Columbia Business School
AT THE VERY CENTER OF BUSINESS™

Columbia CaseWorks

ID#210212

PUBLISHED ON
JUNE 17, 2021

Analytics in Fixed-Income Trading

BY C. DANIEL GUETTA*

Bond Basics[1]

A bond is an investment made by lending money to a corporation or government for a set period of time, typically accompanied by interest payments to the investor. During the lifetime of the bond, the investor receives fixed interest payments called coupons and, when the bond expires, a lump sum equal to the original principal amount (called the "face value" of the bond) plus the final, remaining coupon payment.

Like stocks, most *new issue* bonds are initially underwritten by a bank (purchased from the issuer in full) and sold to a diverse group of investors. Each new issue is identified by a unique set of alphanumeric characters called a CUSIP. The price of the bond is based on its time to maturity, the contractual interest and principal payments, and the credit risk of the bond—i.e., the market's expectation of how likely the entity is to make good on its payment obligations. Treasury bonds issued by the US government are considered the safest such investment; because the government can create money to repay bonds, government bonds are said to be "risk-free." Bonds issued by more risky entities can typically be bought more cheaply to offset the risk of nonpayment.

The Bond Market

There is a large but sometimes illiquid (compared with stocks) secondary market for buying and selling previously issued bonds. When we think of investing and trading, we often think of stocks, but the bond market is larger than the stock market globally. In the United States, the bond market (including Treasury, corporate, and mortgage securities) is worth approximately $50 trillion, with $40 billion traded every day.[2]

In some ways, the bond market functions like the stock market. Bonds are constantly traded between investors at prices determined by market demand. The mechanics of trading a bond,

Author affiliation
Columbia Business School

Acknowledgements
The author is grateful to Dean's Summer Fellow Royce Fillmore '21 for research and writing support, and to Geoffrey Gunow and Beau Lescott for their time in discussing this case.

however, are very different. Stocks trade on centralized exchanges, like the NYSE and NASDAQ. These exchanges use algorithms to match buyers and sellers at a fair market price and give corporations and governments a platform on which to sell. Much of this process and the workflows it uses are automated.

The bond market is a different beast altogether. While much of Treasury trading has become automated through electronic platforms, much of the rest of the market is highly antiquated, with many trades taking place by phone or instant message systems among buyers, sellers, and an intermediating bank. Unlike stocks and Treasury bonds, which trade nearly continuously, corporate and other bonds trade infrequently, sometimes making price discovery challenging. Following the global financial crisis, and the broker-dealer rules that succeeded it, banks' inventory of non-Treasury securities plummeted, and banks now function almost entirely in a matchmaking role.[3] As sellers of trade ideas (either buy or sell), the banks are still referred to as the "sell-side." Finally, because the bond market is dominated by institutional as opposed to retail investors, most trades occur in sizes greater than $1 million; those that are smaller are referred to as "odd lots" and typically suffer from lower liquidity.[4]

Meeting the RFQ Challenge

Since many banks may hold (or, more likely, be in touch with an investor that owns) a given CUSIP at any given time, and a given CUSIP may not have traded in weeks, there is typically no readily available, agreed-upon price for a bond. Each bank will quote its own price for a specific CUSIP to buyers or sellers, and the latter may contact many banks in search of the best price. These inquiries are called requests for quotes, or RFQs. When a buyer makes an RFQ, he or she signals an intent to buy or sell a certain number of bonds of a specific CUSIP, and asks the bank to quote a price at which it would be willing to fulfill the order. Bond traders on the sell-side spend much of their time with RFQ-management systems (Bloomberg, for example) to track these RFQs from potential buyers.

At any given time, a bond trader may have several hundred RFQs in front of him or her. Each of these RFQs has an attached expiry time, and if any RFQ is not acted upon by that time, it expires, and nothing happens. If the bond ends up priced before expiry, a dollar amount is sent back to the person initiating the RFQ. That person now has the option to complete the trade with the bond trader, or trade away with another bank's offer.

Since each RFQ needs to be responded to manually, traders must quickly determine which RFQ is most important and worth pricing, so that opportunities are not lost. Traders facing hundreds of RFQs at once need to quickly work against the clock to decide which ones are worth responding to before expiry. To complicate matters even further, traders also need to consider their current inventory when deciding on which RFQs to act. Various regulations make it difficult for sell-side banks to hold on to bonds for long periods of time, and so traders might be eager to sell bonds that are starting to near these limits. Conversely, a trader might receive an RFQ for a bond he or she does not currently have in inventory. They might still want to quote the RFQ, but this would require some extra work to procure the bond first. To

manage this complexity, bond traders often develop rules of thumb to help them choose RFQs to price.

Finally, once a trader decides to respond to a specific RFQ, he or she must set a price to quote the buyer. This price will depend on myriad factors, including the face value of the bond, the remaining time to maturity, the prevailing interest rate environment, the health of the company in question, and the supply/demand imbalance for the bond. A number of software products exist to facilitate this process, but there is no universally accepted technique.[5] The Bloomberg terminal, for example, provides a number of "old school" functions that will provide various prices to guide the trader's decision (as well as a newer, data-driven package called BVAL), but the bond trader still has to choose among these many prices, and so a lot of subjectivity remains.

Assignment

How might you bring predictive analytics to bear on the bond trading process? You might identify several opportunities, but for the purposes of this assignment, choose the one opportunity you think is most promising and be prepared to:

1. Deliver a 30-second elevator pitch describing the idea.
2. Identify the *exact* quantity you will need to predict to implement your idea.
3. Give some thought to the kind of data you would need to collect to make that prediction.

Endnotes

[1] Tim Parker, "The Basics Of Bonds," Investopedia (updated April 1, 2021), https://www.investopedia.com/financial-edge/0312/the-basics-of-bonds.aspx.
[2] Katie Kolchin, Justyna Podziemska, and Ali Mostafa, "Research Quarterly: Fixed Income—Issuance and Trading, First Quarter 2021," SIFMA.org (2021), https://www.sifma.org/resources/research/research-quarterly-fixed-income-issuance-and-trading-first-quarter-2021/.
[3] U.S. Securities and Exchange Commission, Division of Trading and Markets, "Guide to Broker-Dealer Registration" (modified December 12, 2016), https://www.sec.gov/reportspubs/investor-publications/divisionsmarketregbdguidehtm.html; see also Gideon Saar, Jian Sun, Ron Yang, and Haoxiang Zhu, "From Market Making to Matchmaking: Does Bank Regulation Harm Market Liquidity?" Massachusetts Institute of Technology (September 2020), https://www.mit.edu/~zhuh/SaarSunYangZhu_matchmaking.pdf.
[4] James Chen, "Odd Lot," Investopedia (updated June 22, 2020), https://www.investopedia.com/terms/o/oddlot.asp.
[5] Dhara Ranasinghe and Saikat Chatterjee, "Pandemic propels old-school bond traders towards an electronic future," Reuters (June 22, 2020), https://www.reuters.com/article/us-health-coronavirus-bond-trading-insig/pandemic-propels-old-school-bond-traders-towards-an-electronic-future-idUSKBN23T0MP.