by Developed Pacific (23%) and Emerging Markets (11%). Figure A1 in the Appendix displays coverage for the base factor 5-Year Z-spread, demonstrating the average daily improvement in coverage from our substitution rule, reaching over 70% for the US and Emerging Markets and 42% and 22%, respectively, for Developed Europe and Developed Pacific.

Figure 1

5-Year Z-spread With Substitution coverage

Source: IHS Markit   © 2022 IHS Markit
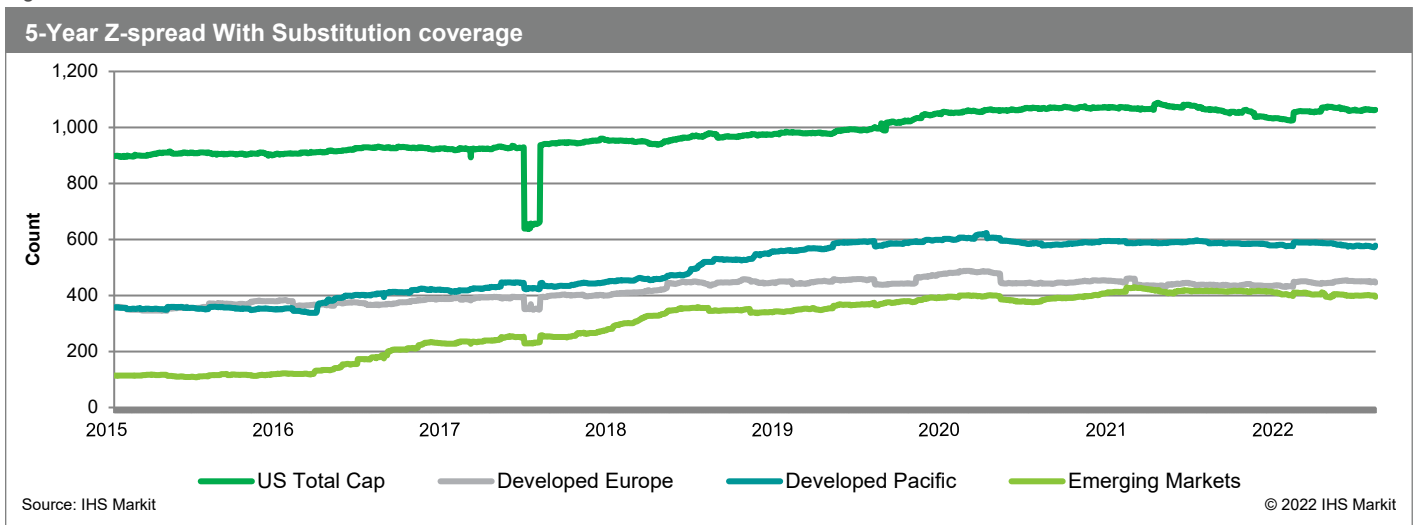
Drilling down to the average monthly coverage percentage by sector (Table 2), we find the highest coverage was associated with Utilities in US Total Cap (53.3%), Developed Europe (55.5%), and Developed Pacific (57.4%), while Energy had the highest coverage in Emerging Markets (29.8%).

Table 2

Average monthly coverage percentage by sector (%), through June 2022

Sector	US Total Cap	Developed Europe	Developed Pacific	Emerging Markets
Energy	41.9	30.7	28.6	29.8
Materials	48.6	41.2	23.4	9.4
Industrials	28.3	28.8	28.1	8.9
Consumer Discretionary	30.7	23.9	15.2	5.9
Consumer Staples	45.5	33.0	19.9	11.4
Health Care	12.2	20.9	4.1	2.9
Financials	30.9	32.2	28.7	20.9
Information Technology	17.8	13.5	9.9	1.5
Communication Services	35.0	43.3	30.7	21.6
Utilities	53.3	55.5	57.4	23.5
Real Estate	30.1	23.7	38.5	17.0

Source: IHS Markit   © 2022 IHS Markit

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[1] The drop in coverage in May and June of 2017 was caused by an error in a system release that was corrected in a later release.

Results

We turn now to performance analysis of our newly introduced factors. Table 3 presents average monthly quantile spreads for each region. Spread hit rates (Table A1) and ICs (Table A2) are also included in the Appendix. Note that some factors have different start dates based on availability of the data used in their construction, as noted in the factor definitions included in the Appendix.

Bond Value Divergence was a strong signal across each region, with top tier quantile spreads in the US (0.55%), Developed Europe (0.69%), Developed Pacific (0.33%) and Emerging Markets (0.67%). It also demonstrated strong consistency in the US, Developed Europe and Emerging Markets with hit rates of approximately 60%, along with high cross-sectional signal power, with ICs of 0.035, 0.026 and 0.034, respectively.

Additionally by region, the highest decile spread in the US was associated with 60-Day Normalized 5-Year Z-spread with Substitution (0.68%), with a high level of consistency confirmed by a 64% hit rate. Other top performing factors include 120-Day Average of Relative Term Spread and 20-Day Aggregated Bond Return, both with average decile spreads of 0.43%.

In Developed Europe, 120-Day Average of Relative Term Spread With Substitution (0.53%) and Bond Return Divergence (0.43%) were also among the top spread performers, with hit rates of 59% and 57%, respectively. 60-Day Change in 5-Year Z-spread With Substitution outperformed in Developed Pacific, with an average decile spread of 0.31%.

We highlight several factors in Emerging Markets with solid spreads including Twist in Bond Z-spread Curve (0.69%) and 60-Day Normalized 5-Year Z-spread (0.49%). From a cross-sectional perspective, Bond Return Divergence (0.021) and Bond Value Divergence With Substitution (0.020) posted above-average ICs.

For a more detailed view of performance, we look at the time series of cumulative spreads for several factors across each region. For this analysis, we focus on the top performing factor from each of the factor construction groupings - basic, principal component analysis and linear regression - to provide a more comprehensive review. Since the bond market structure and the relationship between bond and equity market differ across regions, the select top performing factors are region dependent.

In the US Total Cap universe (Figure 2), 60-Day Normalized 5-Year Z-spread With Substitution logged the highest cumulative spread of 74%, driven by relatively consistent positive spreads throughout the analysis period, as confirmed by its robust hit rate (64%). This aligns with our hypothesis that lower relative credit risk is associated with higher equity return. Bond Value Divergence also posted an attractive cumulative spread (50%), consistent with our expectation that higher equity return could be realized by lower-than-estimated market equity return, while 60-Day Normalized Shift in Bond Z-spread Curve outperformance was more concentrated in the year 2020.

Table 3

Average monthly quantile return spread (%), through June 2022				
Factor	**US Total Cap**	**Developed Europe**	**Developed Pacific**	**Emerging Markets**
5-Year Z-spread	0.33	0.08	0.03	-0.08
60-Day Normalized 5-Year Z-spread	0.42	-0.09	-0.22	0.49
Industry Relative 5-Year Z-spread	0.15	-0.06	-0.16	-0.07
60-Day Change in 5-Year Z-spread	0.13	0.12	0.09	0.00
20-Day 5-Year Z-spread Volatility	-0.17	-0.26	0.18	0.21
120-Day Average of Relative Term Spread	0.43	0.45	0.03	-0.08
Shift in Bond Z-spread Curve	-0.03	0.01	-0.22	-0.59
60-Day Normalized Shift in Bond Z-spread Curve	0.25	0.25	0.25	-0.61
60-Day Change of Shift in Bond Z-spread Curve	0.21	0.37	-0.07	-0.51
60-Day Volatility of Shift in Bond Z-spread Curve	-0.08	0.00	0.09	-0.04
60-Day Average of Tilt in Bond Z-spread Curve	-0.01	-0.35	-0.01	-0.03
Short-term Tilt in Bond Z-spread Curve	-0.07	0.14	-0.28	0.25
60-Day Average of Tilt in Term Spread	0.16	0.08	-0.18	-0.11
60-Day Change of Tilt in Bond Z-spread Curve	0.17	0.11	0.14	0.36
Twist in Bond Z-spread Curve	0.08	0.29	-0.22	0.69
120-Day Average of Short-term Twist in Bond Z-spread	0.10	-0.11	0.03	0.22
Bond Value Divergence	0.55	0.69	0.33	0.67
5-Year Z-spread With Substitution	0.11	0.12	-0.04	-0.10
60-Day Normalized 5-Year Z-spread With Substitution	0.68	-0.16	-0.07	0.40
Industry Relative 5-Year Z-spread With Substitution	0.16	0.40	-0.01	0.06
60-Day Change in 5-Year Z-spread With Substitution	0.24	-0.14	0.31	0.03
20-Day 5-Year Z-spread Volatility With Substitution	-0.05	-0.23	0.01	0.04
120-Day Average of Relative Term Spread With Substitution	0.31	0.53	-0.24	0.14
Bond Value Divergence With Substitution	0.20	0.28	-0.02	0.41
20-Day Aggregated Bond Return	0.43	0.07	-0.21	-0.43
Bond Return Divergence	0.34	0.43	-0.07	0.34

Source: IHS Markit   © 2022 IHS Markit

In Developed Europe (Figure 3), Bond Value Divergence and 120-Day Average of Relative Term Spread outperformed on a consistent basis (approximate 60% hit rates), resulting in cumulative spreads of 74% and 56%, respectively, with the latter supporting our hypothesis that smaller slope in the bond term structure has lower term premium priced in by the bond market and thus tends to have higher equity return. In Developed Pacific (Figure 4), 60-Day Change in 5-Year Z-spread with Substitution and Bond Value Divergence ended the analysis period with similar cumulative spreads of 27%, with the former upholding our hypotheses that smaller increases in credit risk result in higher equity return.

In Emerging Markets (Figure 5), relatively consistent outperformance was found from a representative factor from each of the factor groupings. A 60% hit rate for Twist in Bond Z-spread Curve and 61% for Bond Value Divergence contributed to their 76% and 70% cumulative spreads, respectively, while the favorable cumulative spreads for 60-Day Normalized 5-Year Z-spread (48%) was achieved with an average hit rate. These results are consistent with our hypotheses that higher equity return could be realized by smoother bond z-spread curves, lower-than-estimated market equity return or lower relative credit risk.
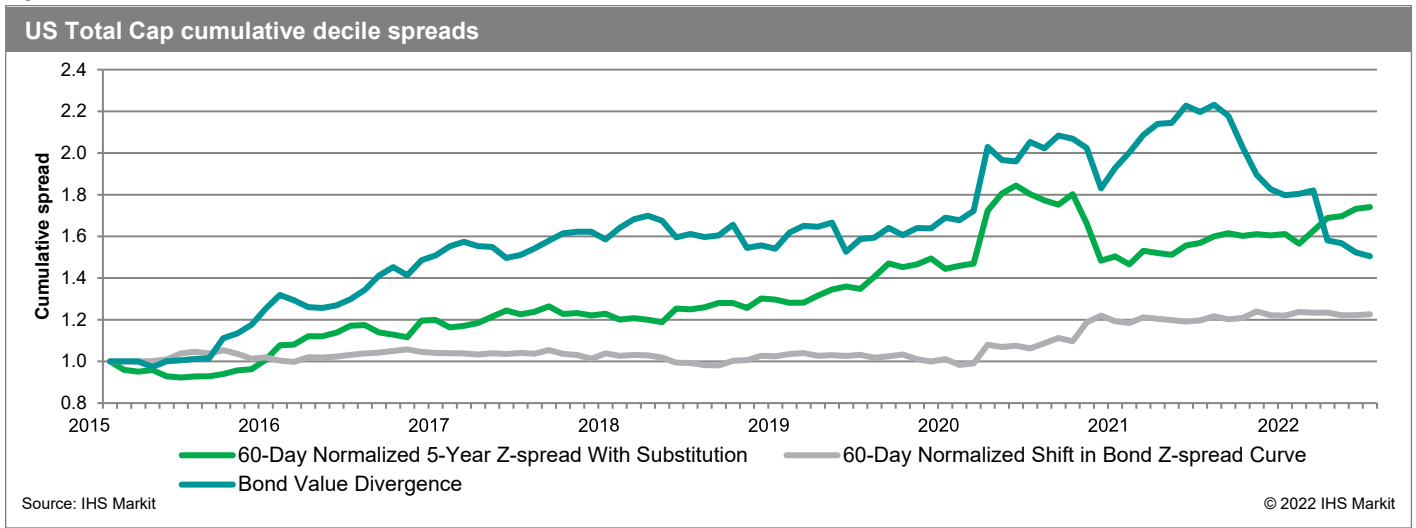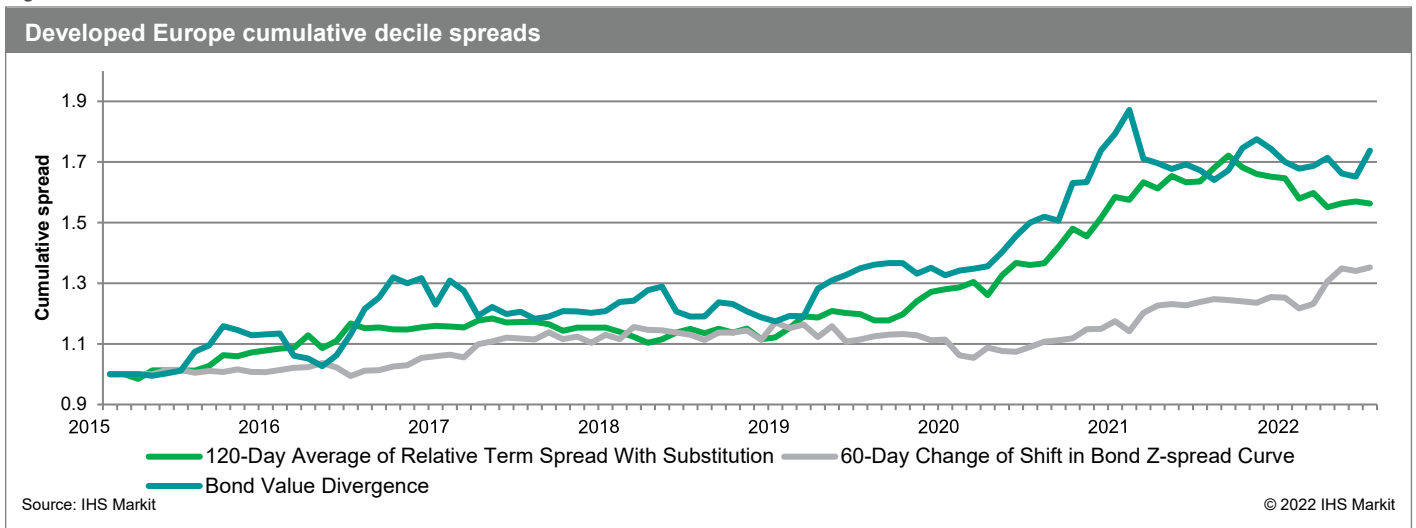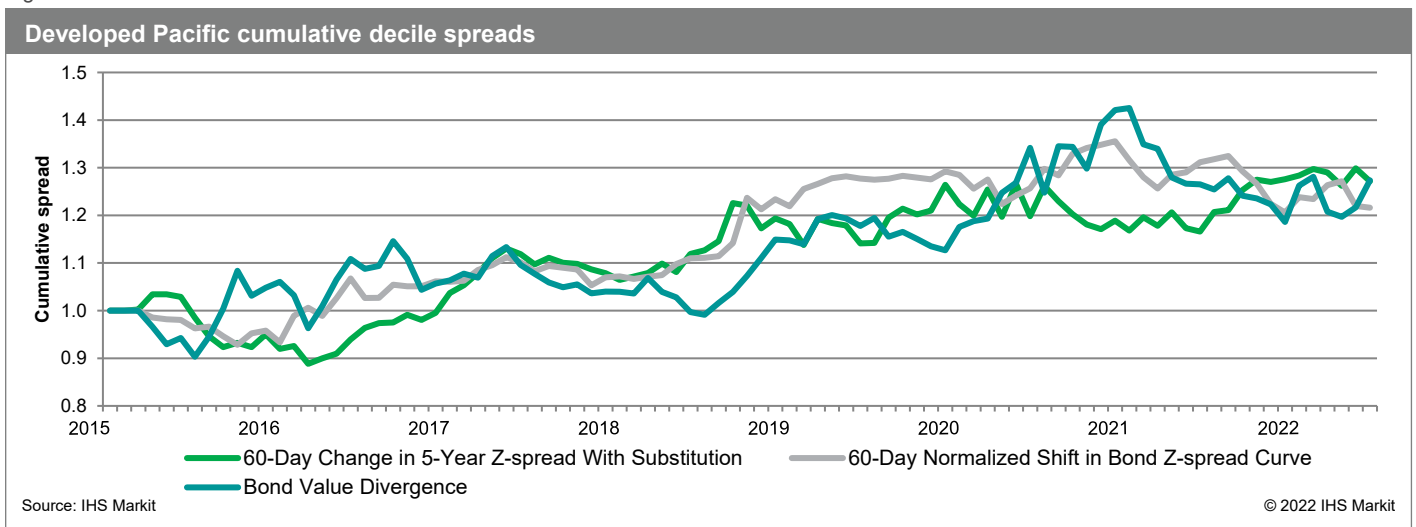
Figure 2

US Total Cap cumulative decile spreads

- 60-Day Normalized 5-Year Z-spread With Substitution
- 60-Day Normalized Shift in Bond Z-spread Curve
- Bond Value Divergence

Source: IHS Markit

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Figure 3

Developed Europe cumulative decile spreads

- 120-Day Average of Relative Term Spread With Substitution
- 60-Day Change of Shift in Bond Z-spread Curve
- Bond Value Divergence

Source: IHS Markit

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Figure 4

Developed Pacific cumulative decile spreads

- 60-Day Change in 5-Year Z-spread With Substitution
- 60-Day Normalized Shift in Bond Z-spread Curve
- Bond Value Divergence

Source: IHS Markit

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Figure 5

Source: IHS Markit   © 2022 IHS Markit

Correlations

Next, we review the relationship between select members of our newly introduced bond pricing factors and representative factors from the Research Signals factor library, across a broad spectrum of standard value, quality, growth, risk, momentum and short sentiment measures. We also include CDS-to-equity measures which use pricing data from the credit default swaps market, and thus are more closely linked with the bond market. We report factor rank correlations again with select representative factors from the three factor construction groupings, namely 60-Day Normalized 5-Year Z-spread With Substitution, 60-Day Normalized Shift in Bond Z-spread Curve and Bond Value Divergence. Table 4 summarizes results for the US Total Cap and Developed Europe universes and Developed Pacific and Emerging Markets results are reported in Table A3 in the Appendix.

We point to one notable observation, where we find high rank correlations between Bond Value Divergence and 5-day Industry Relative Return for the US Total Cap (0.30), Developed Europe (0.28), Developed Pacific (0.31) and Emerging Markets (0.31) universes. To a lesser degree, we also find positive correlations between 60-Day Normalized 5-Year Z-spread With Substitution and Credit Revisions - 3 Month ranging between 0.08 and 0.12.

Otherwise, overall, we find low correlations between the bond pricing factors and the various style factors due to the uniqueness in factor construction, demonstrating the value of the new signals as an alternative data source outside our core style measures. This feature is also a desirable quality in many settings including quantitative multifactor frameworks and fundamental analysis.

Table 4

Average monthly rank correlations, through June 2022

		US Total Cap			Developed Europe		
Style	Factor	60-Day Normalized 5-Year Z-spread With Substitution	60-Day Normalized Shift in Bond Z-spread Curve	Bond Value Divergence	60-Day Normalized 5-Year Z-spread With Substitution	60-Day Normalized Shift in Bond Z-spread Curve	Bond Value Divergence
CDS	Credit Risk	0.06	0.00	0.02	0.01	0.00	-0.03
	CDS Slope - 5 year minus 1 year	0.05	0.00	0.01	0.00	0.00	-0.01
	Credit Revisions - 3 Month	0.08	0.01	0.02	0.12	0.03	0.01
	CDS Divergence	0.04	0.01	-0.04	0.02	0.00	-0.04
Value	Book-to-Market	-0.01	0.00	0.02	-0.01	0.00	0.00
	Forward 12-M EPS-to-Enterprise Value	0.03	0.00	0.05	0.00	0.00	0.00
	TTM EBITDA-to-Enterprise Value	-0.02	0.00	0.02	-0.01	0.01	-0.01
	TTM Free Cash Flow-to-Enterprise Value	0.02	0.00	0.05	0.00	0.00	0.01
	Industry Relative Leading 4-QTRs EPS to Price	-0.01	0.00	0.00	-0.02	0.00	0.00
	Industry Relative TTM Dividend Yield	0.03	0.00	0.01	-0.02	0.01	-0.01
Quality	Fixed Assets Turnover Ratio	0.01	0.00	0.03	0.00	0.00	0.00
	Inventory Turnover Ratio	-0.02	0.01	0.01	-0.01	0.01	-0.01
	Net Operating Asset Turnover	-0.01	0.00	0.01	0.01	0.01	-0.01
	Change in Accruals to Assets	0.00	0.01	0.00	0.00	0.01	0.00
	Change in TTM COGS vs. Inventory Level	0.00	0.00	0.02	0.01	0.01	-0.01
	Change in TTM Sales vs. Accounts Receivable	0.00	0.00	0.00	0.01	0.01	0.01
	Working Capital Accruals	-0.02	0.01	0.01	-0.01	-0.01	0.01
Gro	1-yr Growth in TTM Free Cash Flow	0.02	0.01	0.03	0.00	0.00	0.00
	Reinvestment Rate	0.02	0.00	0.02	0.00	-0.01	0.00
Risk	Average Monthly Trading Volume-to-Market Cap	-0.06	0.00	0.01	0.00	0.01	0.02
	60-Month Beta	0.03	0.00	-0.04	-0.01	-0.01	-0.01
	Asset Quality Index	0.00	0.01	0.00	0.01	0.01	0.00
	Operating Leverage	0.00	-0.01	-0.01	0.01	0.00	0.00
	Natural Logarithm of Market Capitalization	-0.10	0.00	0.01	-0.03	0.01	0.00
Momentum	2-Year Ahead EPS Growth	-0.04	0.00	0.04	-0.01	0.00	0.01
	3-M Revision in FY2 EPS Forecasts	0.05	0.00	0.02	0.04	-0.01	0.02
	Real Earnings Surprise	0.04	0.01	0.02	0.00	0.00	-0.02
	24-Month Value at Risk	0.06	0.00	-0.03	0.02	-0.01	0.00
	5-day Industry Relative Return	-0.03	0.00	0.30	-0.02	0.00	0.28
	Industry-adjusted 12-month Relative Price Strength	0.02	-0.01	0.05	0.01	0.00	0.07
	Rational Decay Alpha	0.03	0.01	0.00	0.02	0.00	0.00
Sh St	Demand Supply Ratio	0.06	0.00	-0.01	0.02	-0.01	0.00
	Implied Loan Rate	0.02	0.01	0.01	0.01	0.01	0.01

Source: IHS Markit   © 2022 IHS Markit

Note that the top 10 correlations in magnitude across all four coverage regions are highlighted

Application

We round out the report demonstrating the use of the bond pricing factors as an overlay to a multifactor strategy. For this application, we begin with our well-established Value Momentum Analyst Model II (VMA II) for the US and Value Momentum Analyst Model (VMA) for other universes, with 70% weights, built from factors spanning value, quality, price and earnings momentum signals, and combine it with 10% weights for each universe's select bond pricing factors from the three factor constructions. Missing percentile ranks for a sub-composite (VMA II / VMA / select bond pricing factor) are replaced with 50. When available we use factors constructed with the substitution rule to provide better coverage, regardless of performance relative to the base factor:

US

- 60-Day Normalized 5-Year Z-spread With Substitution
- 60-Day Normalized Shift in Bond Z-spread Curve
- Bond Value Divergence With Substitution

Developed Europe

- 120-Day Average of Relative Term Spread With Substitution
- 60-Day Change of Shift in Bond Z-spread Curve
- Bond Value Divergence With Substitution

Developed Pacific

- 60-Day Normalized 5-Year Z-spread With Substitution
- 60-Day Normalized Shift in Bond Z-spread Curve
- Bond Value Divergence With Substitution

Emerging Markets

- 60-Day Normalized 5-Year Z-spread With Substitution
- 60-Day Normalized Shift in Bond Z-spread Curve
- Bond Value Divergence With Substitution

In the US (Figure 6), overlaying the bond pricing factors on VMA II resulted in consistent outperformance, with an average monthly spread of 1.59%, compared with 1.33% for the base model. Over the full period, this led to a cumulative return of 265% for the overlay strategy versus 192% for VMA II, a 73 percentage point improvement.

The bond pricing overlay strategy improved average monthly spread performance in Developed Europe by 2 bps, resulting in fairly steady outperformance in cumulative spread, ending the period at 72% compared with 67% for the base model. Finally, in Developed Pacific and Emerging Markets, the overlay strategy provided an average monthly spread improvement of 8 bps (cumulative: 17 percentage points) and 3 bps (cumulative: 4 percentage points), respectively. Lastly, we remark that model turnover was not meaningfully impacted by the overlay strategy in any of the four regions.
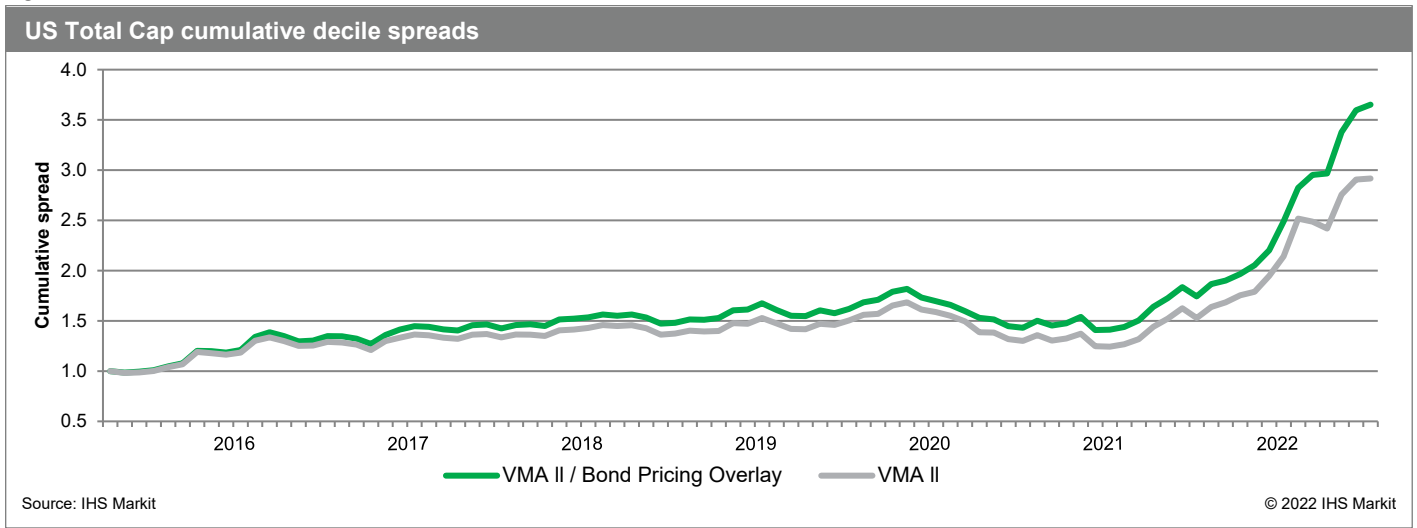
Figure 6

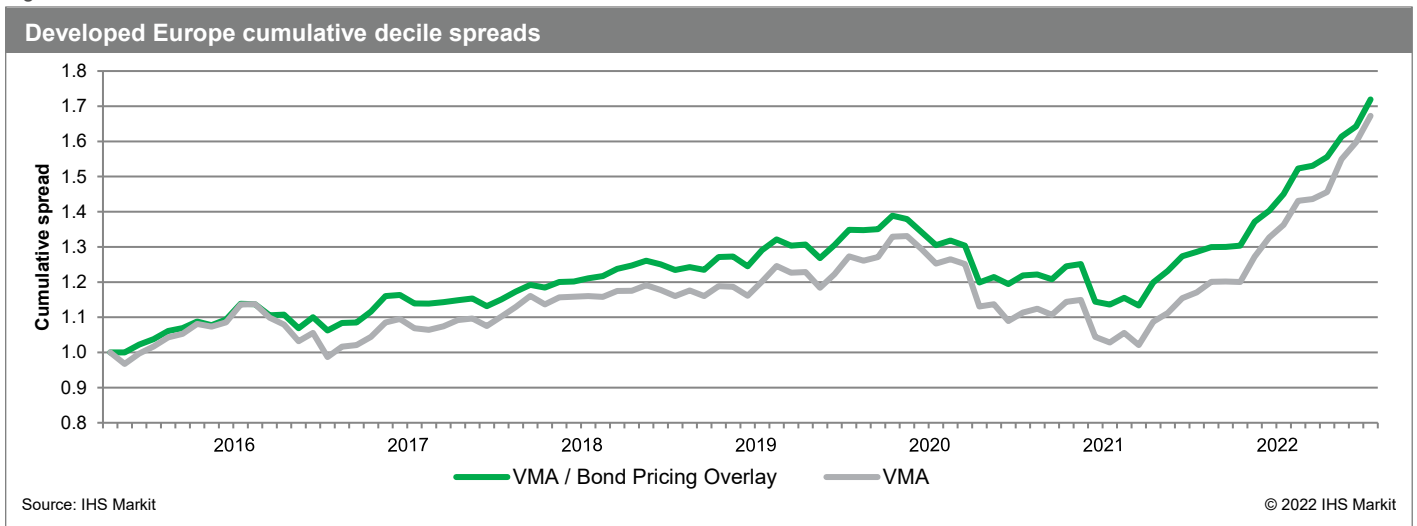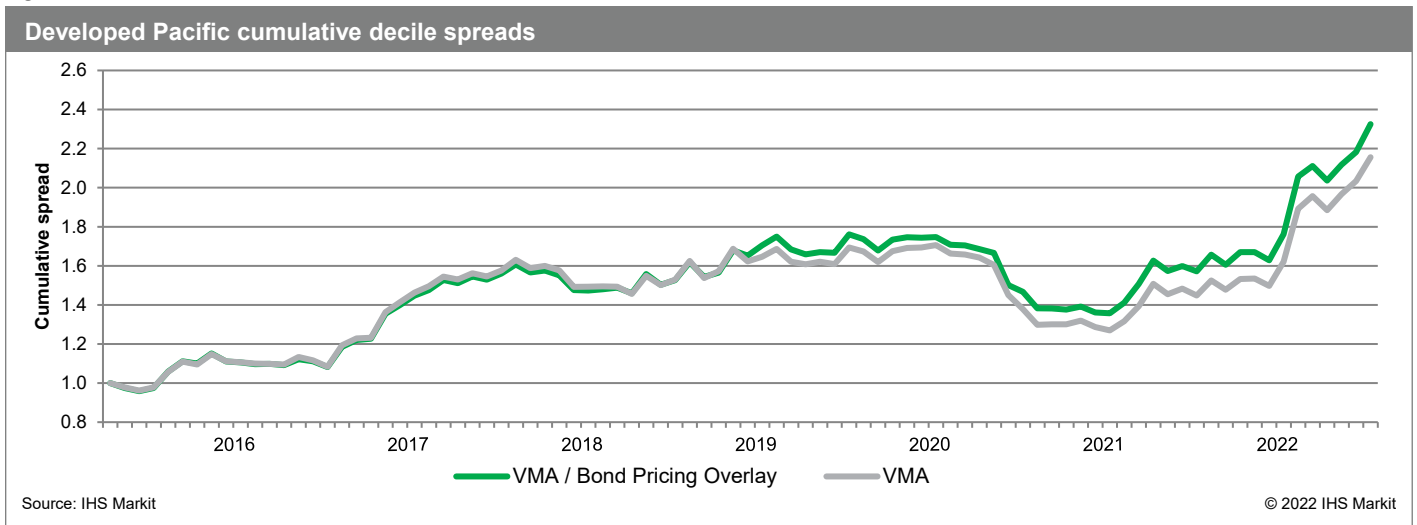**US Total Cap cumulative decile spreads**

Source: IHS Markit

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Figure 7

Developed Europe cumulative decile spreads

Source: IHS Markit

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Figure 8

Developed Pacific cumulative decile spreads

Source: IHS Markit

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Figure 9

Emerging Markets cumulative quintile spreads

Source: IHS Markit
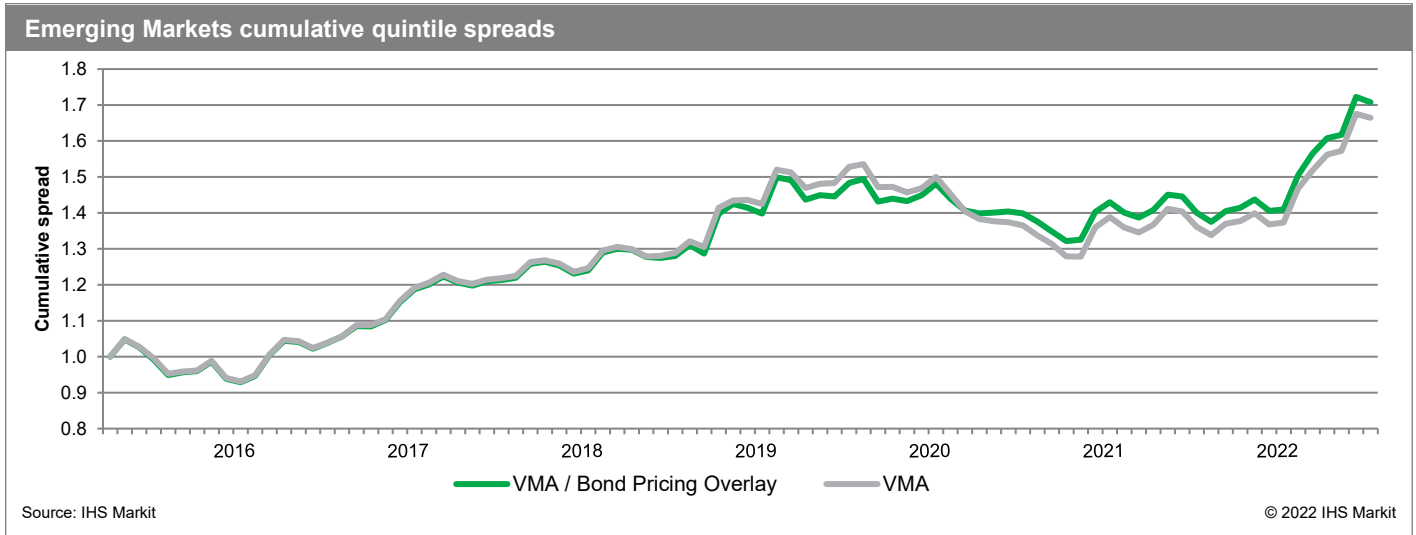
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Conclusion

Using bond return and curve data, we introduce 19 base factors (and seven variants to extend coverage) to predict equity price movement. The data is sourced from the IHS Markit (now a part of S&P Global) Corporate and Sovereign Bond Pricing daily data, which includes price, spread, duration, liquidity and entity level data such as yield to maturity on the yield curve. The factors are constructed using various terms and three methodologies - basic, principal component analysis and linear regression.

Notable factor performance includes Bond Value Divergence, which was a strong signal based on average monthly quantile spreads across the US (0.55%), Developed Europe (0.69%), Developed Pacific (0.33%) and Emerging Markets (0.67%). Consistent outperformance was also posted by 60-Day Normalized 5-Year Z-spread with Substitution (spread: 0.68%; hit rate: 64%) and Twist in Bond Z-spread Curve (spread: 0.69%; hit rate 60%). In Developed Europe, 120-Day Average of Relative Term Spread With Substitution (0.53%) and Bond Return Divergence (0.43%) were also among the top spread performers, while 60-Day Change in 5-Year Z-spread With Substitution outperformed in Developed Pacific, with an average decile spread of 0.31%.

We also examine rank correlations of three representative bond pricing factors - 60-Day Normalized 5-Year Z-spread With Substitution, 60-Day Normalized Shift in Bond Z-spread Curve and Bond Value Divergence - with other style factors in our factor library. Overall, with the exception of 5-day Industry Relative Return and Bond Value Divergence, correlations with bond pricing factors tended to be in the low single-digit range, demonstrating the uniqueness of the signals. Taking advantage of this feature, we wrap up with an example of the benefits from combining bond pricing factors with our Value Momentum Analyst Model, where we found additional monthly alpha from this overlay strategy in the US Total Cap (25 bps), Developed Europe (2 bps), Developed Pacific (8 bps) and Emerging Markets (3 bps) universes, with negligible impact on turnover.

Appendix

Factor definitions

5-Year Z-spread - region relative 5-year mid z-spread in the bond z-spread curve, sorted in ascending order (start date December 4, 2014)

60-Day Normalized 5-Year Z-spread - 60-day z-score of the 5-year mid z-spread in the bond z-spread curve, sorted in ascending order (start date January 14, 2015)

Industry Relative 5-Year Z-spread - Industry relative 5-year mid z-spread in the bond z-spread curve, sorted in ascending order (start date December 4, 2014)

60-Day Change in 5-Year Z-spread - 60-day change of 5-year mid z-spread in the bond z-spread curve, sorted in ascending order (start date February 26, 2015)

20-Day 5-Year Z-spread Volatility - 20-day standard deviation of change in 5-year mid z-spread in the bond z-spread curve, sorted in ascending order (start date December 18, 2014)

120-Day Average of Relative Term Spread - 120-day exponential average of transformed relative term spread, sorted in ascending order (start date February 25, 2015)

Shift in Bond Z-spread Curve - Average factor loading of the first principal component for the z-spread between 6 months and 40 years, produced by PCA over 60 business days, sorted in ascending order (start date February 5, 2015)

60-Day Normalized Shift in Bond Z-spread Curve - 60-day z-score of Shift in Bond Z-spread Curve, sorted in ascending order (start date March 18, 2015)

60-Day Change of Shift in Bond Z-spread Curve - 60-day change of Shift in Bond Z-spread Curve, sorted in ascending order (start date April 30, 2015)

60-Day Volatility of Shift in Bond Z-spread Curve - 60-day standard deviation of Shift in Bond Z-spread Curve, sorted in ascending order (start date March 18, 2015)

60-Day Average of Tilt in Bond Z-spread Curve - 60-day exponential average of average factor loading of the second principal component for the z-spread between 6 months and 40 years, produced by PCA over 60 business days, sorted in ascending order (start date March 18, 2015)

Short-term Tilt in Bond Z-spread Curve - Average factor loading of the second principal component for the 6-month and 1-year z-spread, produced by PCA over 60 business days, sorted in ascending order (start date February 5, 2015)

60-Day Average of Tilt in Term Spread - 60-day exponential average of the difference of factor loading of the second principal component for the 5-year z-spread and 1-year z-spread, produced by PCA over 60 business days, sorted in ascending order (start date March 18, 2015)

60-Day Change of Tilt in Bond Z-spread Curve - 60-day change of Tilt in Bond Z-spread Curve, sorted in ascending order (start date April 30, 2015)

Twist in Bond Z-spread Curve - Average factor loading of the third principal component for the z-spread between 6 months and 40 years, produced by PCA over 120 business days, sorted in descending order (start date April 9, 2015)

120-Day Average of Short-term Twist in Bond Z-spread Curve - 120-day exponential average of average factor loading of the third principal component for the 6-month and 1-year z-spread, produced by PCA over 120 business days, sorted in ascending order (start date July 1, 2015)

Bond Value Divergence - The difference of market equity return and estimated equity return based on 120-day linear regression of equity return on 5-year mid z-spread percentage change and MSCI ACWI Index return, sorted in ascending order (start date March 6, 2015)

5-Year Z-spread With Substitution - Region relative 5-year mid z-spread in the bond z-spread curve, substituted with aggregated bond-level z-spread if curve-level z-spread is not available, sorted in ascending order (start date December 4, 2014)

60-Day Normalized 5-Year Z-spread With Substitution - 60-day z-score of 5-year mid z-spread in the bond z-spread curve, substituted with aggregated bond-level z-spread if curve-level z-spread is not available, sorted in ascending order (start date January 14, 2015)

Industry Relative 5-Year Z-spread With Substitution - Industry relative 5-year mid z-spread in the bond z-spread curve, substituted with aggregated bond-level z-spread if curve-level z-spread is not available, sorted in ascending order (start date December 4, 2014)

60-Day Change in 5-Year Z-spread With Substitution - 60-day change of 5-year mid z-spread in the bond z-spread curve, substituted with aggregated bond-level z-spread if curve-level z-spread is not available, sorted in ascending order (start date February 26, 2015)

20-Day 5-Year Z-spread Volatility With Substitution - 20-day standard deviation of change in 5-year mid z-spread in the bond z-spread curve, substituted with aggregated bond-level z-spread if curve-level z-spread is not available, sorted in ascending order (start date December 18, 2014)

120-Day Average of Relative Term Spread With Substitution - 120-day exponential average of transformed relative term spread, substituted with aggregated bond-level z-spread if curve-level z-spread is not available, sorted in ascending order (start date February 25, 2015)

Bond Value Divergence With Substitution - The difference of market equity return and estimated equity return based on 120-day linear regression of equity return on 5-year mid z-spread percentage change and MSCI ACWI Index return, substituted with aggregated bond-level z-spread if curve-level z-spread is not available, sorted in ascending order (start date March 6, 2015)

20-Day Aggregated Bond Return - Equally weighted single bond return over the last 20 days with the filter of the bonds that mature between 3 years and 7 years, sorted in descending order (start date January 1, 2015)

Bond Return Divergence - The difference of market equity return and estimated equity return based on 120-day linear regression of equity return on aggregated bond return and MSCI ACWI Index return, sorted in ascending order (start date March 6, 2015)
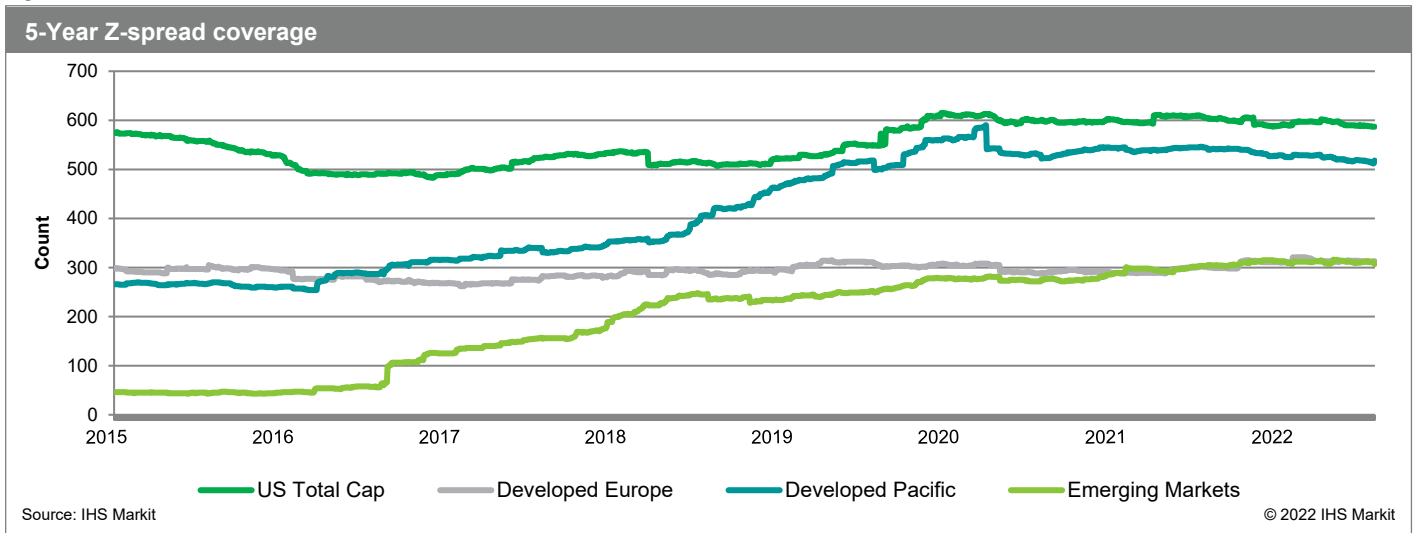
Tables and figures

Figure A1

Source: IHS Markit

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Table A1

Factor	US Total Cap	Developed Europe	Developed Pacific	Emerging Markets
Monthly quantile return spread hit rate (%), through June 2022				
5-Year Z-spread	53	51	50	49
60-Day Normalized 5-Year Z-spread	64	49	46	52
Industry Relative 5-Year Z-spread	53	49	49	52
60-Day Change in 5-Year Z-spread	51	48	49	50
20-Day 5-Year Z-spread Volatility	48	46	52	51
120-Day Average of Relative Term Spread	61	53	51	56
Shift in Bond Z-spread Curve	43	50	47	47
60-Day Normalized Shift in Bond Z-spread Curve	51	57	56	43
60-Day Change of Shift in Bond Z-spread Curve	58	58	45	41
60-Day Volatility of Shift in Bond Z-spread Curve	54	49	51	44
60-Day Average of Tilt in Bond Z-spread Curve	48	45	52	49
Short-term Tilt in Bond Z-spread Curve	51	55	43	49
60-Day Average of Tilt in Term Spread	56	49	40	43
60-Day Change of Tilt in Bond Z-spread Curve	60	49	51	55
Twist in Bond Z-spread Curve	53	50	45	60
120-Day Average of Short-term Twist in Bond Z-spread	43	48	52	53
Bond Value Divergence	59	60	49	61
5-Year Z-spread With Substitution	53	53	51	49
60-Day Normalized 5-Year Z-spread With Substitution	64	49	55	55
Industry Relative 5-Year Z-spread With Substitution	54	57	53	51
60-Day Change in 5-Year Z-spread With Substitution	51	48	53	52
20-Day 5-Year Z-spread Volatility With Substitution	59	52	50	53
120-Day Average of Relative Term Spread With Substitution	56	59	45	57
Bond Value Divergence With Substitution	53	57	44	55
20-Day Aggregated Bond Return	53	49	44	46
Bond Return Divergence	55	57	46	53

Source: IHS Markit

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Table A2

Average monthly IC, through June 2022				
Factor	**US Total Cap**	**Developed Europe**	**Developed Pacific**	**Emerging Markets**
5-Year Z-spread	0.013	0.002	0.007	0.012
60-Day Normalized 5-Year Z-spread	0.005	-0.004	-0.007	0.016
Industry Relative 5-Year Z-spread	-0.001	0.002	0.007	0.014
60-Day Change in 5-Year Z-spread	0.004	-0.002	-0.011	-0.001
20-Day 5-Year Z-spread Volatility	-0.003	-0.016	0.009	0.016
120-Day Average of Relative Term Spread	0.014	0.015	0.002	0.008
Shift in Bond Z-spread Curve	0.005	0.006	-0.007	-0.026
60-Day Normalized Shift in Bond Z-spread Curve	0.009	0.006	0.003	-0.021
60-Day Change of Shift in Bond Z-spread Curve	0.011	0.007	-0.007	-0.020
60-Day Volatility of Shift in Bond Z-spread Curve	0.001	-0.002	-0.004	-0.011
60-Day Average of Tilt in Bond Z-spread Curve	0.011	-0.005	0.003	0.002
Short-term Tilt in Bond Z-spread Curve	-0.003	-0.002	-0.014	-0.004
60-Day Average of Tilt in Term Spread	0.015	0.003	0.010	-0.002
60-Day Change of Tilt in Bond Z-spread Curve	0.001	-0.002	0.003	0.019
Twist in Bond Z-spread Curve	0.012	0.004	-0.003	0.019
120-Day Average of Short-term Twist in Bond Z-spread	0.001	-0.015	0.007	0.010
Bond Value Divergence	0.035	0.026	0.003	0.034
5-Year Z-spread With Substitution	0.030	0.009	0.009	0.013
60-Day Normalized 5-Year Z-spread With Substitution	0.010	-0.003	-0.002	0.007
Industry Relative 5-Year Z-spread With Substitution	0.019	0.010	0.005	0.015
60-Day Change in 5-Year Z-spread With Substitution	0.006	-0.007	-0.006	0.004
20-Day 5-Year Z-spread Volatility With Substitution	0.021	-0.006	0.007	0.007
120-Day Average of Relative Term Spread With Substitution	0.013	0.017	0.000	0.012
Bond Value Divergence With Substitution	0.020	0.014	-0.001	0.020
20-Day Aggregated Bond Return	0.005	-0.004	-0.009	-0.013
Bond Return Divergence	0.016	0.011	0.002	0.021

Source: IHS Markit   © 2022 IHS Markit

Table A3

Average monthly rank correlations, through June 2022

Style	Factor	Developed Pacific 60-Day Normalized 5-Year Z-spread With Substitution	Developed Pacific 60-Day Normalized Shift in Bond Z-spread Curve	Developed Pacific Bond Value Divergence	Emerging Markets 60-Day Normalized 5-Year Z-spread With Substitution	Emerging Markets 60-Day Normalized Shift in Bond Z-spread Curve	Emerging Markets Bond Value Divergence
C D S	Credit Risk	0.01	0.01	0.04	0.03	-0.03	-0.03
	CDS Slope - 5 year minus 1 year	0.00	0.02	0.05	0.00	-0.01	-0.04
	Credit Revisions - 3 Month	0.09	0.02	0.00	0.12	0.00	0.05
	CDS Divergence	-0.01	0.00	-0.03	0.04	0.02	-0.05
V a l u e	Book-to-Market	0.01	0.00	0.00	0.01	0.00	0.01
	Forward 12-M EPS-to-Enterprise Value	0.03	-0.01	-0.02	0.03	0.00	0.00
	TTM EBITDA-to-Enterprise Value	0.01	0.00	0.01	0.01	0.01	0.02
	TTM Free Cash Flow-to-Enterprise Value	0.01	0.01	0.00	0.01	-0.01	-0.01
	Industry Relative Leading 4-QTRs EPS to Price	0.03	-0.01	-0.01	0.00	0.00	0.01
	Industry Relative TTM Dividend Yield	-0.01	0.00	-0.03	-0.01	0.01	0.00
Q u a l i t y	Fixed Assets Turnover Ratio	0.01	0.00	0.00	-0.01	-0.02	0.00
	Inventory Turnover Ratio	0.00	0.01	0.01	0.00	0.00	0.01
	Net Operating Asset Turnover	0.00	0.00	0.01	0.00	0.00	0.02
	Change in Accruals to Assets	0.00	0.00	0.00	0.00	0.00	0.00
	Change in TTM COGS vs. Inventory Level	0.01	0.00	0.01	0.00	-0.01	0.01
	Change in TTM Sales vs. Accounts Receivable	-0.01	0.00	0.00	0.00	0.00	0.00
	Working Capital Accruals	0.00	0.00	0.00	0.00	0.00	0.00
G r o	1-yr Growth in TTM Free Cash Flow	0.01	0.00	0.00	0.00	-0.01	-0.01
	Reinvestment Rate	0.02	0.00	0.02	0.01	-0.01	0.00
R i s k	Average Monthly Trading Volume-to-Market Cap	0.01	-0.01	-0.03	-0.04	-0.01	0.02
	60-Month Beta	0.00	0.01	0.01	-0.01	0.00	-0.03
	Asset Quality Index	0.00	0.00	0.00	0.00	0.00	-0.02
	Operating Leverage	0.00	0.00	-0.01	0.00	-0.03	-0.01
	Natural Logarithm of Market Capitalization	-0.01	-0.01	-0.04	-0.05	0.00	0.00
M o m e n t u m	2-Year Ahead EPS Growth	-0.01	0.00	0.00	0.00	0.01	0.01
	3-M Revision in FY2 EPS Forecasts	0.02	0.00	0.03	0.02	0.00	0.01
	Real Earnings Surprise	-0.01	0.01	0.02	0.00	0.01	0.01
	24-Month Value at Risk	0.01	-0.01	0.00	0.00	-0.01	-0.04
	5-day Industry Relative Return	-0.01	0.00	0.31	-0.02	-0.03	0.31
	Industry-adjusted 12-month Relative Price Strength	-0.01	0.00	0.06	0.01	-0.01	0.06
	Rational Decay Alpha	0.00	0.00	0.00	0.02	0.00	0.00
Sh St	Demand Supply Ratio	0.02	-0.01	-0.02	0.02	0.01	-0.05
	Implied Loan Rate	0.01	0.01	0.02	0.02	-0.03	0.00

Source: IHS Markit © 2022 IHS Markit

Note that the top 10 correlations in magnitude across all four coverage regions are highlighted

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