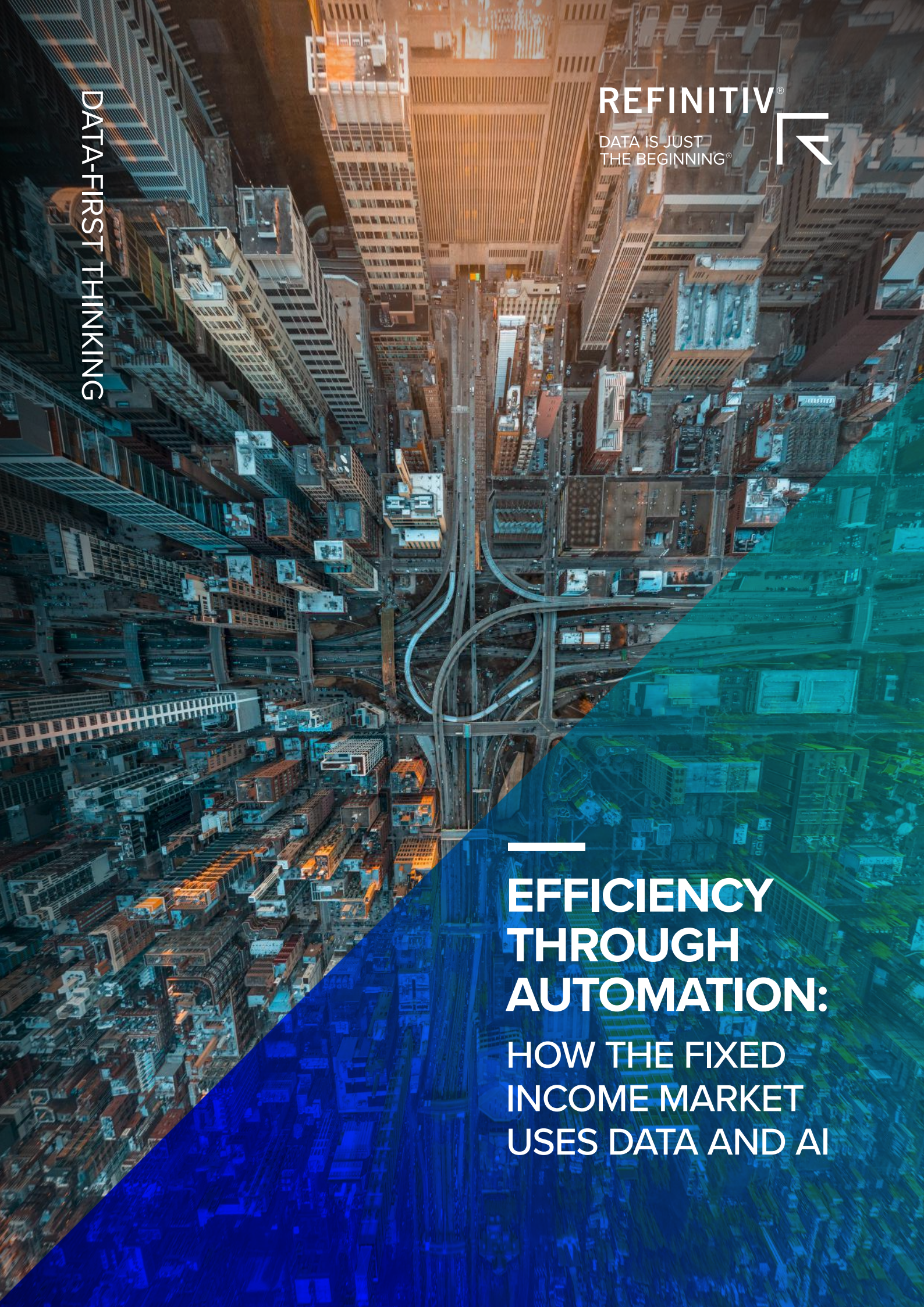


REFINITIV®

DATA IS JUST THE BEGINNING®

DATA-FIRST THINKING

EFFICIENCY THROUGH AUTOMATION:

HOW THE FIXED INCOME MARKET USES DATA AND AI

EXECUTIVE SUMMARY

Artificial intelligence (AI), cloud computing and big data continue to redefine fixed income markets, transforming the traditional approach to finding alpha beyond all recognition.

Whereas, in the past, successful ideas were largely engineered by trader intelligence and intuition, huge strides in automation mean that machines can now pinpoint myriad opportunities that were previously hidden in vast quantities of opaque data.

This transformation, however, does not spell the end of humans on the trading desk, but rather heralds the start of a new era in which the trader's role will ultimately evolve from generating and implementing ideas to interpreting and assessing the potential opportunities discovered by algorithms.

Driven in part by tightening global legislation, the past decade has seen significant amounts of both time and money invested into gathering, generating and cleaning up fixed income-related data. The result has been a virtuous cycle characterized by better data facilitating more e-trading, which in turn creates more data. How traders harness the power of this data will determine their future success.

Alongside the accumulation of vast volumes of data, technology has opened up a treasure-trove of opportunity across the fixed income arena. Cloud computing now enables all market participants to rapidly prototype new algorithms and investment ideas, and perform deeper analysis of available data.

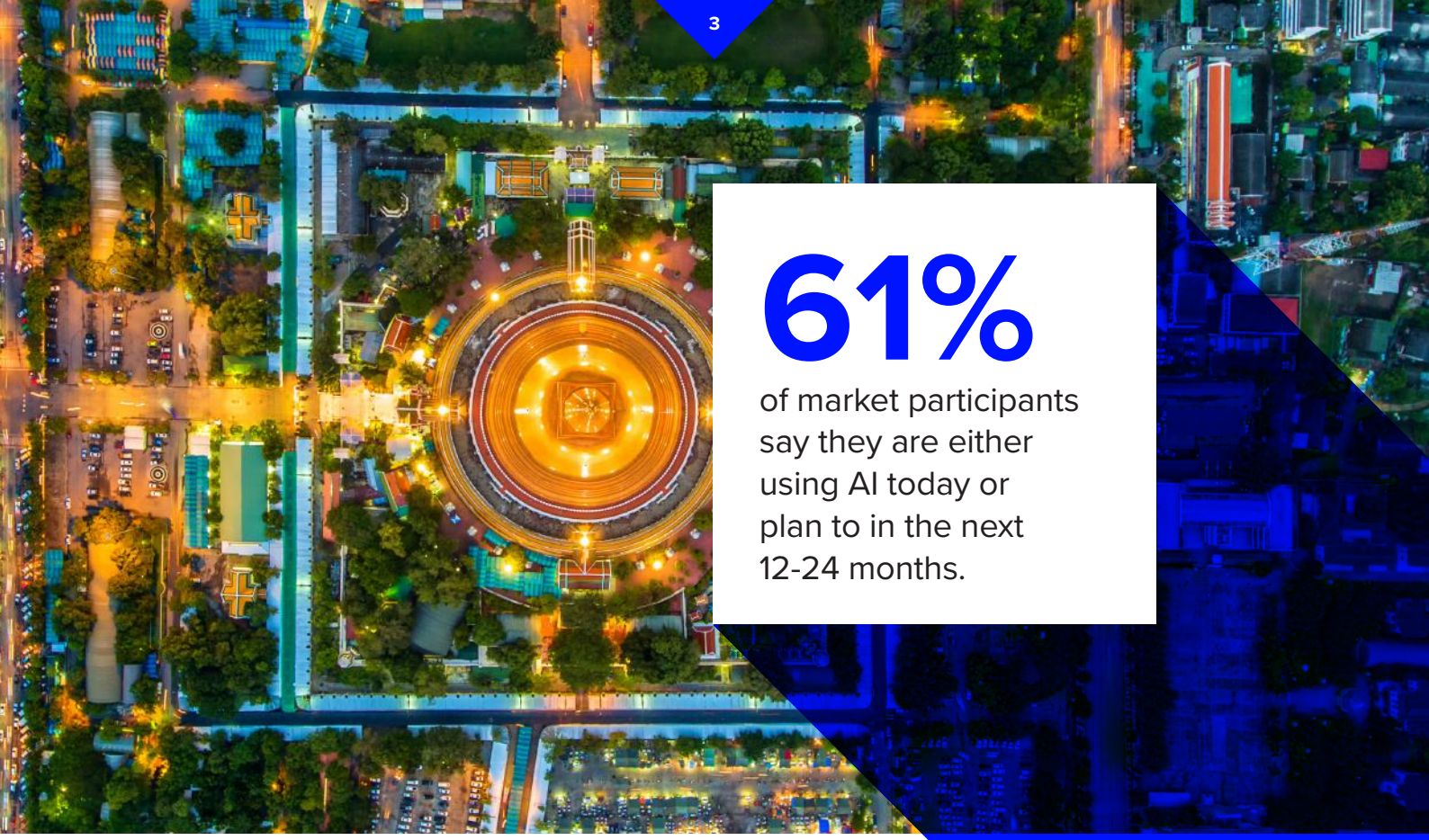
In addition, deep learning techniques and natural language processing (NLP) have unlocked the potential of data that was previously dirty or unstructured; and the growing adoption of user-friendly programming languages like Python has delivered innovation straight to the trading desk.

The net result of these sweeping changes has been a tremendous boost for market efficiency and transparency. The new availability of trusted data and vastly improved computational power mean that nearly every bond can now be priced every few minutes. Moreover, accurately predicting the risk of default for any given bond is now much easier.

The real news is that the innovation we have already witnessed is set to continue at an even greater rate in the coming years, but these changes should not be feared. Automation is not designed to replace humans, but rather to augment and support human ability, and to boost efficiency and effectiveness for all market participants.

> Automation is not about replacing humans but augmenting the best and the brightest to make them more efficient and effective.

Douglas J. Munn
Head of Enterprise Realtime Feed Propositions
Refinitiv



61%

of market participants say they are either using AI today or plan to in the next 12-24 months.

INTRODUCTION

Amazon knows what you want to buy before you do, and Facebook manages to unearth old high school friends that you forgot you knew. The same technologies—artificial intelligence (AI), cloud computing and big data—are now being applied to fixed income markets. Trading and investment ideas are increasingly being extracted from mountains of data in ways that were virtually impossible only five years ago. In fact, parts of the market are nearing the point where the intuition of the trader—something once seen as impossible to automate—is now finding its way into the machines.

We should not minimize the complexity of recreating the intuition of the trader, of course. Decades of experience and human emotion are two things computer scientists still struggle to replicate in software. This, in part, is why suggesting profit opportunities based on a client's trading style, or when sensing that something is amiss in a particular market sector, is still largely done by traders and portfolio managers using their market experience and desktop data. Picture an unusual looking chart and red flashing prices that trigger a trader to pick up the phone.

But looking ahead, those ideas and signals will be increasingly generated by complex algorithms that examine market data, trading history, automatically transcribed and analyzed phone conversations, and myriad alternative data sources. The role of humans on the desk will not end but will continue to evolve—from idea generator and implementer to interpreter of algorithmically discovered opportunities, helping clients to determine the best past forward. Portfolio managers, traders, salespeople, and research analysts will all feel the shift.

Humans have proven they can cut through the noise to find what matters—but machines can do it better.

PUTTING THE DATA TO WORK

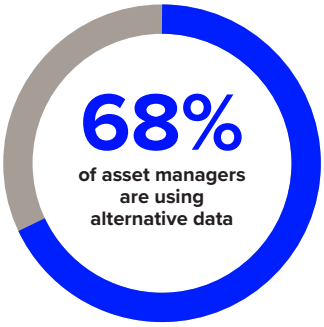
Over the past decade, a tremendous amount of time and money has been spent gathering, generating and cleaning up fixed income-related data to get us to where we are today. The mortgage market, for instance, has been transformed[1] from an opaque, risky, "buyer beware" environment to one of incredible transparency with deep, high-quality data. The Dodd-Frank Act drove the global swaps market in a similar direction, with every U.S. swaps trade now reported and stored using distributed ledger technology—a far cry from the fax-laden swaps market of 2005.

Furthermore, improved data and the growth of fixed income electronic trading have created a virtuous cycle in which better data allows more e-trading and more e-trading creates more data. The result of these and other data wins in the past decade have brought the market to the next phase in its modernization: putting that data to work.

This is where the buzz of Silicon Valley hits the fixed income market. Cloud computing is allowing market participants to more rapidly prototype new algorithms and investment ideas, and to perform deeper analysis of trading and other complex data. Case in point: Recent Greenwich Associates research found that 66% of asset managers are using advanced analytics and 68% are using alternative data. Before cloud computing brought low-cost compute power and data storage to everyone—whether through large cloud providers (AWS, Google, Microsoft, etc.) or via fintech firms—only those with the capital and wherewithal to build massive compute infrastructures were able to carry out such tasks.

Deep learning techniques and natural language processing, both subsegments of AI, have unlocked the potential in data that was previously either too "dirty" or too unstructured to be analyzed systematically. Our data shows that 61% of market participants say they are either using AI today or plan to in the next 12–24 months[2]. Extracting client preferences from phone calls and automatically generating future recommendations from that information is one notable example of putting that technology to use.

Lastly, the growing adoption of programming languages like Python, which are easier to learn and use, has helped to bring all of the aforementioned innovation right onto the trading desk. Not every trader can write Python code today but the majority will in the near future, as it increasingly supplants Excel as the analytical tool of choice. This is a prime example of what makes new and often complex technology successful in capital markets: accessibility. If Google's search engine couldn't be used via a simple text box, all of its sophistication and artificial intelligence would remain out of reach. The same is true on the trading desk.



Source: Greenwich Associates, Element22 & UBS, Analytics Power 2019

1 https://www.refinitiv.com/en/resources/special-report/mortgage-backed-securities-data
2 https://www.refinitiv.com/en/resources/special-report/automation-trading-and-future-technologies

Over the past decade, a tremendous amount of time and money has been spent gathering, generating and cleaning up fixed income-related data to get us to where we are today.

SOLVING REAL MARKET CHALLENGES

What makes these developments so interesting and impactful is that they are solving real market challenges today. This is not about technology for technology's sake nor are these pie-in-the-sky ideas that will someday have real world applications (like self-driving cars).

For example, on any given day, the municipal bond market has over one million tradeable securities. With no more than 1% of those trading with any notable frequency, pricing of the rest has been until recently a game of educated guessing and basic bond math. New data sources and computational power have made it possible to continuously price nearly every bond in this universe every few minutes. The same technology has been applied to corporate bonds and other harder-to-price securities.

It is also now possible to more accurately predict the risk of default for any given bond. These risk analytics can take into account activity up and down the capital structure, comments made by company executives, correlations found with debt issued by others in the same sector, and numerous other inputs. This allows bond portfolios to be priced more accurately at the end of the day, market makers to more precisely quote prices throughout the day, and everyone to more precisely hedge their risk. Retail investors are even starting to see the benefits, with markets more transparent than ever and more retail-focused products available (e.g. ETFs), increasing investment opportunities.

AUTOMATION IS AUGMENTATION, NOT REPLACEMENT

The result is increased automation of processes once done by humans, or done more slowly and less precisely by old technology. Our data reveals that those using auto-execution functionality execute over 20% of buy-side corporate bond trading volume with little or no human interaction. Algorithmic trading and interest-rate curve building have both been done by machines for over a decade, but solutions to those and other related problems in 2020 barely resemble their ancestors.

To this end, banks have proved they are getting much better at handling both data on the trading desk and within their technology departments. And the heads of research on the buy side increasingly have more data scientists on the team than they do fundamental research analysts. Automation is not about replacing humans but augmenting the best and the brightest to make them more efficient and effective. It is also likely to result in some roles being replaced rather than eliminated. Trading has also seen a move from MBAs to computer and data scientists over the past 20 years that is showing no sign of slowing.

Ultimately, the market should celebrate how much more efficient it has become in the past decade. Burdensome regulations, reduced profit margins and low-volume markets have been mitigated by new businesses and business models made possible by these data and technology innovations (as recent, strong performances by many of the largest banks' fixed income businesses have demonstrated). And while the changes we've experienced over the past decade appear dramatic in hindsight, innovation will continue at an even greater pace in the coming years. So while some traditional capital markets businesses feel threatened by the changes, the market is ultimately better for the evolution it has undergone and the evolution still to come.

Those using auto-execution functionality execute over

20%

of buy-side corporate bond trading volume with little or no human interaction

Source: Greenwich Associates 2019 Market Structure and Trading Technology Study

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The recent proliferation of available data in the fixed income space delivers a range of potential benefits, including increased price transparency, but the fixed income arena remains complex.

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Using sophisticated analytics, investors can now dig into the individual loans within any MBS and see exactly what they're buying.

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