Growing adoption of systematic fixed income strategies

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When numbers matter

Contents

1. Introduction

Systematic investing – deploying rules-based, quantitative strategies – has become commonplace in equity and futures markets. It is now rapidly gaining ground in fixed income markets.

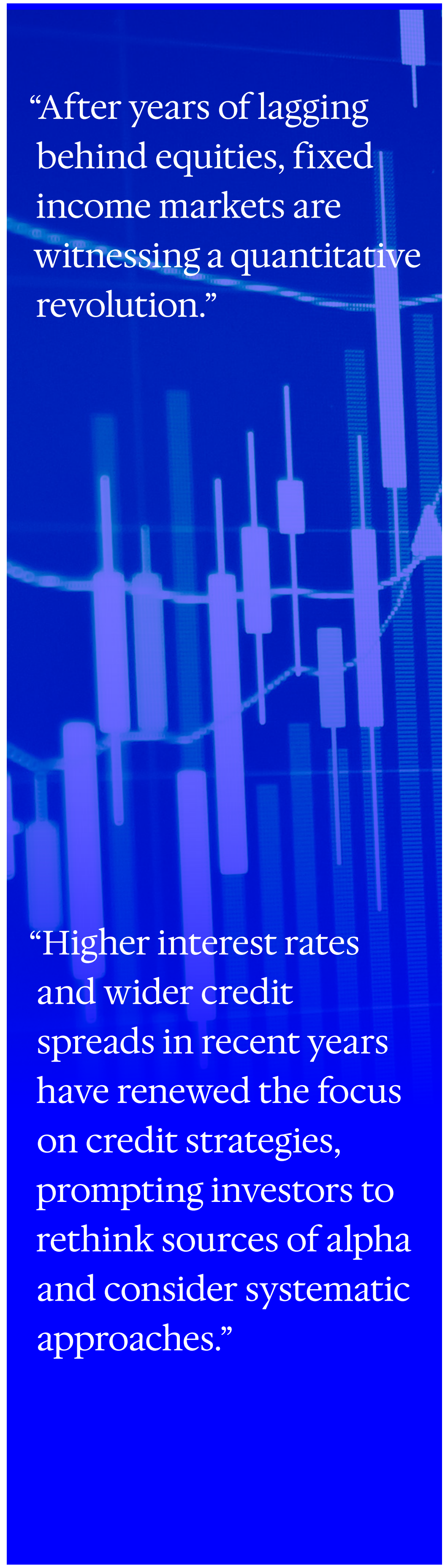
Advances in technology and market structure are enabling investors to systematically trade bonds and credit instruments at scale, bringing quantitative methods into what was once an exclusively discretionary domain[1]. Global hedge funds, asset managers, pension funds, and insurers are showing growing interest in systematic fixed income strategies as a means to capture inefficiencies and diversify returns in bond markets.

This white paper explores the structural and technological changes driving the growth of systematic fixed income (including systematic credit), the key drivers and challenges of adoption, and practical considerations for implementing these strategies at scale.

2. The rise of systematic strategies in fixed income markets

Systematic fixed income strategies – often referred to as quantimental strategies – blend quantitative, systematic methods with fundamental, discretionary insights. In practice, this means investment decisions are driven by rigorous rules-based models and data analysis, while still allowing for some human judgment or fundamental input. A fully systematic fixed income strategy is mathematical and model-driven, executed via computer programs rather than human intuition[2].

After years of lagging behind equities, fixed income markets are witnessing a quantitative revolution. Investors have increasingly recognized that bond markets harbor inefficiencies that quantitative models can exploit[3]. Historically, corporate bond trading was dominated by discretionary, high-touch approaches, but this is changing fast. Higher interest rates and wider credit spreads in recent years have renewed the focus on credit



"After years of lagging behind equities, fixed income markets are witnessing a quantitative revolution."

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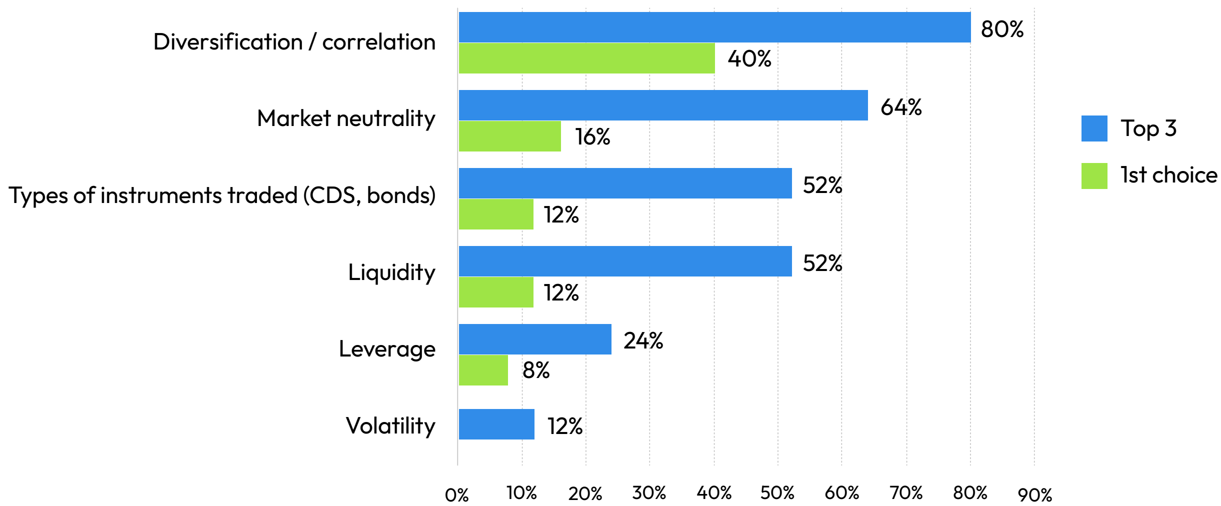
[1] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025

[2] InsuranceAUM.com. Insight Investment. Time for insurance investors to embrace systematic fixed income

[3] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025

strategies, prompting investors to rethink sources of alpha and consider systematic approaches (see figure 1). Quantitative fixed income funds – once a niche – are becoming a credible and scalable part of the investment landscape[4].

Figure 1: Most important factors when making an allocation to systematic credit.



Source: BNP Paribas Prime Services Capital Introduction Flash Survey, September 2021

Surveys of institutional asset allocation decision-makers confirm that there has been a notable rise in interest since 2020. A BNP Paribas Prime Services survey in late 2021 found that over half of respondents were either already investing in or considering investing in systematic credit strategies, reflecting a significant uptick in appetite[5]. This trend has only strengthened since then, with consultants and funds-of-funds leading early allocations and more pension funds and insurers now following suit into systematic fixed income.

One clear signal of adoption is the growth in assets and trading activity driven by quantitative fixed income funds. Market data show that electronic trading of bonds – a key enabler for quantitative strategies – has surged. By 2024, roughly 49% of US investment-grade corporate bond trading was electronic, up from virtually zero two decades ago. Furthermore, an estimated 60% of credit market participants were using some form of automated or electronic execution (up from 40% compared to 2023)[6,7]. The volume of bond trades executed by systematic fixed income funds is climbing accordingly. These statistics underscore a structural shift. Systematic strategies are rapidly becoming part of the fixed income mainstream.

> "By 2024, roughly 49% of US investment-grade corporate bond trading was electronic, up from virtually zero two decades ago."

[4] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025
[5] BNP Paribas, Systematic Credit on the Rise (Prime Services Capital Introduction Flash Survey), 12 October, 2021
[6] The Desk. Analysis: Electronic trading across US and European bond markets, Dan Barnes, 21 June 2024
[7] The Desk. Fixed Income Automation Surge: 60% of Credit Traders Now Use Robots, Etienne Mercuriali, 16 January 2025

3. Key drivers of adoption

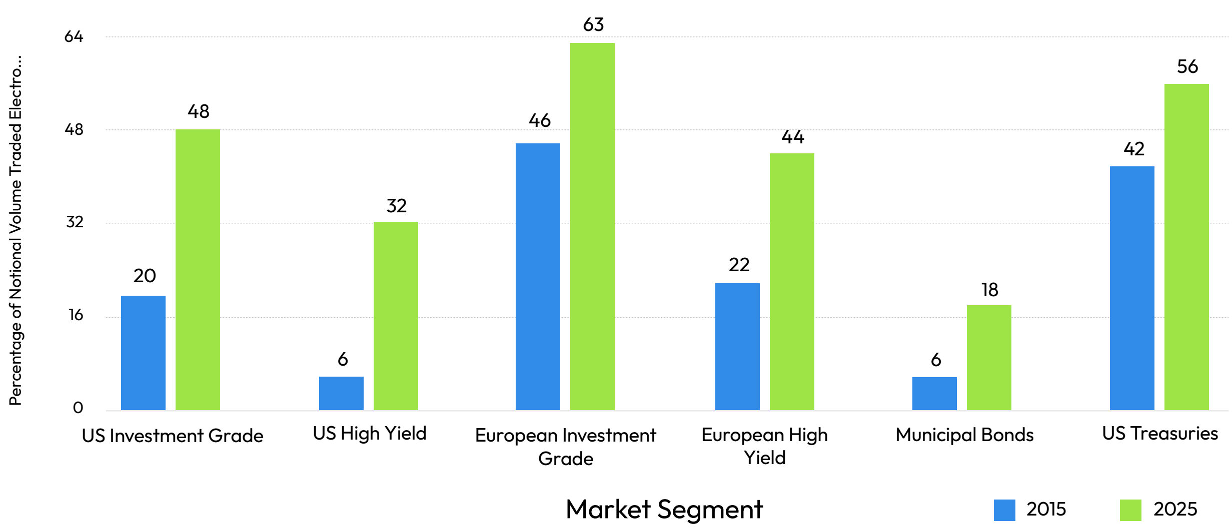
Several structural and technological forces have converged to accelerate the adoption of systematic fixed income strategies. Unlike a decade ago, today's bond markets are far more amenable to data-driven, automated trading. The following key drivers are lowering barriers and enabling quant strategies to flourish in fixed income markets.

Electronic trading infrastructure and market evolution

One of the most critical enablers has been the electronification of fixed income markets. Historically, bond trading was conducted via phone and bilateral negotiation in decentralized over-the-counter (OTC) markets, with fragmented liquidity and opaquely quoted prices[8]. This made it extremely difficult for a systematic strategy to operate – data was sparse or "patchy" and execution could not be automated in the way it is for exchange-traded equities. Over the past 25 or more years, however, fixed income market structure has undergone a transformation.

Milestones such as the launch of the Trade Reporting and Compliance Engine (TRACE) in 2002 dramatically improved post-trade transparency by mandating reporting of corporate bond trades. In parallel, the first bond exchange-traded funds (ETFs) were introduced in 2002, and credit default swaps (CDS) were standardized and centrally cleared by 2009, all of which started to "equify" parts of the market and lay the groundwork for electronic trading[9].

Figure 2: Growth of electronic trading across various fixed income market segments



Source: SIFMA Insights, ICE Fixed Income Monthly Report

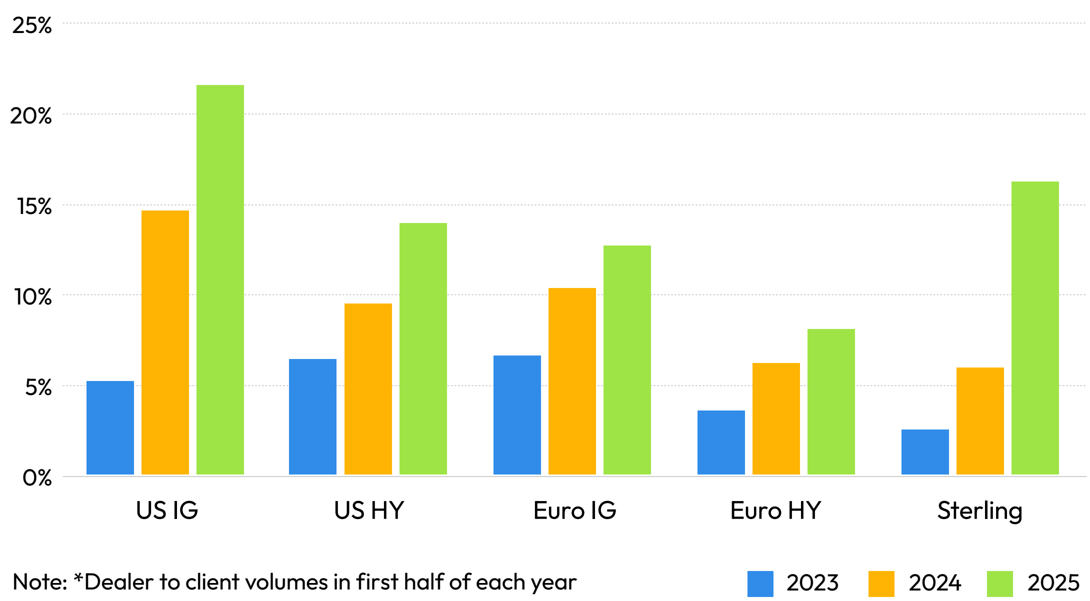
Since 2010, electronic trading platforms have gained traction, offering order book and request-for-quote (RFQ) systems that moved more bond trading to screen-based, digital workflows. By 2016, electronic

[8] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025
[9] BNP Paribas, Systematic Credit on the Rise, Prime Services Capital Introduction Flash Survey – October 2021

trading accounted for about 20% of US investment-grade (IG) corporate bond volume[10], and this share has climbed rapidly since. According to industry estimates, roughly 30% of the US credit market was trading electronically by 2021 (up from 20% just a year prior)[11]. More recent data shows nearly half of investment grade corporate bond trading is now electronic, and even traditionally less liquid segments (such as high-yield and emerging market bonds) are moving in the same direction[12].

Crucially, new trading protocols have emerged to improve liquidity and execution efficiency for systematic trades. All-to-all trading networks allow non-dealers to directly trade bonds, reducing reliance on broker-dealers and expanding the pool of potential liquidity for any given bond. "Portfolio trading" – transacting a basket of bonds in one package – has grown rapidly. US corporate bonds portfolio trading volumes jumped 54% in the first half of 2025 to a record US$823bn[13].

Figure 3: Portfolio trading share of corporate bond volumes*



Source: Barclays

Importantly, these infrastructure changes directly benefit systematic strategies. A quantitative model's signals are only profitable if they can be executed promptly and at low cost. The expansion of electronic trading increases the probability that a bond signal can actually be traded at a reasonable price[14]. While fixed income is still not as instantaneously tradable as equities (many bonds still do not trade daily, and RFQ negotiation can introduce latency), the liquidity frictions that once stymied systematic trading are diminishing. In short, the rise of electronic, algorithm-friendly trading infrastructure has been foundational in unlocking systematic fixed income strategies.

[10] Bank for International Settlements (BIS). Electronic trading in fixed income markets, January 2016
[11] SIFMA Electronic Bond Trading Report. US Corporate & Municipal Securities, February 2016
[12] Coalition Greenwich. The Desk. Analysis: Electronic trading across US and European bond markets, Dan Barnes, 21 June 2024
[13] IFR (International Financing Review). Portfolio trading continues dizzying growth, Christopher Whitall, 1 August 2025
[14] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025

Data availability and cloud computing

A second key driver is the vast improvement in data availability and computational resources, which has lowered the hurdles to quantitative analysis in fixed income markets. In the past, reliable bond price data was hard to obtain. Prices were often indicative, scattered across dealers, and not consolidated. Today, thanks to regulatory transparency initiatives (like TRACE in the US and similar trade reporting in Europe) and the proliferation of market data vendors, investors have access to far richer historical and real-time data on fixed income markets[15].

Everything from corporate bond transaction prices and quotes to CDS spreads, to issuer fundamentals and macroeconomic indicators, can be pulled into large datasets for analysis. Furthermore, the development of consolidated pricing feeds (including consolidated tape systems for bonds) means that data is timelier and more standardized across market participants. This enhanced data access provides the raw material that systematic strategies need to identify patterns and test trading signals.

Equally important is the advent of cloud computing and modern analytics platforms to handle the scale of fixed income data. An institutional bond portfolio might contain thousands of securities – far more than a typical equity portfolio – and each bond has unique characteristics (maturities, coupons, covenants) that a model might incorporate. Analyzing and simulating strategies on such large universes in real-time was once computationally prohibitive.

Now, cloud infrastructure allows firms to perform real-time pricing and risk calculations on large bond portfolios with ease. High-performance computing grids and cloud-based analytics services can ingest massive data streams (for example, tick-by-tick bond prices or issuer news), run complex calculations (such as scenario analysis or optimization of asset allocation strategies) and scale up on demand. This means quantitative researchers can backtest strategies on decades of history across tens of thousands of bonds or calculate the risk on a credit portfolio in milliseconds – tasks that were impractical just years ago.

Another transformative aspect is the modern data science toolkit that has been embraced in finance, particularly the use of open-source programming languages and libraries.

"Now, cloud infrastructure allows firms to perform real-time pricing and risk calculations on large bond portfolios with ease."

"Python has emerged as a key programming language for quantitative finance, including fixed income applications."

[15] BNP Paribas, Systematic Credit on the Rise, Prime Services Capital Introduction Flash S

Python has emerged as a key programming language for quantitative finance, including fixed income applications. Its rich ecosystem of libraries (for statistics, machine learning, data handling, and more) and its ease of integration with databases and cloud services make it ideal for building custom analytics pipelines.

Many systematic fixed income teams now leverage Python-based workflows to combine data from different sources, apply advanced models, and even to automate trade execution logic. The flexibility of these tools speeds up the research cycle. Quants can prototype a new bond selection model or relative value signal rapidly, using cloud computing to crunch the numbers, and evaluate its efficacy.

In effect, enhanced data coupled with cloud computing power has levelled the playing field, allowing fixed income quant strategies to be developed and operated with the same rigor and speed that have for a long time been standard in equity markets. This has been instrumental in attracting more players to systematic fixed income, as the technological barriers continue to fall.

Advances in quantitative models and algorithmic innovation

The third major driver is the progress in quantitative techniques and algorithmic innovation tailored to fixed income markets. As data and trading access have improved, researchers have adapted and invented models to capture alpha in bonds and credit. Early systematic fixed income efforts were stymied by the complexity of credit instruments[16]. For instance, the need to model default risk (a sudden, discontinuous event) and the sheer number of bond issues for each issuer created modelling challenges. In recent years, however, quant managers have developed more sophisticated models that account for credit-specific nuances and have begun to demonstrate that systematic approaches can indeed identify mis-pricings in fixed income markets.

One area of innovation is credit risk modelling and factor analysis. Quantitative credit investors often combine traditional credit analysis with statistical methods. For example, practitioners will use models to estimate an issuer's probability of default and loss given default and then compare those fundamental estimates to market spreads. If a bond's spread is significantly wider than what the model indicates for its default risk, the bond might be flagged as "cheap" (potentially an attractive buy), whereas a bond with a much tighter spread than fundamentals suggest could be "rich" (a short candidate).

This approach introduces a "value" factor in credit, which can be used to identify securities that appear undervalued relative to their inherent credit risk versus those that appear overvalued. Academic and practitioner research has shown that such deviations tend to mean-revert (i.e., credit spreads often move toward fundamental fair values over time) creating an opportunity for systematic value strategies[17].

> "Meanwhile, machine learning and artificial intelligence techniques are being applied to fixed income investing in novel ways. Improved data together with machine learning algorithms have enabled models to detect complex patterns or early-warning signals in credit markets."

[16] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025

[17] AQR, Systematic Credit Investing, September 2018

Beyond value, other quantitative factors and signals have been successfully ported to fixed income markets. Momentum, carry, and defensive (quality) factors are examples of style factors originally identified in equities that also work in credit markets.

For instance, momentum in credit can be captured by measuring the recent performance of bonds or issuers. Systematic strategies might go long bonds of issuers that have outperformed in the last 6–12 months and short those that have underperformed, expecting trends to continue in the near term. Another example is carry strategies, which involve favoring bonds with higher yields or spreads, profiting from the higher income earned over time. In practice, a bond's option-adjusted spread (OAS) can serve as a measure of carry, with higher OAS bonds tending to deliver better forward returns if no default occurs.

These factors have low correlations to each other, and when combined have historically delivered attractive Sharpe ratios for credit investors (in research studies)[18]. The increasing validation of proven quant factors in fixed income gives investors' confidence that systematic approaches can unlock new sources of return beyond what traditional credit managers achieve.

Meanwhile, machine learning (ML) and artificial intelligence (AI) techniques are being applied to fixed income investing in novel ways. Improved data together with machine learning algorithms have enabled models to detect complex patterns or early-warning signals in credit markets.

For example, ML may be used to forecast credit spread changes by analyzing a multitude of features – macroeconomic indicators, issuer financial ratios, trading flows, and even textual sentiment from news or social media. Some systematic credit funds use ensemble learning or deep learning models to predict which bonds are likely to outperform or underperform, augmenting traditional factor models with non-linear insights. It is important to note, however, that ML in credit markets comes with its own challenges (discussed later): credit data can be inconsistent, and because defaults are relatively uncommon, it can be challenging for automated models to predict them reliably.

Nonetheless, AI is becoming an increasingly important tool in the systematic investor's arsenal. A recent global survey found that over half of investors now incorporate some form of AI in their investment process[19], and many expect these techniques to continue advancing, especially in data-rich areas of fixed income and macro strategies.

> "On the execution side, algorithmic trading innovation has also spurred adoption. Execution algorithms originally developed for equities are being adapted to bond trading."

On the execution side, algorithmic trading innovation has also spurred adoption. Execution algorithms originally developed for equities are being adapted to bond trading. These include smart order routers that can split a large bond order into many small pieces and search for liquidity across multiple venues, and auto-RFQ systems that automatically solicit quotes from dozens of dealers within seconds.

[18] AQR, Systematic Credit Investing, September 2018

[19] Invesco Global Systematic Investing Study 2024

Such algorithms help systematic strategies minimize their market impact and deal with the inherently fragmented liquidity in fixed income. Additionally, the growth of bond ETFs and index derivatives provides systematic traders with new instruments to express views or hedge positions. If a quant model, for example, finds an attractive relative value between a set of corporate bonds and the broader market, a manager can use an ETF or credit index swap to short the market while going long the specific bonds, simplifying execution. Over US$500 billion flowed into fixed income ETFs in 2024, adding depth to this ecosystem and creating further arbitrage opportunities for quant strategies[20].

4. Key implementation challenges

While the momentum behind systematic fixed income investing is strong, implementing these strategies is not without significant challenges. Fixed income markets still have structural complexities and risks that require careful management. This section examines the primary hurdles that investment firms must navigate when deploying systematic strategies in bonds and credit.

Data quality and availability

Despite improvements in data access, data quality remains a top challenge for systematic fixed income investing. In contrast to equities, where trade data is centralized and clean, bond data can be messy and incomplete. Many corporate bonds trade infrequently. Some issues might go days or weeks without transactions[21]. This means that historical price series can have gaps, and "last trade" prices may be stale or not reflective of current market value. Evaluating such illiquid securities systematically requires sophisticated data processing, such as interpolation or using proxy instruments (like CDS or similar bonds) to infer prices, all of which introduces complexity and potential error.

Investors know that without reliable data, even the best algorithms will produce unreliable results. Data issues span multiple areas: corporate actions and bond reference data (ensuring accurate terms and cashflows for each bond), pricing data (cleaning and aggregating trades/quotes from various sources), and reference data for analytics (like ratings, fundamentals, and macroeconomic series). If any of these are faulty or delayed, model outputs can be garbage-in, garbage-out.

Closely related to data quality is the breadth of historical data available for model development. Many fixed income instruments (especially for newer markets or structured products) simply do not have decades of history to train on. This is problematic for systematic methods – particularly machine learning – which often crave large datasets.

A machine learning model trying to predict corporate defaults, for example, has relatively few default events to learn from (defaults are rare, and each cycle might produce only a handful of new datapoints). Likewise, regime shifts (e.g., the 2008 financial crisis or the 2020 pandemic shock) are few in number, so it is hard to statistically infer how a strategy will perform under future extreme conditions.

These limitations mean that quant fixed income managers must augment scarce data with domain expertise and stress testing. They often supplement time-series data with cross-sectional data (examining many bonds at a point in time), use simulation to generate additional scenarios, or impose constraints on models to prevent overfitting to limited history.

[20] ETF.com. 2024 ETF Inflows Topped $1.1T, Shattering Previous Record, Sumit Roy, 2 January 2025

[21] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025

Model risk and strategy complexity

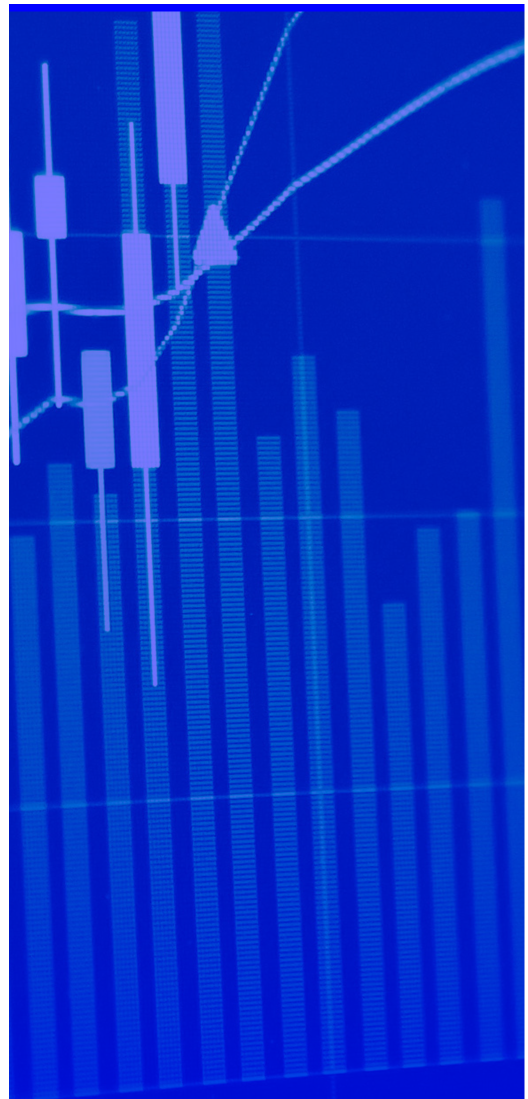
Designing successful systematic strategies in fixed income requires navigating substantial model risk. Fixed income models – whether a simple valuation metric or a complex machine learning algorithm – are only as good as their assumptions and the data they are built on. The relative youth of systematic credit investing means there is less of an industry track record to rely on. This lack of long live track records makes asset allocators cautious, as models that backtest well may not yet have proven themselves through full market cycles.

One source of model risk is the complexity of fixed income instruments. As discussed, a single corporate issuer can have dozens of bonds, each with different sensitivities. A 'naïve' quant model might treat all bonds the same or ignore important features (like a callable bond's option component), leading to mispricing. Systematic managers must develop models that can handle these nuances.

For instance, they may need to adjust spreads for maturity and liquidity differences or model the term structure of credit spreads. There is a higher dimensionality to credit markets that increases model complexity compared to equities[22]. This complexity can breed model risk if not properly managed. It is all too easy for a quant strategy to generate false signals due to an overlooked risk factor or an oversimplified assumption about how credit spreads move.

Machine learning models, while powerful, carry their own risks in fixed income markets. As noted, ML algorithms can struggle with the scarcity of certain kinds of events (like defaults or liquidity crises) and may latch onto spurious correlations in training data. If an ML model is not interpretable, it may be hard for portfolio managers to understand its drivers or to trust it in volatile market conditions.

There is also the challenge of overfitting – given enough variables, an algorithm can always find a pattern in historical bond data, but that pattern may not persist out-of-sample. Systematic fixed income managers mitigate this by imposing structure (e.g., using economic intuition to select features), using cross-validation techniques, and by blending ML signals with more transparent, factor-based signals. Nonetheless, the risk that models misestimate risk or return is always present, so firms must invest in robust model validation and risk management on top of their trading algorithms.



"Designing successful systematic strategies in fixed income requires navigating substantial model risk."

[22] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025

Another facet of model risk is how models perform when market regimes change. Fixed income markets can switch from calm to crisis abruptly. For example, a carry trade strategy that works well in stable markets may suffer quick losses if credit spreads spike unexpectedly (as in March 2020, with the beginning of global lockdowns from the COVID-19 pandemic). Quant strategies must be stress tested for such scenarios and include adaptive elements or overlays (like volatility targeting or stop-loss rules) to protect against breakdowns in normal relationships.

The events of 2020 and 2022 were a trial-by-fire for many systematic credit strategies – some funds hit drawdowns when liquidity evaporated and model assumptions broke, but those that survived often did so by incorporating rigorous risk management and by updating models to account for the new data from these stress events.

Going forward, model risk will remain a key concern, meaning systematic managers need to demonstrate not just raw performance, but also robust processes to manage and monitor their models.

Execution latency and liquidity fragmentation

Even with good data and solid models, systematic fixed income strategies face the practical challenge of executing trades efficiently in a fragmented, sometimes illiquid market. Unlike equity markets, there is no single centralized exchange for corporate bonds. Liquidity is spread across many dealers and platforms. This fragmentation means that when a model flashes a trading signal (say, to buy a particular bond), executing that trade is not as simple as hitting a button on an exchange.

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It often requires requesting quotes from multiple counterparts or waiting for a matching seller to emerge. Execution latency – the time delay between signal generation and trade completion – can thus be significant, and in that time, prices can move, or the signal’s edge can decay.

Investors themselves acknowledge execution capabilities as a major hurdle. In the BNP Paribas survey citied earlier, a majority of respondents (over 50%) listed execution as one of the top three challenges in systematic credit investing. Several factors contribute to this. First, bid-ask spreads in many bonds are relatively wide, especially in high-yield or emerging markets segments. A systematic strategy might identify a mispriced bond, but the act of trading it (paying the bid-ask spread or demanding liquidity in size) could erase much of the theoretical alpha.

This is why some quant credit strategies historically struggled. Their paper returns looked good, but net of transaction costs and slippage, the realized performance was weak. Today, bid-ask spreads have narrowed for commonly traded bonds, but for less liquid issues they remain an impediment.

Second, there is the risk of not finding a counterparty to trade with. A signal is only actionable if there is someone on the other side. In thinly-traded bonds, a systematic fund may detect an opportunity that cannot be immediately realized because no dealer or investor is quoting that bond at the model’s desired price. This can lead to "missing trades" or partial fills, which introduce tracking error between the model's ideal portfolio and the actual portfolio.

To combat this, systematic managers often incorporate liquidity considerations into their models. For example, they may only trade bonds that have a minimum frequency of quotes/trades, or scale positions based on estimated market depth.

Advances in electronic trading are helping to reduce these execution frictions. The growth of all-to-all trading platforms and algorithmic RFQs means that a systematic order can be pinged out to a broad network of participants within seconds, increasing the odds of finding a match. Some firms use smart order routers that will intelligently sequence their trading. If an initial RFQ does not get a hit, the system might try a smaller size, or route via a different platform, or temporarily use a highly liquid proxy (like an ETF or index future) to get exposure while waiting to fill the bond trade.

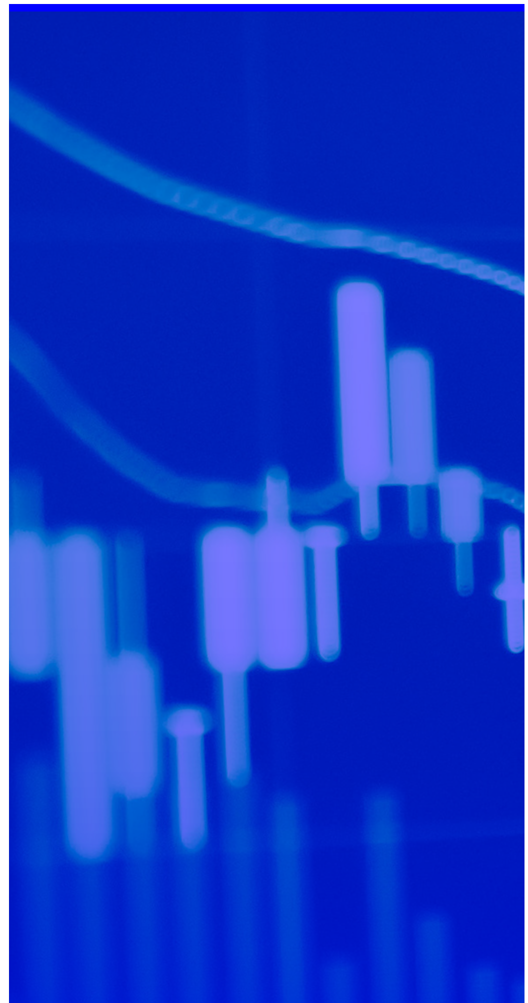
Additionally, the use of portfolio trading and ETF substitutions is a clever workaround. If a particular bond is hard to buy or sell, a fund might execute a basket trade that includes that bond plus others (making the overall package more attractive to dealers) or use an ETF to gain exposure in lieu of the bond and later swap them when liquidity improves. These techniques can substantially mitigate the impact of fragmentation.

Nonetheless, liquidity risk remains a core concern. Many remain wary that systematic strategies could face a liquidity crunch in a crisis. In a fast-moving sell-off, electronic markets can still thin out, and models can be forced to hold positions longer than intended. Systematic fixed income managers, therefore, place heavy emphasis on execution research – continuously refining their algorithms to reduce latency, selecting trading venues carefully, and working closely with dealers and prime brokers to source liquidity (including access to repo and short borrowing for short positions).

Overcoming execution challenges is an ongoing battle, but each year improvements are being made that further close the gap between the theoretical performance of quant strategies and their realized returns in the real world.

Contagion event scenarios

When many portfolio managers follow the same trade, there is a potential for contagion risk to occur. Relative



"Investors themselves acknowledge execution capabilities as a major hurdle."

value hedge funds exploit small price discrepancies across both bonds and markets in general. To magnify these small pricing differences, funds employ high leverage. The EU Non-bank Financial Intermediation Risk Monitor 2025 shows that hedge funds pursuing relative-value strategies typically have gross leverage exceeding 30 times their net asset value (NAV), even after netting and hedging adjustments[23].

> “When many portfolio managers follow the same trade, there is a potential for contagion risk to occur.”

Financial and synthetic leverage allows funds to enlarge positions and generate returns from minor arbitrage opportunities. However, when price discrepancies widen, losses scale with leverage[24]. Liquidity stresses can compel highly leveraged managers to sell assets rapidly, creating spill-over effects.

When volatility spikes or funding conditions tighten, relative value and carry trades are among the first to be unwound. The 2025 Non bank Financial Intermediation Monitor notes that widening bond spreads and rising margin calls could force leveraged investors to sell positions, and the unwinding of relative value and carry trades would add pressure on the underlying markets[25].

This dynamic resembles the March 2020 episode when hedge fund “basis” trades – long cash Treasuries and short futures – amplified instability in the US Treasury market. When losses forced funds to exit positions in 2020, the resulting deleveraging contributed to market dislocation[26]. Because dealers’ risk management constraints limit their ability to absorb mass unwinds, these episodes reveal how a market crowded into similar relative value positions can experience contagion.

Managing contagion risk requires awareness of these structural vulnerabilities and diversification away from crowded trades. Robust analytics and custom benchmarks can help firms differentiate signals and avoid herding.

5. Overcoming implementation hurdles

Implementing systematic fixed income strategies at scale requires not only identifying opportunities, but it also requires addressing the many practical hurdles previously outlined. Leading firms in this space have developed a number of best practices and innovations to overcome these challenges, allowing them to operate effectively in the fixed income arena. Here we discuss how practitioners are tackling data issues, leveraging technology, and refining execution methods to make systematic strategies work in practice.

Improving data pipelines and infrastructure

To solve data quality and availability issues, systematic managers invest heavily in data infrastructure and cleaning processes. Many firms have built centralized data lakes or warehouses in the cloud, where they aggregate all relevant fixed income data – not just prices, but also issuer financials, ratings, macro data, news, and even alternative data. Data engineering teams then focus on validating and enriching this data.

[23] EU Non-bank Financial Intermediation Risk Monitor 2025
[24] EU Non-bank Financial Intermediation Risk Monitor 2025
[25] EU Non-bank Financial Intermediation Risk Monitor 2025
[26] Federal Reserve Bank of Cleveland. Trading Places: My New View from Inside the Federal Reserve, Beth M. Hammack, President and Chief Executive Officer, 27 February, 2025

For example, if a bond has not traded recently, systems may pull in dealer quote data or use a model to interpolate a price. Time-series of spreads are cleaned for obvious errors (such as outlier moves or stale quotes) using algorithms. Firms also source multiple data vendors for the same information to cross-check and improve coverage.

Another technique is to incorporate proxy data to fill gaps. If a particular bond series has limited history, a model might use the issuer's CDS spread history or sector indices to approximate its behavior. Quants also use statistical techniques to infer missing data. For example, principal component analysis on yield curves can help estimate the yield of a rarely traded bond from the yields of more liquid bonds. These approaches require sophisticated tooling but are crucial for creating a robust dataset on which to run strategies.

To ensure reliability, systematic fixed income firms often implement continuous data quality monitoring. Dashboards will track metrics like the number of bonds with stale prices beyond a threshold, or sudden jumps in data fields, and alert the team to investigate. In essence, they treat data as a critical asset and deploy technology accordingly. Cloud computing has been an advantage here as well. Huge amounts of bond data can be stored and manipulated cost-effectively, and computational power can be scaled up to run complex data cleaning or simulation jobs when needed.

Moreover, collaboration with market infrastructure providers helps mitigate data issues. Some investment firms partner with electronic trading platforms or use aggregators that provide composite feeds and analytics. Trading platforms, for example, often have their own algorithms to derive composite prices from multiple contributions. Systematic funds can leverage these to get better real-time price estimates.

The industry as a whole is pushing toward better data standards (such as universal identifiers for bonds and standard reporting formats), which over time will reduce the friction. Until then, those that generate the most alpha in systematic fixed income markets will be those who manage to assemble the best, most usable data – a process that requires constant attention but pays off in investment strategy performance.

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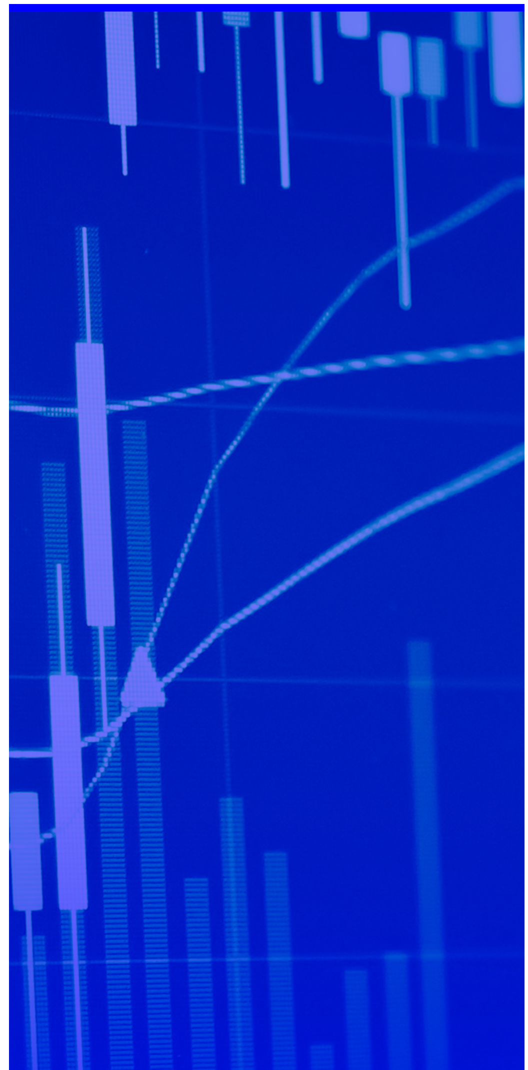
Leveraging Python and cloud technology

The use of modern technology – particularly Python programming and cloud computing – has become a cornerstone of successful systematic trading operations. Firms are building flexible research and trading platforms using open-source tools, which allows them to rapidly iterate strategy ideas and deploy them in production.

Python-based workflows are now standard in many hedge funds and asset managers. Analysts and quants write Python code to ingest data, perform analysis (using libraries like pandas, NumPy, SciPy), and implement models ranging from simple regressions to deep learning.

Python's readability and extensive libraries mean that even complex models (such as a Long Short-Term Memory (LSTM) neural network[27] for forecasting interest rates) can be prototyped relatively quickly, thereby

[27] LSTM Neural Network is a special type of Recurrent Neural Network (RNN) designed to handle sequential data (data that unfolds over time, like text, speech or stock prices). The key innovation of LSTM is that they can remember information for long periods and decide what to keep or forget.



accelerating innovation. New data sources or signals can be tested without waiting for lengthy software development cycles. Many firms also use Jupyter notebooks and similar tools to enable collaborative research and documentation of results.

Once models are tested, cloud computing platforms (like Amazon Web Services (AWS), Microsoft Azure, or Google Cloud Platform (GCP)) allow seamless scaling and deployment. For example, a firm might use cloud servers to run dozens of backtest simulations in parallel, or to perform computationally heavy tasks like Monte Carlo risk analysis on a credit portfolio overnight.

If a strategy requires intra-day or real-time calculation (e.g., continuously scoring thousands of bonds on multiple factors), the cloud can provide the necessary computing power and memory-on-demand, ensuring that the system keeps up with market data feeds. Cloud architecture also offers resilience and low-latency if designed well. Co-locating trading algorithms in data centers near electronic trading venues can shave off milliseconds, which can be crucial for fast-moving strategies.

Another advantage of cloud-based and Python-based systems is the ease of integration with execution platforms and databases. Through APIs, a Python-driven system can automatically send orders to trading venues or to an execution management system when certain signals trigger.

Many systematic fixed income funds have essentially built their own "quantitative trading engines" using these tools. The pipeline might operate as follows: data flows in (prices, news), Python processes update signals and optimal portfolios in real-time using cloud computation, and execution algorithms (sometimes also coded in Python or using vendor APIs) break down orders and route them. This high degree of automation is what allows systematic strategies to operate efficiently.

A small team of quants with a robust tech stack can manage a strategy trading hundreds of bonds, something that would be impossible to do manually.

It is worth noting that technology also helps with risk management and oversight. Python scripts can monitor positions and risk limits continuously, and cloud services can send alerts or even kill switches if something goes wrong (for example, if a model starts generating unusual signals outside expected bounds). This automation ensures that as the scale of systematic strategies grows, they remain controllable and transparent to the humans supervising them.

"The use of modern technology – particularly Python programming and cloud computing – has become a cornerstone of successful systematic trading operations."

Advanced execution algorithms and liquidity solutions

To tackle the execution and liquidity challenges, systematic fixed income traders are increasingly using sophisticated execution algorithms and alternative liquidity solutions as part of their implementation toolkit. These advancements are crucial for closing the gap between theoretical model performance and actual realized returns.

> "To tackle the execution and liquidity challenges, systematic fixed income traders are increasingly using sophisticated execution algorithms and alternative liquidity solutions as part of their implementation toolkit."

One key approach is deploying algorithmic execution strategies tailored to bond trading. Unlike equity algorithms (which might focus on slicing orders to not exceed a certain percentage of volume), bond algorithms often utilize a liquidity-seeking approach. For instance, when a systematic strategy needs to buy a particular corporate bond, the execution engine will typically start by checking multiple venues – request-for-quote platforms (to ping dealers for quotes), electronic order books (if the bond is listed on any all-to-all exchange or alternative trading system), and possibly dark pools or inter-dealer brokers. The algorithm might also post indications of interest or partial orders to see if there are bites.

If immediate liquidity is not found, the system can employ time-based tactics. For instance, these tactics could include leaving limit orders that join the bid/ask and waiting or breaking a desired position into smaller lots to be executed over several hours or days as liquidity appears.

Increasingly, ML is used within execution processes to optimize these choices. Some execution management systems learn from past trades to predict the optimal way to trade a given bond. For example, recognizing that certain dealers consistently offer the best price for bonds of a particular sector or rating, or that liquidity tends to improve at certain times of the day or around certain events. By leveraging these insights, the execution algorithm can adapt its strategy to minimize cost and slippage.

Another solution to improve execution is the use of cross-instrument hedging and substitution. If a target bond is hard to source, a systematic fund might temporarily take a position in a more liquid instrument that has similar exposure. For instance, instead of waiting to short a specific high-yield bond that looks rich, the strategy could short a high-yield ETF or a broad index future as a proxy, which can be done instantly, and later unwind that proxy when the specific bond short is executed. This ensures the portfolio's risk is adjusted as soon as signals are generated, even if the exact instrument trade lags.

Similarly, for buying, if a particular new issue bond is attractive but not available in the market yet, a manager could buy a basket of older bonds from the same issuer or industry that correlates highly with the desired exposure. These substitution techniques help keep the strategy as fully invested in its intended bets as possible, despite liquidity gaps[28].

Collaboration with dealers and prime brokers is also a part of overcoming execution hurdles. Many banks have responded to the growth of systematic trading by offering improved financing and execution services. Prime brokers, for instance, now provide services like portfolio swap facilities for credit trades, where a fund can enter a total return swap on a custom basket of bonds – effectively allowing the prime

[28] Resonanz Capital, The Systematic Credit Gap: Why This Frontier Remains Underexplored, 17 April, 2025

broker to source the bonds and provide the exposure synthetically. This can reduce the operational strain on the fund and provide access to dealer balance sheet.

Banks also assist with securing borrowing for short positions (important for long/short credit funds) by integrating their repo and securities lending operations with prime services. Such services help systematic strategies short bonds more easily, which historically was a challenge due to limited supply of certain bonds to borrow. By ensuring short positions are feasible and margin is efficiently managed (through cross-product margining for example), prime brokers are helping quant funds implement their trades without undue friction.

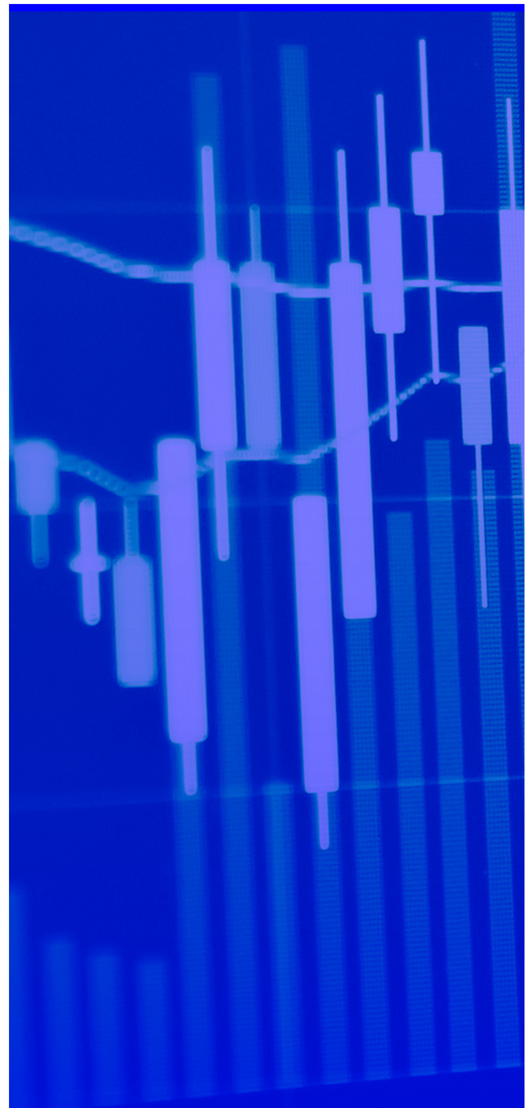
Finally, continued market structure improvements are on the horizon which will further ease execution. Regulatory pushes for greater post-trade transparency in Europe and Asia, the broadening of all-to-all trading networks, and the integration of streaming prices (where market-makers stream continuously updated quotes electronically) are all developments that systematic traders are taking advantage of.

As these innovations spread, the fixed income market should become increasingly liquid and accessible. Systematic investors are often early adopters of new trading protocols. Many quant funds were among the first to use anonymous all-to-all platforms or to execute via portfolio trading because they directly benefit from any reductions in transaction costs.

Low-latency pricing is critical in systematic fixed income strategies

The gradual electronification of fixed income markets means that more of the trade life-cycle happens on screen. According to a 2025 market structure outlook, the number of in bound "request for quote" (RFQ) messages from clients is rising exponentially, and dealers are automating responses. TransFICC's cofounder Steve Toland notes that the velocity of dealer to dealer rates markets is increasing, and that ultra low latency is no longer a nice to have but a necessity for dealers to remain competitive[29]. As more transactions migrate to electronic platforms, buyers and sellers expect instant price updates and accurate analytics. High quality pricing data are therefore needed for both real time execution and risk management.

[29] The Trade. The TRADE predictions series 2025: What to expect in fixed income – part two



> "Collaboration with dealers and prime brokers is also a part of overcoming execution hurdles."

6. Outlook

Systematic fixed income strategies have moved from the fringes to the frontiers of institutional investing. What was once an under-explored area – applying quantitative, algorithmic methods in bonds and credit securities – is now a rapidly growing segment, enabled by the confluence of technology, data, and market evolution.

> "Systematic fixed income strategies have moved from the fringes to the frontiers of institutional investing."

Hedge funds and asset managers are launching dedicated quant credit funds. Pension funds and insurers are using systematic strategies as diversifiers in their overall asset allocation and sell-side providers are building out infrastructure to support this shift. The adoption of systematic fixed income is poised to continue its upward trajectory, supported by ongoing improvements in electronic trading, data science, and computational power.

Looking ahead, we expect to see wider adoption and deeper integration of systematic techniques across fixed income sectors. Areas like emerging market debt, municipal bonds, and securitized products, which have lagged in electronification, may present the next frontier as data and trading access improve. The role of AI and machine learning is likely to expand with more natural language processing to gauge issuer credit risk from textual data, or reinforcement learning algorithms optimizing portfolio rebalancing.

Institutional investors evaluating these strategies should consider not only the potential returns but also the structural changes that make those returns achievable now. The ecosystem around systematic fixed income – including vendors, trading platforms, and service providers – is maturing rapidly. Importantly, many firms are overcoming historical implementation hurdles by adopting modern tools like Python and cloud computing, and by partnering with the right trading counterparties.

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