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Systematic Fixed-Income Investing Comes of Age

How a New Kind of Active Strategy Helps Meet Today's Investment Challenges

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Bond investors have been challenged by heightened volatility and big drawdowns in the aftermath of the pandemic. In response, investors are increasingly seeking systematic strategies, which can generate active returns while mitigating risk and charging competitive fees. In this paper, we explore the principles, processes and benefits of a systematic fixed-income strategy, an investment approach whose time has come.



New Challenges Call For Fresh Solutions

Leading active fixed-income managers have long sought to make their investment performance outcomes more consistent and repeatable through process improvements. These enhancements have typically systematized aspects of the investment process without substantially altering the main sources of outperformance or reducing the levels of beta risk.

Now, fully systematic strategies are available that are driven exclusively by quantitative (“quant”) research insights into the alpha-generating potential of factors (also known as “alphas”) in fixed-income markets. Here, research is concentrated at the factor level.

Systematic strategies aim to deliver active excess returns that are uncorrelated with traditional active manager products. Systematic strategies are evidence based and objective and use model-driven investment decisions that remove human biases. Because they target different sources of outperformance and manage tracking-error risk rigorously, systematic strategies can complement traditional active bond approaches. As with any active strategy, systematic portfolios can experience periods of negative performance. But, because of their diversified factor exposures, the probability of large drawdowns from single-factor events is significantly less for well-designed systematic strategies than for traditional active strategies.

Technological advances in data capture, liquidity discovery and trading analysis have made it possible to devise and implement systematic fixed-income strategies in a highly efficient and cost-effective manner. Further, these strategies can be employed across a wide range of fixed-income markets, including US, European and Canadian credit; long-duration US credit; US aggregate mandates; and emerging-market debt.

Also, by boosting returns while improving portfolio diversification, an active systematic approach may raise a fixed-income portfolio's information ratio, a measure of active return per unit of active risk.

This paper sets out the principles behind systematic fixed-income investing and illustrates how it compares with other approaches. Considering its potential advantages, we believe that systematic fixed-income investing is an idea whose time has come.

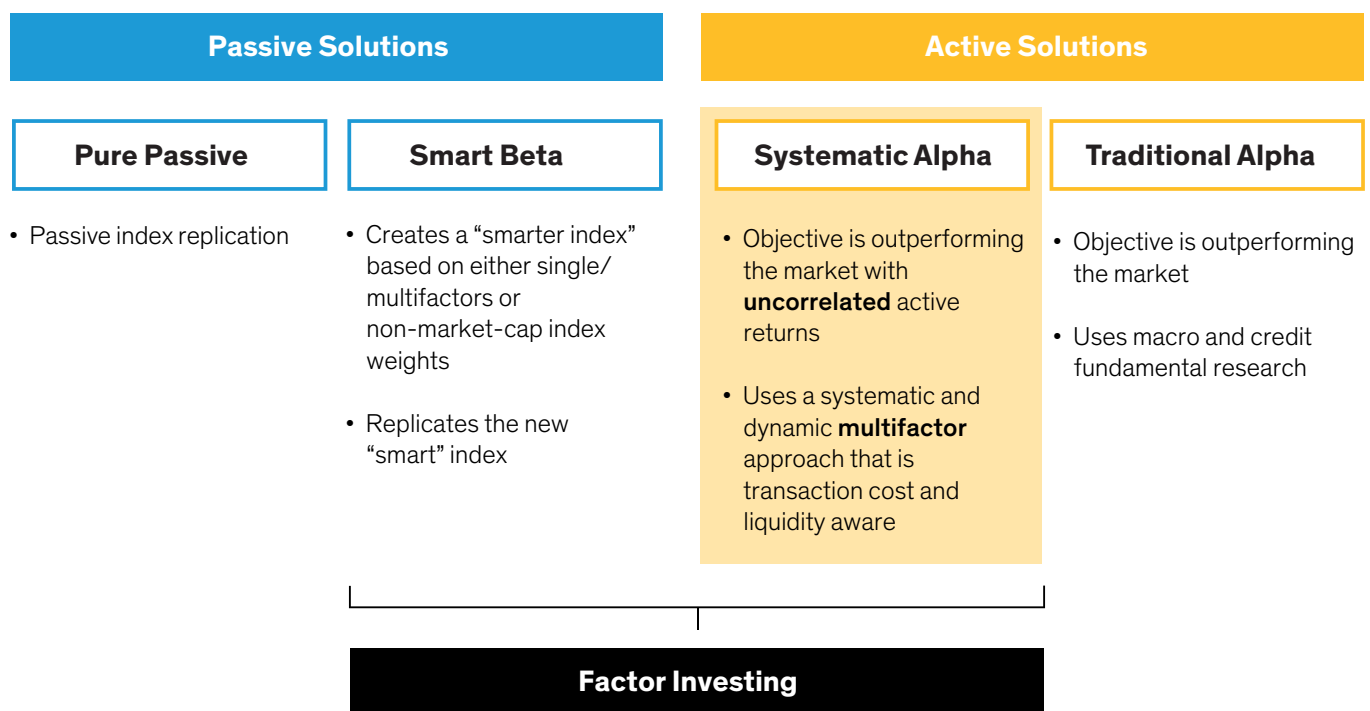
What Is Systematic Fixed-Income Investing?

Systematic fixed-income investing is an active approach that aims to outperform bond market benchmarks. Investment decisions are driven by a dynamic multifactor process, using predictive factors with demonstrable links to outperformance. These factors form the basis for a systematic approach to bottom-up security selection. This approach scores individual bonds on the basis of their degree of alignment with preferred predictive factors.

Systematic fixed-income investing uses a dynamic model-based quant process that harnesses advanced technology to analyze data,

identify investment opportunities, and evaluate liquidity and potential trading costs across large numbers of fixed-income securities. It is active and clearly differentiated from pure passive and smart beta solutions, as these rely on replicating either indices or static risk exposures. And it represents a different but complementary approach to traditional active bond management. Traditional active portfolios may harness some of the same factors and technology as systematic investing but use macro and fundamental research rather than a model-based process to select securities (*Display 1, below*).

DISPLAY 1: SYSTEMATIC FIXED INCOME DIFFERS FROM OTHER SOLUTIONS



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As of December 31, 2022

Source: AB

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How Do Predictive Factors Work?

Risk factors, such as duration or spread duration, identify the ways that market drivers can influence security prices. Predictive factors incorporate this information and analyze large volumes of historical market data to identify the characteristics of securities that have an above-average probability of outperforming a benchmark. These preferred characteristics can relate to market valuation-based factors such as value and momentum, or to fundamental, company-specific factors such as quality.

Although there are strong similarities between equity and fixed-income predictive factors, there are important differences in the metrics used to analyze them (*Display 2, below*). While equity value might be based on share price/book or share price/cash flow ratios, fixed-income value metrics are typically based on credit spreads—for instance, option-adjusted spread (OAS) compared with the

probability of default. Factors based on carry (the return from holding an asset) are also applied differently. While equity carry factors relate to dividend yield, fixed-income factors focus on a broader range of metrics: carry (based on coupon), OAS (related to movements in spreads) and roll (related to changes in yield over time).

There are many subsidiary factors behind the main factor categories shown in the Display. Managers with deep research databases may be able to access hundreds of proprietary factors. Even if not all of them are implemented in a given systematic strategy at all times, the manager can rotate them according to market conditions as investment regimes change and the efficacy of the factors changes with them.

DISPLAY 2: A COMPARISON OF FIXED-INCOME AND EQUITY FACTORS

Broad Factor Categories That Incorporate Multiple Sources of Alpha

Factor Categories	Factor Description	Equity Factor	Fixed-Income Factor
Value	Cheap securities outperform	Share price/book value, share price/cash flow	OAS* to probability of default
Momentum	Trailing outperformers keep doing so	Three- to 12-month equity return	Equity momentum (12-month equity return), credit momentum (three-month industry-level spread return), sell-side analyst sentiment (three-month median change of earnings forecast by sell-side analysts)
Size	Small companies outperform	Market cap	Revenue
Quality	Higher-quality companies outperform	Return on equity	Profitability, working capital accruals
Carry	High yielders outperform	Dividend yield	OAS carry and roll
Volatility	Lower-volatility companies outperform	Realized volatility	Probability of default, excess return volatility

For informational purposes only.

*OAS: option-adjusted spread

As of December 31, 2022

Source: AB

There are several other important differences between equity and fixed-income predictive factors. For instance, in terms of size, while equity analysts like small companies because of their growth potential, fixed-income analysts prefer larger companies because of their greater diversification and ability to reduce debt levels by selling noncore assets.

In terms of quality, both equity and fixed-income analyses center on profitability and leverage, but bond investors also focus on the intensity of future capex needs, as this may detract from a company's ability to pay back its debt. And for volatility, while equity factors are based on share-price performance, fixed-income factors use alternative metrics such as duration times spread (a measure that can be used to compare credit risk across a wide range of bonds).

Predictive factor-based approaches originated in equity markets, where benchmarks are relatively straightforward to construct, and pricing is largely transparent. Factor-based approaches arrived more recently in fixed-income markets, which are larger, more complex and fragmented across disparate trading pools. All these features make liquidity and pricing harder to discover in bond markets.

For these reasons, advanced technology and analytics are vital to making systematic approaches work in fixed-income markets. And although academic research supports the case for predictive factors in fixed income, it takes rigorous testing and practical implementation skills to create successful portfolios.



Creating a Systematic Portfolio: Combining Predictive Factors for Future Success

Portfolio Construction

With a systematic approach, each bond in the benchmark is scored on a range of predictive factors. This results in an array of scores for each security. For instance, a bond might have a high score on value but a low score on momentum.

A factor combination model then combines the different factor scores to produce a single composite score for each security in the benchmark. Because the model governs the way the alpha sources are deployed, it is crucial to the success of the strategy. Consequently, investors need to be sure the model is robust.

There are two key criteria to consider:

- 1) **Some factors matter more than others.** An effective model needs to recognize and allow for relative importance. For instance, the choice of regression technique is very important. We favor a simple but robust regression approach for stronger predictive power and greater transparency.
- 2) **Circumstances change.** Because investment regimes change over time, a robust model needs to be dynamic rather than static. This allows the predictive factor combinations to evolve with market changes and avoid being stuck with factors that performed well in a bygone era. A systematic portfolio should be constantly evolving, dynamically adjusting the factor weights as their efficacy changes, adding new factors once their efficacy has been demonstrated and removing old factors once their efficacy has faded.

Portfolio Optimization for Risk and Cost Control

The final output from the factor combination model is a complete list of bonds in the benchmark, ranked according to their factor scores. This ordinal ranking could be implemented as a long/short portfolio—that is, the portfolio could buy the bonds with the highest scores and sell those with the lowest scores. But to create a live portfolio, there are some further important risk and cost issues to consider. These are addressed by a portfolio optimization process, which creates an actual risk-efficient portfolio with specific weights for each bond.

* CUSIP stands for Committee on Uniform Securities Identification Procedures. A CUSIP number identifies most financial instruments, including: stocks of all registered US and Canadian companies, commercial paper, and US government and municipal bonds.

The portfolio optimizer is constrained by:

- 1) **Risk controls.** These include limits on duration, credit spread and turnover as well as limits on divergence from the benchmark at the bond, issuer and industry levels. At AB we also consider ESG constraints, aiming to deliver a higher-than-benchmark MSCI ESG score for our portfolio. Typically, overall portfolio characteristics are kept close to the benchmark, although the optimization may result in overweights or underweights in specific sectors. These arise because of the bottom-up scoring process, which may favor securities in some sectors and disfavor others. Systematic fixed-income strategies should be rigorously risk-balanced across a range of factors to avoid significant deviations from the benchmark. This is important in terms of reducing the impact of big drawdowns from large single-factor exposures, such as to credit risk in the event of a significant equity market fall.
- 2) **Available liquidity and transaction cost controls.** Advanced systems identify available liquidity in the market and calculate whether suggested trades pass cost-effectiveness tests. At AB, we use two dedicated tools: ALFA, which sources liquidity and helps minimize transaction costs, and abSimulator, a sophisticated, proprietary CUSIP by CUSIP* and transaction cost-aware trading simulation platform (this tool may also impose an overriding limit on monthly turnover to control transaction costs).

The systematic portfolios that result from this process are therefore highly diversified and risk and cost controlled.



Factors that appear to have similar performance potential in a frictionless (cost-free) environment can look quite different once a trade simulator models the impact of transaction costs. For instance, “fast-moving” factors such as momentum can be more expensive to implement because trends can change quickly. By contrast, “slow-moving” factors like carry do not change frequently and so typically incur lower transaction costs. Thus the simulation phase is vital for assessing which factor ideas can be implemented profitably.

Potential to Improve Portfolio Sharpe Ratios

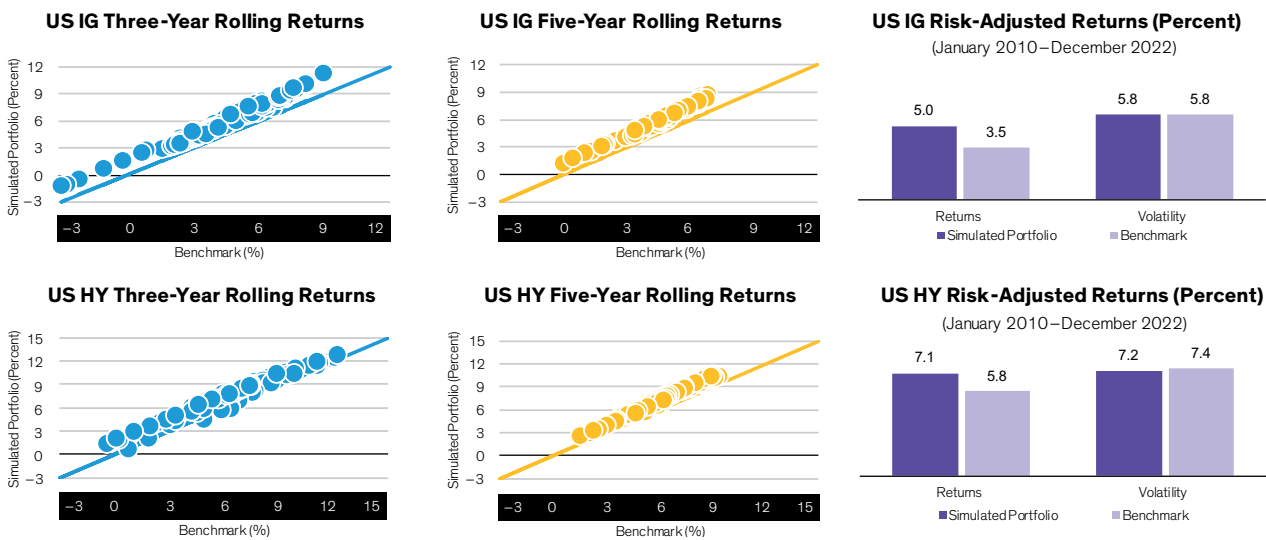
Systematic fixed-income strategies now have the research, technology and implementation experience behind them to generate strong risk-adjusted returns. But how would we expect them to perform in practice?

Display 3, below, shows the performance of two simulated systematic fixed-income strategies from December 31, 2009, through December 31, 2022.

The left-hand panels show three- and five-year rolling returns that indicate a high degree of performance consistency. The right-hand panels show five-year returns materially exceeding the benchmark, while still exhibiting benchmark-like volatility levels.

Considered together, they indicate strong potential for systematic fixed-income strategies to generate consistent alpha and to enhance Sharpe ratios.

DISPLAY 3: SYSTEMATIC STRATEGIES AIM TO PROVIDE BETTER RISK-ADJUSTED EXCESS RETURNS



Past performance does not guarantee future results. Historical information provided for illustrative purposes only.

Based on simulated monthly returns from December 31, 2009, to December 31, 2022. Performance for simulated systematic US investment-grade portfolio is shown net of a maximum 0.15% annual managed account fee; benchmark is Bloomberg US Corporate Fixed Income Index. Performance for simulated systematic US high-yield portfolio is shown net of a maximum 0.20% annual managed-account fee; benchmark is Bloomberg US Corporate High Yield Index. Simulated returns are based on the performance of long-short portfolios. The weights of securities in the portfolios are determined by portfolio optimization that maximizes the overall expected return of the portfolios subject to different risk constraints (e.g., security limit, issuer limit, industry limit, risk limit etc.). In general, this means the higher the factor scores, the higher the weight for a security subject to the risk limit. And the lower the factor scores, the lower the weight for a security, with the weight floored at zero. The portfolios are rebalanced on a monthly basis subject to a turnover constraint; a hypothetical transaction cost is also incorporated. Simulated or hypothetical performance results have certain inherent limitations. Simulated or hypothetical trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or is likely to achieve returns or a volatility profile similar to those being shown.

As of December 31, 2022

Source: Bloomberg and AB

Using Systematic Strategies in Your Portfolio

Why Are Systematic Fixed-Income Strategies Uncorrelated with Traditional Active Strategies?

Systematic active approaches aim to add value in a different way than traditional active approaches. Their strengths lie in identifying predictive factors and constructing portfolios using recognized benchmarks and rigorous, well-tested rules.

Traditional active managers rely on more idiosyncratic ideas that cover a wider range of factors and markets. These ideas may include potential corporate changes, merger and acquisition activity, private markets, and unique or esoteric situations. For instance, they could feature country assessments of political changes in the UK, US elections or changes to European Central Bank programs.

Display 4, below, compares the two approaches.

DISPLAY 4: HOW DO SYSTEMATIC STRATEGIES DIFFER FROM TRADITIONAL ACTIVE ONES?

Systematic Fixed-Income Strategies	Category	Traditional Active Managed Strategies
Driven by quantitative research	Investment Process	Driven by either 1) fundamental research or 2) integration of quantitative and fundamental research
Mostly security selection	Source of Alpha	Sector, industry, country, yield curve, currency, security selection
Process driven. Portfolio weights determined by portfolio optimization	Portfolio Construction	Portfolio weights based on conviction level around issuers, sectors, etc.
Determine, test and augment factors; review data integrity and model suggested outcomes for credibility; minimum bias	Roles of PMs and Analysts	Macro call, fundamental research, sector/issuer/bond allocation; dependent on PM discretion (subjective; allows for emotional bias)
Reporting around factor contribution, overview of factors and their performance, factor insights	Client Service/Reporting	Fundamental insights into issuers
When performance of risk assets is more muted/when dispersion of expected returns is high (more alpha in the markets)	Periods of Outperformance	When beta rallies/when dispersion of expected returns is low

For informational purposes only.

As of December 31, 2022

Source: AB

Systematic strategies typically have a more disciplined approach to identify and neutralize factor biases. During the portfolio construction process, they also deploy rigorous tracking error controls versus the benchmark and will neutralize unintended risk exposures resulting from bottom-up security ranking and selection, especially the beta bias. By contrast, traditional active strategies may be managed to include significant mismatches, notably large credit or duration exposures relative to the benchmark.

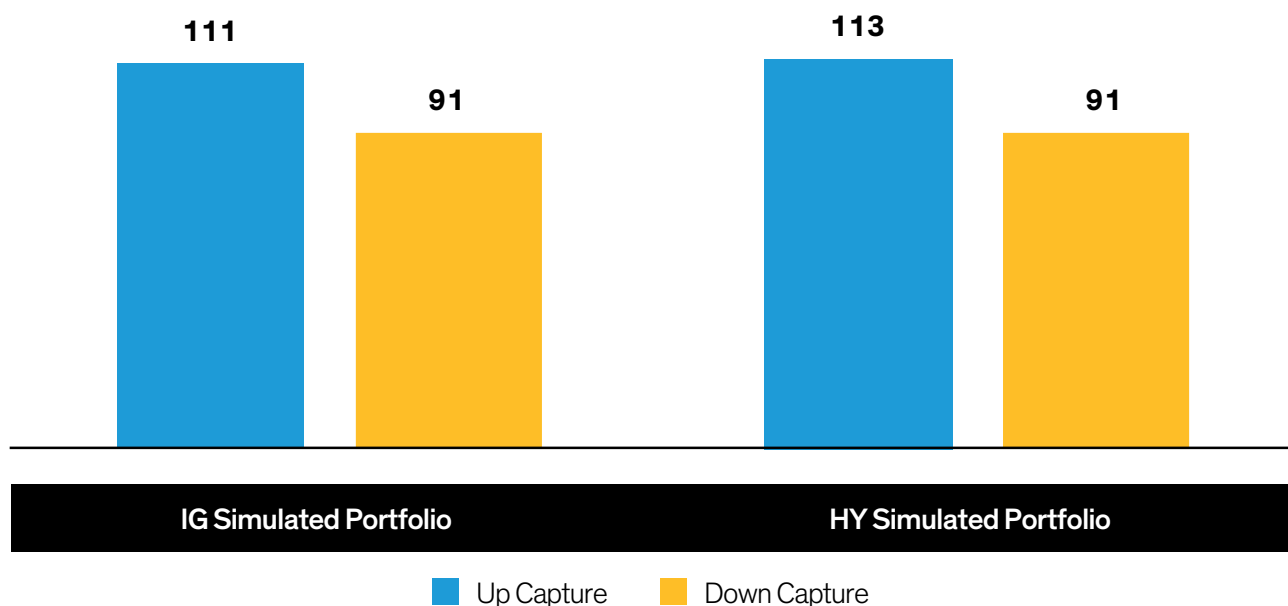
As a result of these differences in approach, systematic and traditional portfolios are likely to exhibit significant differences at the sector- and industry-weight levels. Hence, combining the two strategies can improve diversification across a bond portfolio. In performance terms, although well-constructed systematic strategies should deliver strong performance in different market environments, they typically shine the most when returns from risk assets are more muted and when the dispersion of expected returns is high, providing more alpha-generating potential for systematic

strategies' bottom-up security-picking approach. By contrast, traditional active strategies tend to have the best returns when beta rallies and the dispersion of expected returns is low.

We compared the upside and downside capture of a simulated US investment-grade strategy and a simulated US high-yield strategy versus their respective benchmarks (*Display 5*). We also compared the performance of a simulated systematic fixed-income multifactor portfolio with the performance of several well-known and established individual factors (*Display 6*). The up/down capture of both the investment-grade and high-yield strategies imply materially better outcomes than the benchmarks, and the cumulative growth of the multifactor systematic strategy was far superior to the cumulative growth of each individual factor. This suggests systematic strategies that combine multiple current factors and manage them dynamically have strong potential to add value to portfolios and enhance their Sharpe ratios.

DISPLAY 5: SYSTEMATIC STRATEGIES OFFER STRONG UP/DOWN CAPTURE

Up/Down Capture vs. Benchmark (Percent)



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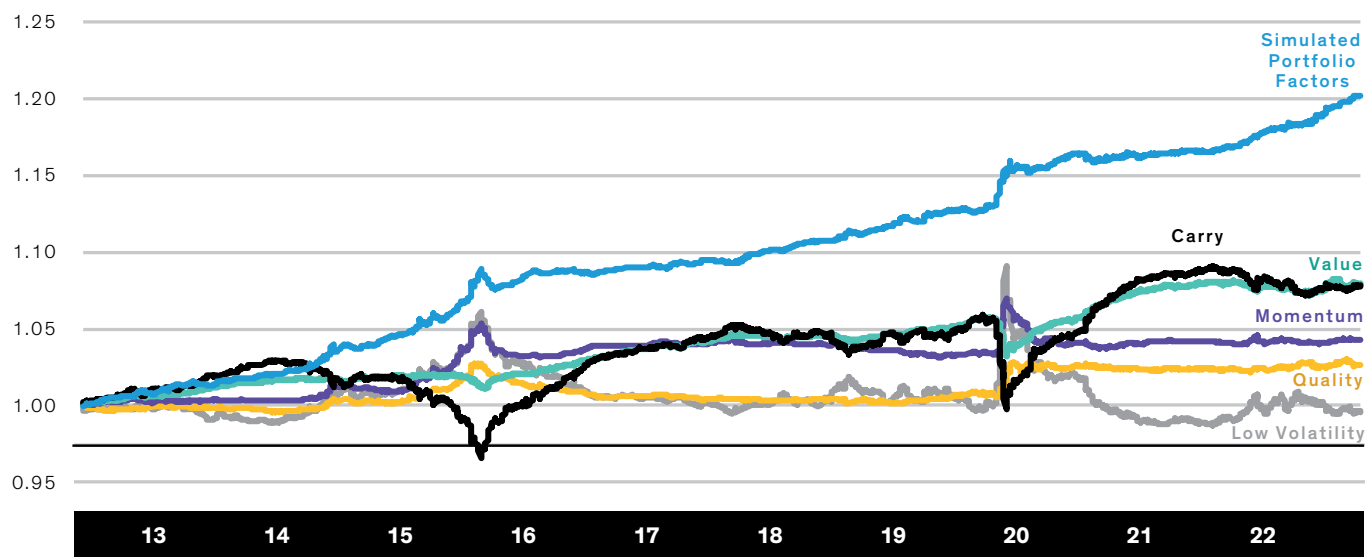
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As of December 31, 2022

Source: Bloomberg and AB

DISPLAY 6: SYSTEMATIC STRATEGIES CAN OUTPERFORM TRADITIONAL FACTORS

Cumulative Growth of Factors



Past performance does not guarantee future results. Historical information provided for illustrative purposes only.

Based on simulated monthly returns from December 31, 2009, to December 31, 2022. Simulated returns are based on the performance of long-short portfolios. Weights of securities in the portfolios are determined by their factor scores. Positive scores mean long positions and the higher the score, the bigger the long positions. Negative scores mean short positions and the lower the score, the bigger the short positions. The performance of the portfolios is calculated based on the sum product of weights and their risk-adjusted returns. The performance reflects factor returns with a constant volatility in a frictionless world—there are no turnover limits and no transaction costs incorporated in these returns. Simulated or hypothetical performance results have certain inherent limitations. Simulated or hypothetical trading programs in general are also subject to the fact that they are designed with the benefit of hindsight. No representation is being made that any account will or is likely to achieve returns or a volatility profile similar to those being shown.

As of December 31, 2022

Source: Bloomberg and AB

Three Pillars of Success in Systematic Fixed Income

Creating effective systematic fixed-income strategies requires an array of resources and skills.

In this relatively new fixed-income investing approach, the performance of some providers' systematic products has so far proved disappointing. In particular, their live returns haven't performed as well as their back-tests. In our view, relying on static factors, using unreliable data, and the inability to source liquidity and to execute ideas efficiently have been the most frequent failings. This illustrates the crucial importance of three "pillars" for effective systematic strategies.

Dynamic Factor Approach

Market conditions are always changing, and the efficacy of factors varies from market to market and over time. For instance, carry may be a strong factor in investment-grade bond markets but not in high yield (where default risk is a more important performance driver). Consequently, it is crucial to evaluate factors continuously and to manage them dynamically.

First, market data should be monitored for potential new factors and signs of improvement or deterioration in the efficacy of existing factors. Second, the existing mix of factors in a portfolio needs to be regularly reappraised. This process makes it possible to modify the factor weights dynamically, and/or swap certain factors out as their efficacy changes and replace them with more timely ones. abAlphaLabs is our dedicated research engine built to extract information from data. We use it to test factors and identify those that will drive future returns, to create back-tests and to construct portfolios. Our portfolio managers determine and augment factors, review data integrity and scrutinize model-suggested outcomes for credibility.

By constantly seeking to test and expand the range of available factor choices, systematic investors can increase their opportunity set and improve their chances of achieving strong risk-adjusted returns. Simply relying on traditional, well-publicized factors limits the opportunity set and the probability of success.

Abundance of Data

Reliable data are the indispensable building blocks of effective systematic strategies.

Systematic investors need vast quantities of data that are clean, extensive and have a very long history. That's hard to come by, for several reasons. Systematic strategies require data across a wide range of metrics, including option-adjusted spread, option-adjusted duration and maturity. They also need point-in-time analytical data for companies' financials across multiple fields, such as analysts' earnings revisions. Data have to extend globally, across markets and far back in time. Data also have to be carefully adjusted—cleaned—to remove anomalies and inconsistencies.

It is not easy to recreate historical data such as index constituents going back to 1999. It's expensive to acquire such data from vendors, and costly and time consuming to clean it in order to iron out inconsistencies in vendors' standards and identification systems.

Consequently, there are powerful advantages for systematic investors that have already built high-quality databases.

Simply relying on traditional, well-publicized factors limits the opportunity set and the probability of success.

Factor Innovation in Systematic Fixed Income— Some Examples

Market intelligence: Published academic research provides strong underpinnings to well-known factor strategies. But widening the search to look at discussions in industry forums, sell-side research and internal ideas can provide new leads. These may help to identify and evaluate additional factors, and to create new insights to enhance current factors.

Cross-asset class: Equity and credit markets share some similar characteristics and can have common factors. For instance, we find that free cash flow to enterprise value can be effective across both asset classes.

Mean reversion: No asset class or part of the market outperforms forever. Researching performance trends can identify factor strategies that profit from mean reversion.

Relative momentum: Similarly, researching relative performance across different parts of the credit curve can produce factor strategies that determine which part of the curve will likely perform best.

Artificial intelligence and machine learning: New technologies can create fresh insights. For instance, natural language processing (NLP) technology searches published documents, looking for specified words and phrasing. When applied to a 10-K earnings statement, NLP data can reveal whether analysts are more or less bullish by the type of words and questions they use. This type of insight helps generate new predictive factors.

Advanced quantitative techniques: By applying numerical techniques that originated in the worlds of advanced physics and mathematics, it's possible to improve the information signal from existing factors—for instance, by making sense of outlying data points to better understand performance patterns.



Liquidity Considerations

Liquidity is the number one issue influencing a fixed-income manager's ability to outperform. Firms that can't effectively assess a bond's liquidity won't be able to implement their investment ideas. And if a trade can't be implemented, there's no way it can make money.

Liquidity pools, or markets that provide liquidity for credit securities, have long been highly fragmented across multiple third-party sources. The information provided by these sources is valuable, but it's inefficient to continually monitor each one and then compare and contrast the data.

To keep up in a marketplace that will digest and react to every new bit of information faster and faster, successful fixed-income managers need to use technology that pulls all external fixed-income trading platforms together in one place. Firms that adopt this technology can become price makers instead of price takers, resulting in better executions, lower transaction costs and faster investment of new cash inflows.

All these issues are critically important for systematic fixed-income strategies. Finding adequate liquidity to execute desired trades is a precondition for dynamically managing a portfolio's factor weights. And finding enough liquidity at attractive prices is paramount, because systematic strategies only execute trades if they pass tests for transaction-cost effectiveness.

How Should Investors Consider an Allocation to Systematic Fixed Income?

Investors' choices depend on their starting point. That includes their existing preferences regarding active and passive strategies, their familiarity with quant strategies, and their fee budget. These considerations will drive how they consider a potential allocation to systematic fixed income—for instance, as an alternative to an existing active or passive allocation, or a complement to an active allocation, or a combination of both solutions.

The amount they should allocate also depends on the end in view. Accordingly, investors need to be clear about their objectives. They can then optimize for their preferred allocation based on the expected return and risk characteristics of their existing portfolio and new systematic portfolio. For instance, an investor might optimize a combination of systematic and traditional active portfolios to achieve the highest risk-adjusted portfolio return or the best Sharpe ratio, given a specific level of risk tolerance.

Investors should also consider their desired level of factor exposures. Some investors will want their fixed-income portfolio to incorporate certain beta characteristics. For example, an investor might currently use two traditional active managers, with one portfolio having a high exposure to corporate credit risk and the other portfolio having high sensitivity to interest-rate risk. In this case, the optimization objective could be for a new systematic portfolio to create a specified balance between these two factors.

Liquidity is the number one issue influencing a fixed-income manager's ability to outperform.

Face the Future with More and Better Options



Recent market conditions have created tough challenges. As a result, investors need new approaches that can give them additional and improved options.

Systematic fixed-income strategies help address this need. They:

- generate active, diversified and uncorrelated fixed-income excess returns using predictive factors
- provide the benefits of active management in a more cost-efficient way
- can enhance portfolio risk and return characteristics and thus mitigate downside risk

We believe that these strategies can play a unique role in meeting the challenges that fixed-income investors face today in terms of reducing risks and achieving positive active returns net of fees.

It takes several attributes to implement systematic fixed-income strategies successfully. These include wide-ranging fixed-income experience and capabilities, substantial data banks, strong quantitative research and advanced technology. So it is important for investors not only to understand the strategies, but also the skills needed to manage them successfully. We urge investors to take the time to become familiar with these strategies and widen their options to generate strong risk-adjusted returns in demanding market conditions.

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The value of an investment can go down as well as up, and investors may not get back the full amount they invested. Capital is at risk. Past performance does not guarantee future results.

Some of the principal risks of investing include:

Market Risk: The market values of the investments may rise and fall from day to day, so investments may lose value. **Currency Risk:** Currency fluctuations may have a large impact on returns, and the value of an investment may be negatively affected when translated into the currency in which the initial investment was made. **Derivatives Risk:** The Portfolio may include financial derivative instruments. These may be used to obtain, increase or reduce exposure to underlying assets and may create gearing/leverage; their use may result in greater fluctuations of the assets under management. **OTC Derivatives Counterparty Risk:** Transactions in over-the-counter (OTC) derivatives markets may have generally less governmental regulation and supervision than transactions entered into on organized exchanges. These will be subject to the risk that their direct counterparty will not perform its obligations and that the Portfolio will sustain losses. **Allocation Risk:** Allocating to different types of assets may have a large impact on returns if one of these asset classes significantly underperforms the others. **Overseas Assets Risk:** Investing in overseas assets may be more volatile because of political, regulatory, market and economic uncertainties associated with them. These risks are magnified in assets of emerging or developing markets. **Systemic Risk:** Systemic risk is the risk of broad financial-system stress or collapse triggered by the default of one or more financial institutions, resulting in a series of defaults by other interdependent financial institutions. **Turnover Risk:** A portfolio will be actively managed, and turnover may, in response to market conditions, exceed 100%. A higher rate of portfolio turnover increases brokerage and other expenses. High portfolio turnover may also result in the realization of substantial net short-term capital gains, which may be taxable when distributed. **Illiquid Securities:** Selling illiquid or restricted securities usually requires more time, and costs are often higher. **Leverage Risk:** The Portfolio may use derivatives or other financial instruments to gain exposure to investments exceeding its overall value. This may cause greater changes in the Portfolio's price, as it is more sensitive to market or interest-rate movements, and increase the risk of loss. **Interest-Rate Risk:** Bonds may lose value if interest rates rise or fall. Long-duration bonds tend to rise and fall more than short-duration bonds. **Credit Risk:** A bond's credit rating reflects the issuer's ability to make timely payments of interest or capital—the lower the rating, the higher the risk of default. If the issuer's financial strength deteriorates, the issuer's rating may be lowered and the bond's value may decline. Medium-, lower- and unrated securities may be subject to wider fluctuations in yield and market values than higher-rated securities. **Corporate Debt Risk:** There is risk that a particular issuer may not fulfill its payment and other obligations. In addition, an issuer may experience adverse changes to its financial position or a decrease in its credit rating, resulting in increased debt-obligation price volatility and negative liquidity. There may also be a higher risk of default. **Sovereign Debt Risk:** There is risk that government-issued debt obligations will be exposed to direct or indirect consequences of political, social and economic changes in various countries. Political changes or the economic status of a country may affect the willingness or ability of a government to honor its payment obligations. **Mortgage-Backed Securities/Other Asset-Backed Securities Risk:** Investments in mortgage-backed and other asset-backed securities may be particularly sensitive to changes in interest rates. They may also be subject to higher rates of default in the mortgages or assets backing the securities, or risks associated with the nature and servicing of those securities. **Below-Investment-Grade Securities Risk:** Investments in fixed-income securities with lower ratings (commonly known as "junk bonds") tend to have a higher probability that an issuer will default or fail to meet its payment obligations.

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