Fixed Income Systematic Investing: Factor-based Portfolio Construction in the Corporate Credit and Bond Markets

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In this article we exemplify how the Axioma Factor-based Fixed Income Risk Model, with its insights into systematic macro and style factors, can be used to construct smart beta strategies in the corporate credit and bond markets.

Systematic investing that takes exposures to smart beta style factors is a staple in equity markets[1]. Recent studies[2] have now shown that such smart beta or style factor investing can be implemented successfully in fixed income markets for both corporate credit and government bonds. That said, fixed income investors have been slow to adopt such strategies. The reasons for this include data quality concerns that stem from the illiquidity of fixed income securities relative to their equity counterparts. In the past, investors only had access to poor quality fixed income data that were insufficiently robust to outliers, where noise obscured systematic risk factor signals. From a systematic trading point of view, these issues led to trading in and out of positions to maintain consistent exposure to underlying style factors with high transaction costs, or investors were forced to pay a large premium to cleanse the available data. With recent enhancements to data quality

and advanced modeling techniques, fixed income factor investing has been on the rise.

A robust factor risk model, with insights into systematic macro and style factor exposures, is essential for fixed income investors to effectively construct portfolios that achieve their smart beta strategies. Fixed income style factors provide another dimension to portfolio managers who want to go beyond geography, sector, duration and macro factors. We exemplify this using the Axioma Factor-based Fixed Income Risk Model[3]:
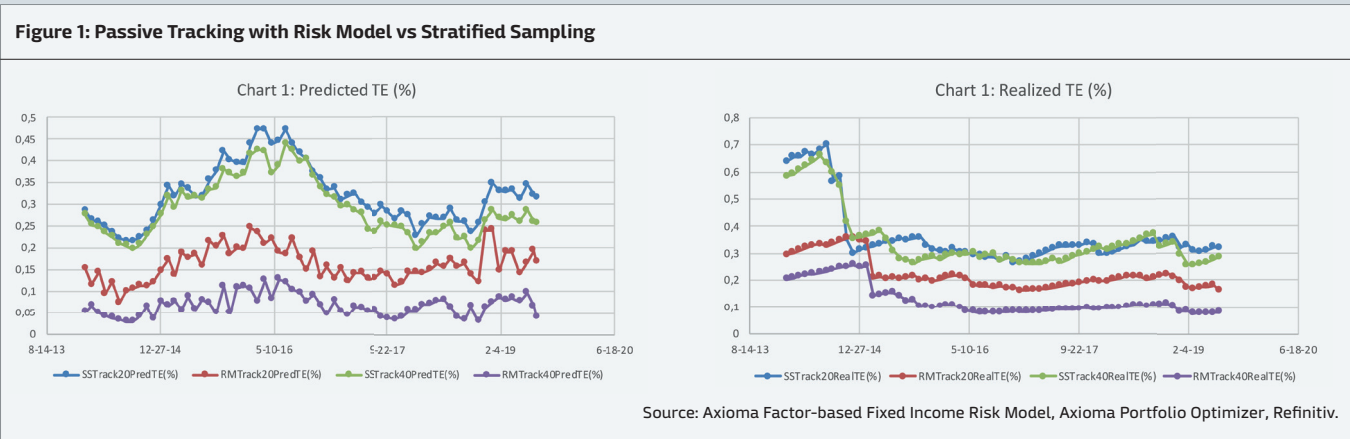1. We compare Index tracking with a Stratified Sampling (SS) approach that does not use a risk model.
2. We leverage systematic macro and style factors in the risk model to generate portfolios with superior risk-adjusted returns to a market-cap weighted benchmark.

The case for index-tracking

We compare two approaches to generate tracking portfolios using the Axioma Portfolio Optimizer™. The benchmark is a USD-denominated Investment Grade universe with senior fixed coupon debt, minimum notional of 750 million USD, minimum time to maturity of 3 years, and ratings up to BBB.
1. The Risk Model (RM) approach minimizes the tracking error $(w-b)^T Q\,(w-b)$, where $Q=(B\Omega B^T+\Delta^2)$ is the Axioma Factor Risk Model and $(w-b)$ is the vector of active portfolio weights.
2. The Stratified Sampling (SS) approach uses a linear programming portfolio model to keep the portfolio close to the benchmark in various maturity, rating and sector buckets.

A monthly backtest is run from 2005 to 2019 to generate long-only, fully invested RM and SS portfolios that satisfy the following constraints:

Figure 1: Passive Tracking with Risk Model vs Stratified Sampling

Source: Axioma Factor-based Fixed Income Risk Model, Axioma Portfolio Optimizer, Refinitiv.

a. Hold at most 20% (Track20) and 40% (Track40) of the benchmark names;
b. Max asset bound of 3.5%, Max issuer bound of 7.5%;
c. Monthly round-trip turnover of 5%;
d. Key Rate Duration (KRD) matched to the benchmark to +/- 0.01 years.

The left exhibit of Figure 1 plots the predicted tracking error of two tracking portfolios that can hold up to 20% and 40% of the total number of benchmark assets, respectively. As expected, the predicted tracking error of both the RM and SS portfolios decreases when one can hold a larger proportion of the benchmark. The decrease in predicted tracking error, however, is greater for the RM portfolio. This is because the RM portfolio uses the correlations between the different factors in the risk model to reduce the tracking error. The asset, the issuer, and KRD matching constraints are also needed in the model to prevent the RM portfolio from hedging its active exposures and taking concentrated sector bets.

The right exhibit of Figure 1 shows the rolling 3-year realized tracking error (%) of the four portfolios, where the portfolios are rolled-forward between rebalancings with the total bond returns, including coupons and accrued interest. We see that the RM portfolios better track the benchmark over time. The RM tracking over SS also improves considerably when the portfolio can hold a larger proportion of the benchmark.

The case for smart beta investing
A smart beta portfolio tilts on factors with known risk premia, tracks a market-cap weighted portfolio closely and is investable. Academic and practitioner research have evaluated the efficacy of these factors and show that smart beta portfolios outperform the benchmark by generating superior risk-adjusted returns.

Unlike traditional fixed income factor models, the Axioma Factor-based Fixed Income Risk Model incorporates style factors, including Value, Steepness, Momentum, Size, and Beta, to allow for a better trade-off of risk and return in these factors. In addition to style factors, the

model includes market, currency, sector and quality factors in a cross-sectional regression framework—all built on robust issuer spread curve returns. Well-constructed, stable issuer spread returns are crucial for estimating factor returns with strongly significant explanatory power and for specifying issuer-specific risk. The Axioma Risk Entity Framework classifies different credit issuers within a corporate hierarchy and serves as the foundational layer for the mapping of bonds to issuers for curve construction and within the risk model.

In this example, we construct smart beta portfolios that:
1. Maximize their risk-model exposures to:
   • Value (underpriced relative to their peers);
   • Momentum (good recent performance) and
   • Steepness (high ex-ante roll).
2. Minimize their exposures to:
   • Beta (low exposure to credit market) and
   • Size factors (low debt).

We also generate an Option-Adjusted Spread (OAS) portfolio that maximizes its exposure to the bond OAS for comparison. One can regard this as a Carry portfolio that maximizes the ex-ante return, including coupons and the passage of time. Finally, we construct a multi-factor portfolio that maximizes its exposure to an equal-weighted alpha of the Value, Momentum, Steepness, Low Beta and Small Size factors in the risk model. These portfolios track the same USD IG benchmark that is discussed in the previous section on passive tracking.

A monthly backtest is run from Jan 2012 to Oct 2019 to construct long-only, fully invested portfolios that also satisfy the following constraints:
a. Max asset bound of 1%, Max issuer bound of 5%;
b. Ex-ante tracking error to benchmark of 1%;
c. Monthly round-trip turnover of 5%;
d. KRD matched to benchmark to +/- 0.01 years;
e. Hold no more than 20% of the constituents of the benchmark.

Figure 2 shows the cumulative active return of the different portfolios, where a transaction cost (TC) of 40 bps bid/ask is used when computing net performance. All portfolios outperform the market-cap benchmark. Moreover, they track the benchmark closely, while holding fewer names. The Value and Low Beta portfolios have the best investment returns, with Value generating the best return, while Low Beta has the lowest risk.

By leveraging a fixed income factor risk model that includes systematic macro and style factor exposures, investors can construct portfolios and clearly manage portfolio risk in the corporate credit and bond markets. «

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1   Fama and French (1993), Carhart (1997), Fama and French (2015), Hou, Xue, and Zhang (2015), Stambaugh and Yuan (2016), and Daniel, Hirshleifer, and Sun(2019a).
2   Houweling, P and van Zundert, J (2016), Israel, R, Palhares, D and Richardson, S A (2018), Heckel, Amghar, Laplénie, Carvalho (2019).
3   To learn more about the Axioma Factor-based Fixed Income Risk Model visit axioma.com/products/ axioma-fixed-income-suite/.

Figure 2: USD IG Factor Strategies – Cumulative Active Return (%)

Source: Axioma Factor-based Fixed Income Risk Model, Axioma Portfolio Optimizer, Refinitiv.