

WE CONSIDER HOW TECHNOLOGICAL ADVANCES, ALTERNATIVE DATA SOURCES AND SHIFTING INVESTOR FLOW DYNAMICS ARE CHANGING THE FACE OF FIXED INCOME MARKETS.



Prior to the financial crisis, economists and company analysts had been seemingly satisfied with a physicist's view of the world where cause and effect rules; a pressed economic lever here leads to a predictable and repeatable consequence over there. But as the rules broke down in 2008, the idea that the market summed all knowledge into a single price was shown to be woefully inadequate.

Post the crisis, investors went searching for new ways of describing the world; ones that evolved, learned and adapted as time went by and were less rooted in rigid rules that could become obsolete without them realising. More importantly, they wanted to make better predictions and deliver more stable returns, which meant moving from price-rich to data-rich assessments of value. A new type of investor has emerged; one that embraces the rapid technological change underway and keeps an open mind – always looking for creative new ways to find an edge.

There are three main trends emerging that help shine a light on where fixed income is headed: alternative data, artificial intelligence and structural flow dynamics. We take a detailed look at each in turn.

1. DIGITAL SCAVENGER: THE NEW-BREED ECONOMIST

A generation of fixed income managers were brought up on the idea bond management was synonymous with economics; interest rates were a function of the economic cycle, while bond yields and the yield curve were a function of today's interest rates and speculation about their future path. Bond managers would regale you with endless charts of money supply, inflation, unemployment, ISM surveys and Gross Domestic Product. Given the slightest encouragement, they would slip data going back tens, if not hundreds of years, into a spreadsheet and set about predicting the next move in borrowing rates.

Macroeconomics, as practiced by the financial markets, is about collecting data about each other; something we've been doing for a long time and in a variety of forms. The 1970s were altogether simpler and more direct times: rummaging through trashcans, as pioneered by William L. Rathje at the University of Arizona, showed that even recent artefacts could tell you a lot about the people who used and discarded them. 'Garbology' became a valuable method of defining social trends.

Data scientists are continuing the rummaging model. But instead of going through your rubbish bins, they are doing it in real-time, collecting lots of data from a wide array of places, with no obvious connection to each other, in order to make economic predictions. From apparently-disconnected digital breadcrumbs, a behavioural profile can be stitched together.

For the new breed of analyst, social media is an indispensable source of data to base predictions on. Companies actively scan platforms like Facebook, YouTube, Instagram, Twitter and Pinterest to decipher preferences, choices and perceptions towards brands, companies, political parties. You name it; they want to find out what you think about it. And we tend to give the data away freely and willingly (See: The Great Digital Detox?). On Twitter, there are an estimated 10 billion tweets per day; Facebook's one billion users generate four new petabytes (about four million gigabytes) of data a day, and four million 'likes' a minute.

Transactional data, generated from the likes of eBay, Amazon, credit card providers and any online retailer you visit, is gathered by the bucket-load and stored in vast files. It is primarily used to predict consumer behaviour. Target, the large US retailer, can now accurately predict when one of its customers will have a baby just by knowing their personal data and mapping it to their expected life cycle. Others have started using aerial photography to monitor car park occupancy as a method of predicting retail sales. But its biggest use comes inside business intelligence units. Business intelligence models can respond to changing perceptions through social and financial transactional data and even alter pricing in real-time as supply and demand fluctuates; micromanaging the business in a way monthly economic statistics series find it difficult to predict.

INFLATION – FROM REAL WORLD TO REAL TIME

Even familiar macroeconomic variables suffer from real-world problems that the new algorithmic approach can help with. Take the one variable fixed income investors fret about the most: inflation.

The Billion Prices Project has been developed at the Massachusetts Institute of Technology (MIT). It relies on hundreds of websites all over the world to calculate inflation in real-time. Since online and offline prices appear to be fairly close most of the time, researchers can confidently show real-time data is a good predictor of monthly data releases, which are sometimes released with a lag of several months. It could provide an edge for fixed income managers hungry for information, helping them design winning portfolio strategies based on economic predictions. Already there are rich data sets to be found in Google Trends, while Twitter has been busy indexing hundreds of billions of tweets from 2006 onwards, covering human experiences and major historical events, so they can be correlated with future economic developments.

It is easy to imagine a situation where real-time economic statistics will replace the traditionally infrequent (monthly and quarterly) economic time series, creating with it a revolution in fixed income management.

2. AI AND MECHANICAL ANALYSIS: 'YIELDING' SOME ANSWERS

Predicting the future of the economy is one thing, but bond investors want to know whether interest rates are rising or falling, what will happen to the yield curve and, just as importantly, the likelihood of companies they invest in going bust and defaulting on their debt.

Modelling, interpreting and predicting the next yield curve movement is a valuable source of absolute and index-relative returns for government bond managers. Theories of how and why the yield curve moves the way it does have traditionally broken down into explanations based upon expectations about future interest rates, the behaviour of bond market participants or the lasting effects of long- and short-term information entering the market.² But no one theory has satisfactorily answered the question under all circumstances throughout history. It has been a vexed question ever since yield curve management came to the fore in the 1970s, and one that has been harder to answer since central banks started manipulating and nudging markets through massive quantitative easing programmes that have taken some of the 'free' out of the free financial markets.

COMPUTATIONAL BRUTE FORCE

Most attempts to model the level and slope of the yield curve use macroeconomic factors and transactional flow data to predict future movements. But now more adaptive models are emerging. Researchers at the University of Thrace used machine learning, coupled with GDP data, to successfully predict the movement of the US yield curve 67 per cent of the time and every recession for the period 1976 to 2011.³ Other attempts to model the direction of bond yields using machine-learning models have shown they can outperform standard theory to a degree that would be of interest to bond market investors using conventional methods.⁴

If the level of yields and slope of the yield curve are two dimensions of bond management, the third is the direction of credit spreads; the difference between the yield on a corporate bond and a comparable government bond.

Credit spreads are a function of the collective thoughts of the market about the ability of a company to pay its annual interest bill and return investors' initial capital at maturity: the more likely a company will default on its debts, the higher the credit spread to reward investors for the risks they are taking and vice versa.

There has never been a more important time to get this right: total global debt hit a record \$164 trillion in 2016, according to the International Monetary Fund, with debt-to-GDP at an all-time high of 225 per cent.⁵ Governments, local authorities, global agencies, companies, banks, mortgage providers, credit card companies, car and boat finance companies – the list is pretty much endless – are all included in the total. Credit analysis has gone from the minority activity it was a couple of decades ago into a crucial activity within bond management.

The question is whether the value of traditional analysis by humans; analysing balance sheets and projecting the fortunes of companies forwards, has been undermined by QE and central bank support for credit markets.⁶ Default rates appear artificially suppressed, which could mean problems are being stored up in the system that will only be revealed when interest rates and bond yields rise to any great extent. It would take vast legions of credit analysts to properly cover the interconnected system of debt fuelled by ultra-low interest rates, the cost of which would be hard to justify.

An alternative approach is to leverage computing power, using artificial neural networks and machine learning to predict credit ratings⁷ usually produced by in-house and external analysts.⁸

The inputs are familiar to any corporate debt analyst; sales, total debt, cash flows, income, financing costs. The output is just as familiar: a credit rating that can be used to assess the adequacy of credit spreads or reveal hidden gems to create an investment opportunity.

Analysing vast and disparate data sets to assess value could be a revolution in how fixed income departments function in future. Once the technique is honed and the most influential variables identified, bulk data processing can occur. In the new age of transparency, where one major consequence of the Markets in Financial Instruments Directive (MiFID) II has seen many fund managers absorb the cost of external research, you have a recipe for revolution with Big Data as the sponsor. This could be significant as it transfers costly research via technology to asset managers, who can focus their attention on creating tools to aid bond selection.

LIQUIDITY: TRADING PLACES WITH TECH

Prior to the collapse of Lehman Brothers, fund managers had become accustomed to buying and selling most things in their portfolios at will; the liquidity of the system was high. However, in the post-crash environment, the ability of investment banks to act as market makers has been severely hindered by tighter regulation.

The inventories of bonds held at investment banks has collapsed. According to the New York Federal Reserve, broker inventories fell from over \$200 billion to just \$60 billion within a year of the financial crisis beginning. With it went the assumptions of fund managers that they could buy and sell whatever they wanted, whenever they wanted. Pre-trade information like multiple quotes and what successful trades looked like in the past has become scarce and fragmented. If you were a fund manager trying to find the right additions to your portfolio, the whole exercise became time consuming, frustrating and sometimes futile.

The effect has been felt across the market, but the most profoundly wounded area was the corporate bond market, leading to concerns about the ability of some goliath corporate bond funds to raise cash should clients want it.⁹ This is another area where artificial intelligence, machine learning and Big Data stepped in to fill the information void in the shape of Project Neptune.

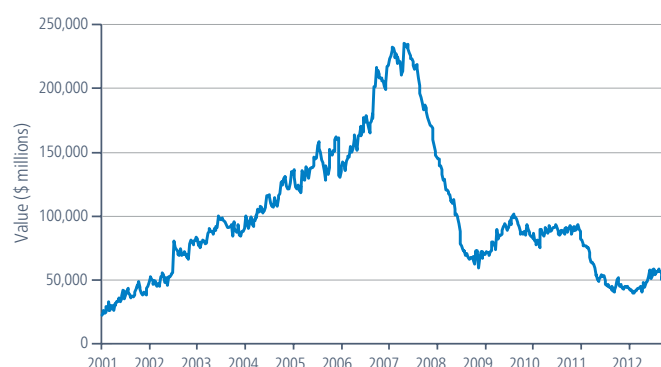
Project Neptune was created out a consortium of 22 banks working with buy-side companies to pool real-time information on what is on offer in corporate and emerging bonds.¹⁰ This the first step towards regaining the liquidity institutional investors need to transact large trades. After its launch in 2017, it was envisaged Neptune would provide real-time information on more than 14,500 different securities with a notional value in excess of \$131 billion generated from over 26,500 pre-trade buy and sell indications, daily.¹¹

Although Neptune isn't a trading platform, it is another piece in the jigsaw of automating the trade lifecycle, starting with portfolio cash flow through instrument selection and culminating in the execution of a trade. For the time being, the emphasis is on creating visualisations of liquidity and what it takes to make a successful trade, as an aid to decision-making for fund managers and their counterparts on the other side of a trade.

Reinforcing the idea of AI as an aid, Dutch financial services company ING has launched Katana, an artificially-intelligent trading tool that uses predictive analytics to aid price discovery for clients. The belief is that a human with AI support performs better than one without.¹² However, developments in other areas of financial markets, like equities, suggest automation for fixed income is only a step away.¹³ It won't be long before the data-rich algorithm-driven technology of Amazon, Netflix, YouTube and Alibaba will be used to show trades to clients based upon their preferences and previous buying history.

It is part of a trend that sees dealing as much more part of the investment process than a few years ago. Some dealing desks see bond trades as either 'High Touch' or 'Low Touch' depending on how much hand holding is required. AI and pooled data are set to combine with order-management systems and connect to execution management systems, increasing the integration of investment with dealing. Dealers will then be able to spend more time handling time-consuming exceptions.

Figure 1: US dealer inventories



Source: New York Fed

3. DEMOGRAPHICS ARE DESTINY: WHAT GIVES BETWEEN CENTRAL BANK MANIPULATION AND AGEING POPULATIONS?

Even allowing for the decline in annuities, bonds are set to become a larger and larger part of portfolios. The great gravitational force of demographics alone will pull portfolios towards owning more fixed income assets. At the same time, the amount of debt in the world issued by national governments and companies is increasing, making credit risk management as important as investment returns. The clash between rising credit risk and the need for retirement income will be the major preoccupation of bond managers for decades to come.

Stretched government finances are the starting point for a sea change in attitudes towards borrowing. The sense of restraint and belt-tightening, combined with tax hikes in the post-crisis era, is gradually being loosened as voters tire of what seems like a constant assault on jobs and services. Already, there is talk of the 'Great Divergence' as US fiscal policy and spending is loosened while Europe holds on to its hard-won discipline. According to the IMF's 'Fiscal Monitor', the US will have a debt-to-GDP ratio of 117 per cent by 2023, putting it on a par with Italy on current plans.¹⁴ Even in Europe things are changing. The rise of populist movements, like Five Star in Italy, promising greater expenditure and a guaranteed basic income for the poor, is a possible sign of things to come. Faced with unfamiliar government credit risks, bond investors won't be able to rely on fiscal responsibility to do their credit work for them in the future, even for the best-known nations.

But the true severity of the situation is masked by the backwards-looking nature of debt-to-GDP ratios; they miss out pledges made to future generations in the form of benefits, social care, healthcare and pensions. According to the World Economic Forum (WEF), the world's six largest pensions savings systems – the US, UK, Japan, Netherlands, Canada and Australia – are expected to have a shortfall of \$224 trillion by 2050. Add in China and India, the two most populous countries, and the combined savings gap reaches \$400 trillion, or 500 per cent of the global economy by that time. This will "imperil the income of future generations and [set] the industrialized world up for the biggest pension crisis in history", as WEF puts it.

Faced with this problem and with many nations already hitting their credible debt ceilings, stark choices need to be made, which could include: reneging on current promises, increasing taxes on income and wealth, increasing borrowing radically to reflate the economy, defaulting on debt and devaluing currencies.

All of the options spell trouble politically, economically or in the markets, giving investors a difficult course to negotiate in the decades to come. For bond managers, the ability to distinguish between yield and the ability to pay will never be more important to their clients.

A more sanguine view would be that rising debt availability may pose credit risks but growing liabilities also create bond buyers. Bond yields may not rise to catastrophic levels as some expect; asset-liability matching demand outstrips debt supply, but this may change the

power dynamics of the world; debtor nations could be in the thrall of creditor nations. We've already had a taste of things to come as China, which has one of the largest bank accounts and is one of the largest owners of US government debt, continues to remind the US authorities of their responsibility to not default on their debt obligations;¹⁵ a scenario that would have been unthinkable a decade ago.

If debt is the lifeblood of capitalism, another episode similar to 2008 is almost certain to happen. Future bond managers will be preoccupied trying to spot the onset of the next crisis.

BIONIC BOND MANAGERS...

Things are changing fast in the fixed income industry. Bond managers of the future will use new sources of real-time economic and company data to guide their decisions on timing and value, implementing transactions peer-to-peer through anonymised arenas secured by incontrovertible blockchain records. The entire process may even become completely automated as asset-liability matching programs tweak portfolios in real time via commoditized government bond and currency platforms.

None of this is to suggest human input will, or even should, be eradicated; the algorithm-inspired flash crash of May 6, 2010 at 2.45pm that caused the Dow Jones Industrial Average to fall nine per cent in 30 minutes, or the seizing up of the bond markets during the 2013 Taper Tantrum, illustrate markets need adult supervision from time to time. What organisations are seeking in the next phase of tech-driven fund management is the correct balance between what should be automated and what is best left to far-sighted individuals who can intervene and create rules that express new paradigms.

However, day-to-day bond management is clearly being transformed. Where once rows of desks were filled with fund managers and their analysts managing individual portfolios, in the future they could be supplanted by data scientists creating smarter and better price discovery and implementation algorithms; humans create the strategies and trading rules and are left to monitor the exceptions. Already, some foresee artificial intelligence being directly incorporated into the trade and portfolio management process.¹⁶

Aided by the incontrovertible recording of trades using blockchain encryption, the way is open for new trading methods circumventing traditional trading broker-client relationships. So far, wealth and asset managers have concentrated most of their resources on digital transformations benefitting their customers; better websites, richer account information and improved client communications.¹⁷ That technology spend is set to change. The bionic bond manager is coming.

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