Morgan Stanley

INVESTMENT MANAGEMENT

The MSIM Quantitative Credit Strategy Model

Helping to Inform About the Relative Attractiveness of Key Credit Markets

INSIGHTS | BROAD MARKETS FIXED INCOME TEAM | September 2023

Summary

Our proprietary MSIM Quantitative Credit Strategy (QCS) model advises us on tactical investing in credit markets over a relatively short time horizon (around 1 month). The model is based on five factors:

1. Momentum
2. Risk Sentiment
3. Carry
4. Valuation
5. Business Cycle

Individually, each of these factors has limited power in predicting short-term credit excess returns, but when combined they create a more successful and reliable signal. This makes intuitive sense: by looking at a broader range of information, one gets a better picture of the appropriate risk to take.

Our back-tests show generally attractive Information Ratios, strong performances during periods of market stress and few significant drawdowns (before taking transaction costs into account). However, they also have modest returns for extended periods, so should not be relied on to generate attractive returns in all market conditions.

In all, our QCS is an important part of our investment process, but only one of several inputs we consider.

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Introduction

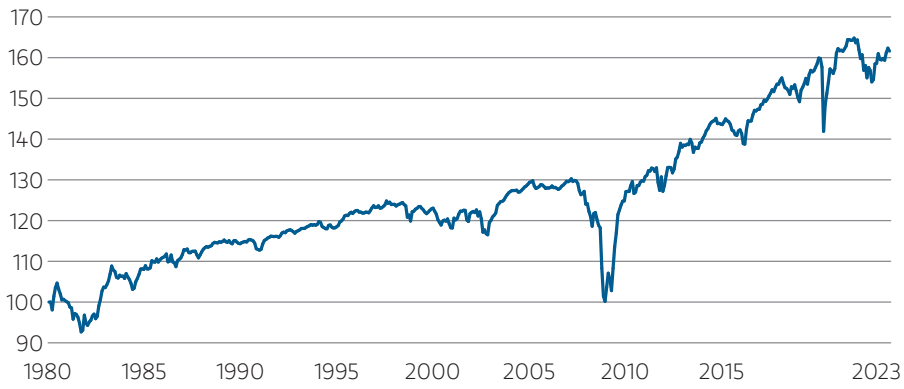
The fundamental characteristic of credit investing is that lenders are paid a higher interest rate than the default-risk-free rate as compensation for the risk that creditors do not pay them back in full and/or on time. Historical data for the largest and most established corporate credit markets (e.g. the U.S. investment grade (IG) corporate market) show that this additional return has more than compensated investors for realised default losses, suggesting that a portion of the additional yield pick-up, or credit spread, reflects credit risk premium rather than actual default expectations.

It now looks more likely that investors are fully compensated for facing default risk. First, credit events increase return volatility, in particular to the downside, which risk-averse investors find unattractive. Second, defaults tend to be highly correlated with each other, the business cycle and other risky assets. As such, a credit investor is likely to experience multiple credit events simultaneously and for this to coincide with other assets in their portfolio (e.g. equities, property) also performing poorly while the economy is in recession. While losses from idiosyncratic credit events can be minimized through owning a diversified portfolio, systemic credit events cannot be avoided and it makes sense that investors demand a premium for facing this risk. This is consistent with the Capital Asset Pricing Model (CAPM) and the idea that investors should be rewarded for holding undiversifiable market risk. There is a debate in the industry about the relative attractiveness of owning credit risk premia vs. other risk premia,[1] but the key point here is that investing in corporate credit has historically generated higher returns than government bonds, even if it has increased return volatility.

DISPLAY 1

It Has Paid to Own Corporate Credit Over the Medium Term

U.S. investment grade corporates excess return vs U.S. treasuries



Source: Bloomberg, July 2023. U.S. Investment Grade Corporates are represented by the Bloomberg US Corporate Bond Index. U.S. Treasuries are represented by the Bloomberg US Treasury Index. The index performance is provided for illustrative purposes only. **Past performance is not indicative of future results.**

Maybe surprisingly, the main driver of this volatility is not actual defaults but fluctuations in default expectations and the credit risk premium, i.e., movements in credit spreads. The job of active credit investors is to identify when the credit risk premium is particularly attractive, when one is being particularly generously compensated for facing default risk. This may be on a single name basis, at a particular level within the capital structure, on a sector level or in relation to the market overall. But it can be difficult to distinguish between actual default risk from default risk premium, requiring an in-depth understanding of corporate business models, structural sector trends, macroeconomic fundamentals and the business cycle.

Fortunately, several studies[2] in recent years suggest that quantitative, factor-based models can help active investors identify attractive credit securities. Similar to analysis on equities, this approach uses well-known factors, such as momentum, carry and defensiveness, to identify portfolios of securities which are more attractive to own on a market neutral basis.

Our approach is different in that we focus on the overall level of credit risk in a portfolio—the "credit beta"—the amount of default risk to own relative to the risk-free alternative. This is relevant for both fixed income asset allocators, in determining their allocation to credit in their portfolios, and for corporate bond managers, looking to manage the risk of their portfolios relative to a benchmark (most sectors are highly correlated to the overall market, but have differing betas to it, meaning active sector exposures frequently translate into an exposure to the overall performance of the market in addition to more idiosyncratic risk). But our model is still a quantitative, factor-based approach. Interestingly, most of the factors we use are the same, or similar to, the ones for taking non-market directional credit risk discussed in the academic literature.

[1] For example, Berkin & Swedroe (2016) conclude that owning credit/default risk premium is unattractive in comparison to other factor-based investment strategies they consider, they recognise a positive premium exists. By contrast, Dor et al (2021) find that the introduction of corporate credit improves the risk-adjusted performance of equities/Treasuries portfolios. Of course, this debate is irrelevant to investors, e.g., pension funds and insurers, who are constrained, due to fiduciary or regulatory reasons, from owning assets which are riskier than corporate credit.

[2] For example, Israel et al (2018), Houweling & van Zundert (2017), Doctor (2019).

Our Quantitative Credit Strategy model incorporates both fundamental and technical credit factors to inform us about the relative attractiveness of key credit markets. We incorporate the signals obtained from the model into our day-to-day decision-making process, which provides an efficient framework for processing relevant information, leads to better investment discipline and consistency of our funds' performance.

MSIM Quantitative Credit Strategy (QCS) model

As mentioned, our QCS model advises us on tactical investing in credit markets over a relatively short time horizon (around 1 month). The model is based on five factors:

1. Momentum
2. Risk Sentiment
3. Carry
4. Valuation
5. Business Cycle

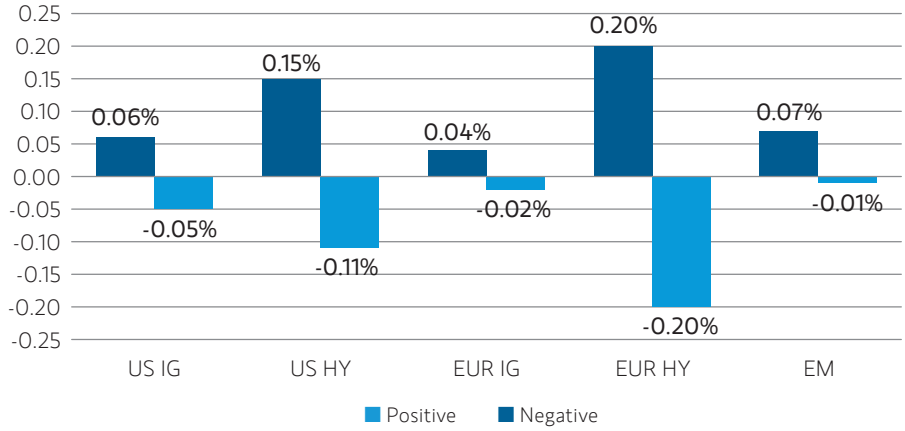
Individually, each of these factors has limited power in predicting short-term credit excess returns, but when combined they create a more successful and reliable signal. This makes intuitive sense: by looking at a broader range of information, one gets a better picture of the appropriate risk to take. If everything is lining up in the same direction at the same time, it makes sense to have more conviction and take more risk; but if the factors are at cross purposes, it is prudent to moderate one's active position.

We find the indicators are successful in all the major corporate credit markets (U.S. and European Investment Grade and High Yield as well as Emerging Markets). Our back-tests show generally attractive Information Ratios, strong performances during periods of market stress and few significant drawdowns (before taking transaction costs into account). However, they also have modest returns for extended periods, so should not be relied on to generate attractive returns in all market conditions. QCS is an important part of our investment process, but only one of several inputs we consider.

DISPLAY 2

Momentum Matters

Average weekly bond excess returns when prior 6-months were positive or negative (%)



Source: Bloomberg, MSIM, June 2023. Period of observation is from February 2000 to June 2023. U.S. IG is represented by the Bloomberg U.S. Corporate Bond Index, U.S Treasuries by the Bloomberg U.S. Treasury Index; US HY by the Bloomberg US Corporate High Yield Bond Index; EUR IG by the Bloomberg Euro-Aggregate Corporates Index, EUR Treasuries by the Bloomberg Euro-Aggregate Treasury Germany Index; EUR HY by the Bloomberg Pan-European High Yield Index; EM by the J.P. Morgan EMBI Global Total Return Index. The index performance is provided for illustrative purposes only. **Past performance is not indicative of future results.**

Factor-based approach

As previously mentioned, the factors we use are either the same or similar to ones already documented in academic literature, so our approach is not necessarily novel. However, we find it reassuring that others have had success using the same approach. Our choice of factors is based not only on their success, and that they make intuitive sense, but also on how they fit together to provide a more powerful overall signal. In particular, we look for factors which ideally have low correlation to each other as this helps increase the diversity of information in the signal (see *Display 8* for correlations of QCS model factors).[3]

Factor 1: Momentum

While the phenomenon lacks a fundamental (rather than behavioral) explanation, it is well documented that financial assets exhibit persistence in their performance, i.e., assets which have been going up in price are more likely to continue doing so, and *vice versa*. "The trend is your friend" is a well-known adage in financial markets, and there is an additional reason to believe in it in credit markets, where strong returns can become self-fulfilling by reducing refinancing risk, and *vice versa*. In *Display 2* we show that from February 2000 through June 2023 corporate credit returns (vs treasuries) in the U.S., European and Emerging Markets have been, on average, significantly higher if excess returns in the prior 6 months were also positive.

[3] Another way to address this issue would be through altering the weights assigned to each factor, depending on the regime one is in and/or the factor's success, but we have not yet found a robust, systematic manner in which to do this.

Factor 2: Risk Sentiment

Our second factor is constructed from the average of (1) performance of risky assets, particularly in equity markets and (2) the Morgan Stanley Global Risk Demand Index. The rationale for this signal is that there is persistence in risk sentiment and the performance of risky assets, and that the performance of equities in particular have a knock-on effect on to the corporate bond market. The Merton model certainly postulates a fundamental link between equity and corporate bond valuations, and it would appear that changes in corporate fundamentals, which initially impact the equity market, affect the bond market as well with a lag (Dor *et al* (2021) report that earnings surprises have a persistent impact on corporate bond returns). It is also possible that risky assets in general exhibit momentum, and this provides useful information for positioning in corporate bonds (i.e., equity and credit excess returns are positively correlated; past equity returns help predict future equity returns, which mean they also predict future excess credit returns).

An additional explanation is a "wealth effect:" poor returns of risk assets negatively affect an investor's wealth, making them more risk averse and demanding a higher risk premia for owning default risk (and *vice versa*). This is the same concept as Ilmanen (1997) proposes for forecasting duration returns.

PRIOR EQUITY RETURNS – We found that across the five major bond markets, excess returns are higher if equity returns over the previous 6 months have been positive, and vice versa (*Display 3*).

MORGAN STANLEY GLOBAL RISK DEMAND INDEX – Since 2004, Morgan Stanley has published a daily index to assess the level of risk sentiment across markets. The index is comprised of 10 different assets and creates a single measure of risk taking. Assets included are volatility measures of different assets (equity, bond, FX), relative performance of risky assets (EM vs G10 bonds, base vs precious metals, G10 bonds vs equity, growth vs value stocks, HY vs IG credit) and the performance of US swaps.

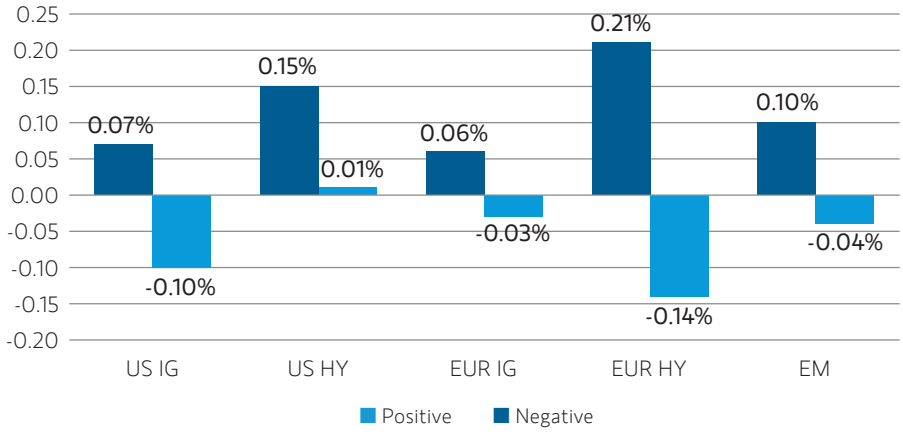
Factor 3: Carry

Carry is maybe the most obvious and intuitive factor strategy in corporate credit markets. Wider credit spreads mean that investors are paid more to own corporate credit rather than treasuries, and while periods of wider spreads have generally predicted higher default rates, the additional carry has historically outweighed default losses (at least for the market as a whole - *Display 4*).

DISPLAY 3

The Impact of Risk Sentiment and Prior Equity Returns

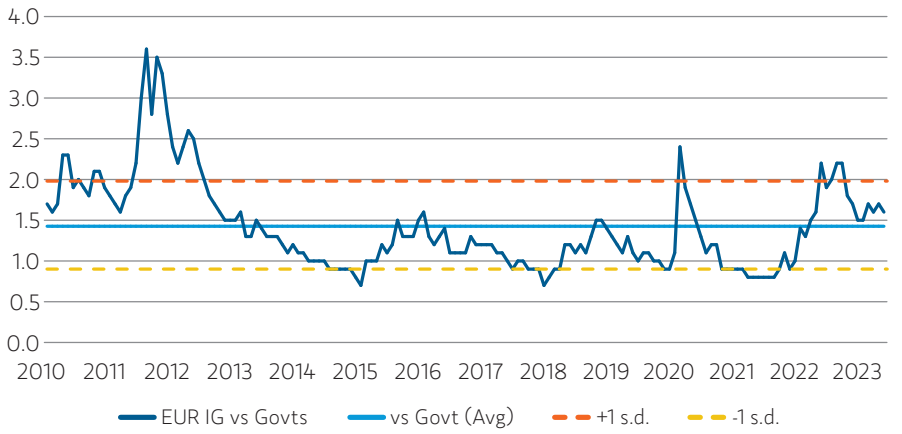
Average weekly excess bond returns when prior equity returns were positive or negative (%)



Source: Bloomberg, MSIM, June 2023. Period of observation is from February 2000 to June 2023. U.S. IG is represented by the Bloomberg U.S. Corporate Bond Index, U.S Treasuries by the Bloomberg U.S. Treasury Index; US HY by the Bloomberg US Corporate High Yield Bond Index; EUR IG by the Bloomberg Euro-Aggregate Corporates Index, EUR Treasuries by the Bloomberg Euro-Aggregate Treasury Germany Index; EUR HY by the Bloomberg Pan-European High Yield Index; EM by the J.P. Morgan EMBI Global Total Return Index. The index performance is provided for illustrative purposes only. **Past performance is not indicative of future results.**

DISPLAY 4

Spread of the Euro Aggregate Corporate Benchmark vs Long-run Average



Source: Bloomberg, July 2023. Spread represented by the Bloomberg Euro Aggregate Corporate Average Option Adjusted Spread Index. **Past performance is not indicative of future results.**

Both credit spreads and credit excess returns have historically been mean-reverting. We found that after periods of significant widening, credit spreads tend to compress, where credit outperforms treasuries. Conversely, after periods of compression, spreads tend to widen out towards average.

Factor 4: Valuation

Value investing is possibly the best known and most intuitive investment strategy. This factor is mean-reverting and provides diversification to our Momentum and Risk Sentiment factors (Asness *et al* (2013)).

To estimate a fair value of credit spreads, we run an ordinary least squares (OLS) regression using five inputs: rates volatility, equity volatility, P/E ratio, swap and Treasury-EuroDollar (TED) spreads as well as the U.S. corporate bankruptcy index. Effectively, we use four pricing inputs from other markets, i.e., our fair value estimate is based on the consistency of credit spreads with their historical relationship to prices of other assets, and one global risk-event proxy (bankruptcy index). Our assumption is that discrepancies between the two will generally be resolved through credit spreads moving into line with other market prices rather than the other way round (the positive performance of our back-tests suggests that this is indeed the case). Although the explanatory power of this model differs across the markets, it is fairly high—the highest being in U.S. IG spreads (R^2=86%), followed by U.S. and European HY (82% and 83%, respectively), whilst the lowest is for EM credit spreads (56%).

Factor 5: Business Cycle

A Business Cycle factor is included to capture expectations around the economic cycle, which in turn drive expectations of systemic default risk. We build our Business Cycle indicator using two inputs: (1) the U.S. Treasury yield curve (30-year minus 3-month) and (2) the economic surprise index which looks at realized data compared to expectations.

The yield curve is a well-documented indicator of the health of the economy, with an inverted curve seen as a predictor of recession within the next 12-18 months. The connection with the business cycle comes through investors' expectations of monetary policy: the curve primarily reflects the market's pricing of future policy rates, with an inverted curve showing central bank rates expected to fall, as typically happens during a recession.

To provide additional information about the direction of the Business Cycle, we also include economic surprise indices, which track the difference between realised macro data releases against consensus expectations. This allows us to capture the strength of the economy compared to expectations, and hence if default expectations should be revised higher or lower.

Constructing a Diversified Portfolio of Signals

Having constructed five factors which we think capture the main drivers of fluctuations in credit risk premia, we combine them into a single indicator.

The first step is to normalise factors relative to their history to make them comparable. We give each factor a maximum score of +10 (for being most bullish on credit relative to its historical distribution) to -10 (most bearish). We then calculate an overall positioning signal from the average of the 5 individual factors, effectively weighing each factor in the model equally. We also make the signal zero when it varies between -1.5 and +1.5 so that the model recommends taking no risk when the conviction level is low (which helps reduce transaction costs and data noise as well as improve the model's performance statistics). In theory, a single factor can vary between -10 and +10, but historically has a tighter range of -6 to +7, due to the low or negative correlation between factors. Said differently, the signals have never all been at a maximum or a minimum at the same time.

Combining all 5 factors into one signal provides a convenient summation of whether an investor should be long or short credit risk against treasuries, based on a wide range of relevant information i.e., the factors which have a successful track record in credit markets.

Back-testing Our QCS Model

In *Displays 5-8* on the following pages we show the back-test results of the QCS model for the last 20 years. The results are presented without transaction costs taken into account. With only a few exceptions, we find that the QCS model has worked with our factors in every market and during different time periods under consideration.

Display 5 shows the cumulative average returns of the QCS model since 2000. The QCS model generates an attractive returns profile as large drawdowns are rare and don't occur in periods of financial market stress. In fact, the approach worked relatively well during periods of market stress, including 2002-03, 2008, 2010-2012 and 2020. Most importantly, the performance is negatively correlated to equity returns, which allows for diversified portfolios to protect overall value in times of stress.

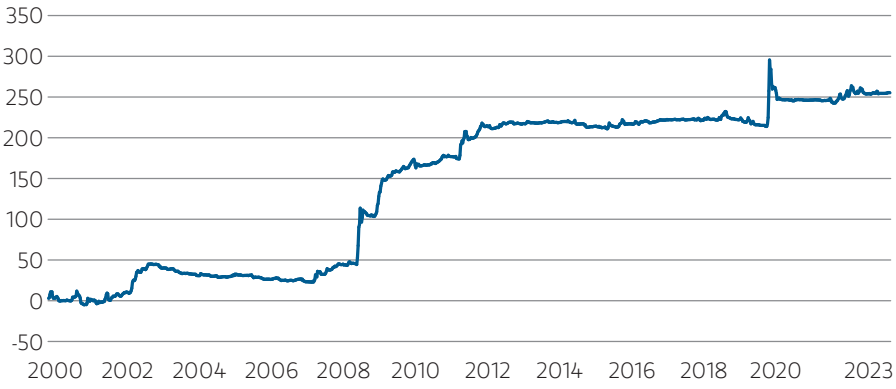
Display 6 shows the performance of this investment approach in three different credit spread environments: (1) "Middle" periods when spreads are within ½ a standard deviation of the long-term historical average;

(2) "Wide" periods when spreads are ½ a standard deviation above the historical average and (3) "Tight" periods when spreads are ½ a standard deviation tighter than the historical average. The results show that the model performs very well during "Wide" periods, which is very helpful for investors as uncertainty is high during those periods. On average, the Sharpe Ratio is 1.48 during those periods as compared to 0.57 during "Middle" spread intervals.

Historically, Momentum has been the most successful strategy, followed by Value and Risk Sentiment (*Display 7*). However, the overall strategy has a higher Information Ratio than any of the individual strategies, reflecting the diversification benefit we get by combining the factors: together they provide us with a more reliable and successful strategy. Making sure we consider a wide range of information, factors with low or

DISPLAY 5

QCS Cumulative Gross Return Back-Test



Source: Bloomberg, July 2023. **Past performance is not indicative of future results.**

DISPLAY 6

QCS Model Back-Test Results By Market

LAST 12 MONTHS	US IG	US HY	EURO IG	EURO HY	EM	COMBINED
Average	-0.11%	-0.34%	0.29%	-0.05%	-0.10%	-0.06%
Std Dev	1.54%	3.48%	0.75%	2.00%	2.86%	1.32%
Sharpe Ratio	-0.50	-0.71	2.76	-0.17	-0.26	-0.32
Hit Ratio	42.4%	50.0%	57.9%	42.1%	55.6%	53.3%
Frequency	63.5%	69.2%	36.5%	36.5%	34.6%	86.5%

MIDDLE	US IG	US HY	EURO IG	EURO HY	EM	AVERAGE
Average	0.17%	0.49%	0.07%	0.14%	0.30%	0.23%
Std Dev	1.32%	3.47%	1.01%	4.73%	4.24%	2.95%
Sharpe Ratio	0.93	1.01	0.51	0.21	0.51	0.57
Hit Ratio	58.0%	58.6%	54.7%	51.3%	53.3%	55.2%
Frequency	62.1%	56.1%	53.3%	57.7%	51.8%	

"Middle" is defined as within -0.5 and +0.5 of standard deviation in each market

LAST 10 YEARS	US IG	US HY	EURO IG	EURO HY	EM	COMBINED
Average	0.13%	-0.04%	0.12%	0.03%	0.37%	0.07%
Std Dev	3.08%	5.17%	1.75%	5.19%	4.93%	2.83%
Sharpe Ratio	0.30	-0.05	0.48	0.05	0.54	0.19
Hit Ratio	58.2%	47.8%	51.3%	45.2%	53.0%	53.8%
Frequency	55.2%	47.1%	51.3%	60.0%	54.8%	91.5%

WIDE	US IG	US HY	EURO IG	EURO HY	EM	AVERAGE
Average	0.89%	2.11%	0.66%	2.62%	0.46%	1.09%
Std Dev	5.06%	7.08%	2.42%	9.43%	11.42%	5.34%
Sharpe Ratio	1.27	2.15	1.96	2.01	0.29	1.48
Hit Ratio	59.5%	66.2%	66.2%	60.3%	43.7%	59.2%
Frequency	60.4%	52.6%	51.1%	55.1%	64.3%	

"Wide" is defined as > +0.5 of standard deviation in each market

WHOLE SAMPLE	US IG	US HY	EURO IG	EURO HY	EM	COMBINED
Average	0.26%	0.62%	0.18%	0.54%	0.27%	0.22%
Std Dev	2.26%	4.35%	1.47%	5.50%	6.27%	2.46%
Sharpe Ratio	0.82	1.03	0.88	0.71	0.31	0.64
Hit Ratio	60.8%	54.8%	57.6%	50.4%	49.2%	53.9%
Frequency	59.5%	51.6%	55.0%	55.7%	54.4%	94.0%

TIGHT	US IG	US HY	EURO IG	EURO HY	EM	AVERAGE
Average	0.08%	-0.27%	0.04%	-0.18%	0.10%	-0.04%
Std Dev	0.44%	1.72%	1.15%	1.94%	2.47%	0.57%
Sharpe Ratio	1.30	-1.15	0.23	-0.67	0.30	-0.44
Hit Ratio	66.7%	42.2%	56.3%	44.1%	47.2%	51.3%
Frequency	54.8%	46.6%	60.2%	54.1%	52.8%	

"Tight" is defined as < -0.5 of standard deviation in each market

Source: Bloomberg, MSIM, July 2023. **Past performance is not indicative of future results.**

negative correlation to each other, is an important consideration in constructing the model *(Display 8)*.

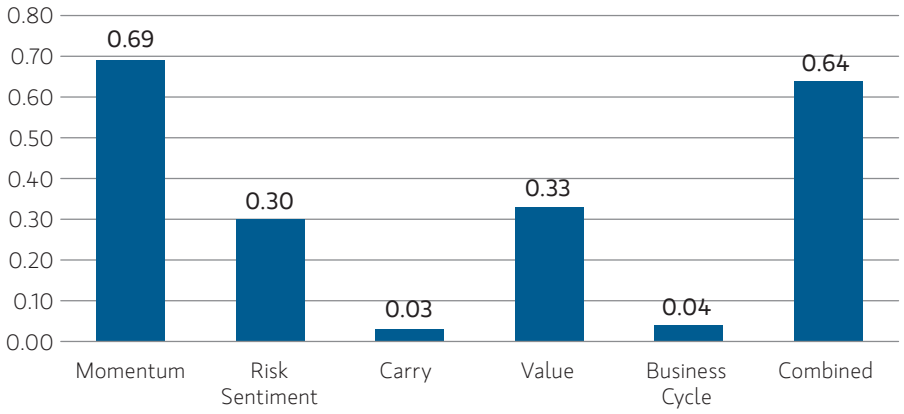
The main limitation of the model is that it can have long periods of low-conviction scores, and hence cannot always be relied on to provide active investment recommendations. The individual factors can also go through long periods of limited success, suggesting the model is vulnerable to regime shifts. We look to address this problem through diversification, in the sense that any point in time at least some of the factors will work well.

Model Results Disclaimer

While we endeavor to make the back-test results realistic, they have significant limitations. Chief amongst these is not taking transaction costs into account, which can be variable depending on market conditions and will be higher in corporate credit cash markets, particularly in high yield and emerging markets. There is also a selection bias risk in the model we have constructed, i.e., that we have gone for a factor and structure specification which results in a favourable back-test result, which may not be repeated going forward. We look to minimize this risk by selecting factors which make intuitive sense and are supported by academic research articles, and a model specification which is simple. However, "data mining" is a pervasive risk in developing quantitative models. Additional information, including the basis and methodology for the information shown, is available upon request.

DISPLAY 7

Information Ratio by Factor



Source: Bloomberg, MSIM, July 2023. Period of observation is from February 2000 to June 2023. **Past performance is not indicative of future results.**

DISPLAY 8

Correlation Between Factors

	MOMENTUM	RISK SENTIMENT	CARRY	VALUE	BUSINESS CYCLE
MOMENTUM	1.00	0.80	-0.66	0.35	0.47
RISK SENTIMENT		1.00	-0.85	0.35	0.20
CARRY			1.00	-0.18	-0.21
VALUE				1.00	0.05
BUSINESS CYCLE					1.00

Source: Bloomberg, MSIM, June 2023. Period of observation is from February 2000 to June 2023. **Past performance is not indicative of future results.**

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Risk Considerations

Diversification does not eliminate the risk of loss. The value of investments held by the portfolio may increase or decrease in response to economic, and financial events (whether real, expected or perceived) in the U.S. and global markets. As interest rates rise, the value of certain income investments is likely to decline. **Investments in debt instruments** may be affected by changes in the creditworthiness of the issuer and are subject to the risk of non-payment of principal and interest. The value of **income securities** also may decline because of real or perceived concerns about the issuer's ability to make principal and interest payments. **U.S. Treasury securities** generally have a lower return than other obligations because of their higher credit quality and market liquidity. While certain **U.S. Government-sponsored agencies** may be chartered or sponsored by acts of Congress, their securities are neither issued nor guaranteed by the U.S. Treasury. **Investments rated below investment grade** (sometimes referred to as "junk") are typically subject to greater price volatility and illiquidity than higher rated investments. **Investments in foreign instruments or currencies** can involve greater risk and volatility than U.S. investments because of adverse market, economic, political, regulatory, geopolitical, currency exchange rates or other conditions. In the event of a default by a sovereign entity, there are typically no assets to be seized or cash flows to be attached. Investing primarily in responsible investments carries the risk that, under certain market conditions, the portfolio may underperform strategies that do not utilize a responsible investment strategy. The portfolio is exposed to **liquidity risk** when trading volume, lack of a market maker or trading partner, large position size, market conditions, or legal restrictions impair its ability to sell particular investments or to sell them at advantageous market prices. **Environmental, Social and Governance (ESG)** strategies that incorporate impact investing and/or ESG factors could result in relative investment performance deviating from other strategies or broad market benchmarks, depending on whether such sectors or investments are in or out of favor in the market. As a result, there is no assurance ESG strategies could result in more favorable investment performances.

INDEX DEFINITIONS

The indexes shown in this report are not meant to depict the performance of any specific investment, and the indexes shown do not include any expenses, fees or sales charges, which would lower performance. The indexes shown are unmanaged and should not be considered an investment. It is not possible to invest directly in an index.

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The **Bloomberg U.S. Corporate Index** is a broad-based benchmark that measures the investment grade, fixed-rate, taxable, corporate bond market.

The **Bloomberg U.S. Treasury Index** includes public obligations of the U.S. Treasury.

The **Bloomberg US Corporate High Yield Index** measures the market of USD-denominated, non-investment grade, fixed-rate, taxable corporate bonds. Securities are classified as high yield if the middle rating of Moody's, Fitch, and S&P is Ba1/BB+/BB+ or below. The index excludes emerging market debt.

The **Bloomberg Euro Aggregate Corporate Index (Bloomberg Euro IG Corporate)** is an index designed to reflect the performance of the euro-denominated investment-grade corporate bond market.

The **Bloomberg Euro-Aggregate Treasury Index** consists of fixed-rate, investment-grade public obligations of the sovereign countries participating in the European Monetary Union. This index currently contains euro-denominated issues from 13 countries. The Euro Treasury Index rolls up to other flagship indices such as the Global Aggregate Index. The **Bloomberg Euro-Aggregate Treasury Germany Index** is a subset of the **Bloomberg Euro-Aggregate Treasury Index index** that focuses on Germany.

The **Bloomberg Pan-European High Yield Index** covers the universe of fixed-rate, sub-investment-grade debt denominated in euros or other European currencies (except Swiss francs). This index includes only euro- and sterling-denominated bonds, because no issues in the other European currencies now meet all the index requirements. To be included, the bonds must be rated high-yield (Ba1/BB+ or lower) by at least two of the following ratings agencies: Moody's, S&P, Fitch. If only two of the three agencies rate the security, the lower rating is used to determine index eligibility. If only one of the three agencies rates a security, the rating must be high-yield. Bonds must have at least one year to maturity and an outstanding par value of at least EUR50 million. The index does not include non-rated bonds, and it excludes debt from entities in countries that are designated as emerging markets.

The **J.P. Morgan EMBI Global Total Return Index** tracks total returns for traded external debt instruments in the emerging markets, and is an expanded version of the EMBI+. As with the EMBI+, the EMBI Global includes US dollar-denominated Brady bonds, loans, and Eurobonds with an outstanding face value of at least $500 million.

The **Bloomberg Euro-Aggregate Corporate Average Option Adjusted Spread (OAS) Index** tracks the average OAS of the **Bloomberg Euro-Aggregate Corporates Index**.

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