

Bond Trading at the Digital Frontier

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I. INTRODUCTION

The bond market is arguably “the most important market in the world.”¹ It is recognized as “one of the largest sources of capital for issuers and investment opportunities for a broad array of savers and investors.”² As an informational engine, the collective trading activity of bond dealers, institutional investors, and other trading professionals wields a formidable capacity to both reflect and shape macroeconomic developments.³ Yet for all its importance, bond trading remains relatively unregulated as compared to stocks, options, and futures markets.⁴ Congress has never enacted transformative regulation on the scale of its interventions in other trading markets. The U.S. Securities and Exchange Commission (SEC) has thus historically left coordination of bond market trading to the securities self-regulatory organizations (SROs).⁵

There are good reasons for such restraint. While stocks, futures, and other instruments attract continuous trading interest from a wide range of investors, bonds have traditionally been viewed as a sleepier, “buy-and-hold” investment—better suited to insurance companies, pension funds, and retirees than to the average Robinhood investor.⁶ Bond trading also does not draw public attention in the same way that stock prices do.⁷ Aggregate information about yields and spreads inform investment decisions in bond funds and individual issues, but pricing and trading relatively illiquid bonds requires a combination of expert knowledge and access to networks of trading activity.⁸

1. See Robin Wigglesworth, *How Bonds Ate the Entire Financial System*, FIN. TIMES (Aug. 3, 2023), <https://www.ft.com/content/5631cc22-a04d-405c-9154-e307f938f8f3> (on file with the *Journal of Corporation Law*) (quoting Ray Dalio). James Carville once quipped, “I used to think if there was reincarnation, I wanted to come back as the president or the pope or a .400 baseball hitter. But now I want to come back as the bond market. You can intimidate everybody.” David Wessel & Thomas T. Vogel Jr., *Arcane World of Bonds Is Guide and Beacon to a Populist President*, WALL ST. J., Feb. 25, 1993, at A1.

2. *A Review of Fixed Income Market Structure: Hearing Before the Subcomm. on Cap. Mkts. Sec. & Inv. of the Comm. on Fin. Servs.*, 115th Cong. 1 (2017) [hereinafter *2017 Fixed-Income Hearing*].

3. See, e.g., DONALD MACKENZIE, AN ENGINE, NOT A CAMERA: HOW FINANCIAL MODELS SHAPE MARKETS 211–24 (2006) (describing the relationship among bond prices, interest rates and credit spreads, and how arbitrageurs such as Long-Term Capital Management seek to exploit price anomalies and anticipate macroeconomic and regulatory developments).

4. The “secondary market” is the market in which securities are bought and sold after they are issued, whether by investors, dealers, or other market participants.

5. See, e.g., Regulation ATS and Regulation SCI for U.S. Government Securities and Electronic Corporate Bond and Municipal Securities Markets, Exchange Act Release No. 90019, 85 Fed. Reg. 87106, 87156–59 (Dec. 31, 2020); see also JOEL SELIGMAN, THE TRANSFORMATION OF WALL STREET 183–89 (3d ed. 2003) (discussing legislative difficulties in asserting SEC authority over over-the-counter markets). Congress did, of course, create the Municipal Securities Rulemaking Board in 1975, as a dedicated SRO for the municipal securities market. *Id.* at 612–15; see also *infra* note 36.

6. See, e.g., Michael Hartzmark, Cindy A. Schipani & H. Nejat Seyhun, *Fraud on the Market: Analysis of the Efficiency of the Corporate Bond Market*, 2011 COLUM. BUS. L. REV. 654, 676–77 (explaining that bonds tend to be held to maturity and thus trade less frequently than stocks due to the smaller effects of “outside macroeconomic and internal financial factors”).

7. *2017 Fixed Income Hearing*, *supra* note 2, at 1 (noting that the fixed income market is “lesser known to some investors,” despite being “nearly twice as large as the equity markets”).

8. See Aaron Brown, *Trading Corporate Bonds Is Still More Art Than Science*, BLOOMBERG (Dec. 4, 2023), <https://www.bloomberg.com/opinion/articles/2023-12-04/jfe-retraction-shows-bond-trading-is-more-art-than-science> (on file with the *Journal of Corporation Law*) (describing the travails of “the nascent field of research

Nevertheless, a series of shocks to the U.S. government securities marketplace has spurred financial regulators, industry participants, and academics to think about bond market structure with greater intentionality. Unregulated trading systems and market participants account for an increasing volume of trades and order flow in Treasury securities.⁹ Regulators have attributed recent “rallies,” “disruptions,” and other “episodes” in U.S. Treasury markets to inelastic capacity or unwillingness of intermediaries to respond to surging demand for liquidity.¹⁰ After years of public hearings, advisory committee meetings,¹¹ and deliberations,¹² the SEC has released a flurry of rulemaking proposals that would dramatically expand both the depth and breadth of bond market regulation.¹³

on the corporate bond market, where data is far murkier than in most other markets”); *see generally* Frank J. Fabozzi, *Bond Pricing, Yield Measures, and Total Return*, in *THE HANDBOOK OF FIXED INCOME SECURITIES* 63 (Frank J. Fabozzi ed., 9th ed. 2021) [hereinafter *HANDBOOK*] (explaining the various measures of return from holding a bond).

9. Yesha Yadav, *The Failed Regulation of U.S. Treasury Markets*, 121 *COLUM. L. REV.* 1173, 1215–18 (2021).

10. U.S. DEP’T OF THE TREAS. ET AL., *RECENT DISRUPTIONS AND POTENTIAL REFORMS IN THE U.S. TREASURY MARKET: A STAFF PROGRESS REPORT* 7, 17–21 (2021) [hereinafter *2021 TREASURY MARKET REPORT*] (discussing the causes behind the October 15, 2014 “flash rally,” the September 2019 repo market pressures, the March 2020 COVID-19 disruptions, and “other episodes”); *see also* U.S. DEP’T OF THE TREAS. ET AL., *THE U.S. TREASURY MARKET ON OCTOBER 15, 2014*, at 35–44 (2015) [hereinafter *2015 TREASURY MARKET REPORT*]; Yadav, *supra* note 9, at 1207–18.

11. Fixed Income Market Structure Advisory Committee, Exchange Act Release No. 81958, 82 Fed. Reg. 50460 (Oct. 31, 2017) (chartering the Fixed-Income Market Structure Advisory Committee (FIMSAC) “to provide the Commission with diverse perspectives on the structure and operations of the U.S. fixed income markets, as well as advice and recommendations on matters related to fixed income markets”); *see also* SEC. & EXCH. COMM’N, *STAFF REPORT ON THE FIRST YEAR OF THE FIXED INCOME MARKET STRUCTURE ADVISORY COMMITTEE* 2 (2018).

12. A prior SEC rulemaking proposal, under former SEC Chair Jay Clayton, would have extended Regulation ATS and Regulation SCI to certain alternative trading systems that exclusively trade U.S. government securities. Regulation ATS for ATSs That Trade U.S. Government Securities, NMS Stock, and Other Securities; Regulation SCI for ATSs That Trade U.S. Treasury Securities and Agency Securities; and Electronic Corporate Bond and Municipal Securities Markets, Exchange Act Release No. 90019, 85 Fed. Reg. 87106 (Dec. 31, 2020). Those proposals have been superseded by the proposals advanced under current SEC Chair Gary Gensler. *See* sources cited *supra* note 11.

13. *See, e.g.*, Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, Exchange Act Release No. 94062, 87 Fed. Reg. 15496 (Mar. 18, 2022) (to be codified at 17 C.F.R. pts. 232, 240, 242, 24) (proposing to amend the SEC’s definition of certain terms used in the Exchange Act’s definition of “exchange”); Further Definition of “As a Part of a Regular Business” in the Definition of Dealer and Government Securities Dealer, Exchange Act Release No. 94524, 87 Fed. Reg. 23054 (Apr. 18, 2022) (to be codified at 17 C.F.R. pt. 240) (proposing to define terms used in the Exchange Act’s definition of a “dealer” and “government securities dealer”); Request for Comment on Certain Information Providers Acting as Investment Advisers, Advisers Act Release No. 6050, 87 Fed. Reg. 37254 (June 22, 2022) (to be codified at 17 C.F.R. pts. 270, 275) (seeking public comment on whether certain information providers should be regulated under the Investment Advisers Act of 1940); Conflicts of Interest Associated with the Use of Predictive Data Analytics by Broker-Dealers and Investment Advisers, Exchange Act Release No. 43-97990, 88 Fed. Reg. 53960 (Aug. 9, 2023) (to be codified at 17 C.F.R. pts. 240, 275) (proposing rules to mitigate conflicts of interest in broker-dealers’ interactions with investors using certain technologies); Regulation Best Execution, Exchange Act Release No. 96496, 88 Fed. Reg. 5440 (Jan. 27, 2023) (to be codified at 17 C.F.R. pts. 240, 242) (proposing rules to enhance broker-dealers’ compliance with the duty of best execution); Standards for Covered Clearing Agencies for U.S. Treasury Securities and Application of the Broker-Dealer Customer Protection Rule With Respect to U.S. Treasury Securities, Exchange Act Release No. 95763, 87 Fed. Reg. 64610 (Oct. 25, 2022) (to be codified at 17

Predictably, these proposals draw on the SEC's decades of experience with regulating trading in stocks and exchange-traded funds. U.S. Treasury securities represent the most visible and liquid segment of the bond market: extending equity market rules to aspects of the U.S. Treasury market thus may make sense. But most fixed-income instruments do not enjoy the same liquidity, as a result of which dealer intermediation may be necessary. Where agency trading systems have developed in corporate and municipal bond markets, they are largely operated by (or for) dealers, thereby solidifying their role as intermediaries rather than with a view to bringing investors together. Policymakers should thus consider, as part of any regulatory strategy, how their actions would improve the liquidity and efficiency of otherwise hard-to-trade securities and improve opportunities for "all-to-all" trading.¹⁴

In particular, regulators and policymakers should keep several considerations in mind when tinkering with the structure of bond markets. First, the Federal Reserve Board and other financial regulators' actions during and after the 2008 financial crisis—including both heightened systemic risk regulation and policy interventions—may have reduced the ability or willingness of dealers to maintain, increase, or diversify bond inventories during times of market stress.¹⁵ Enhanced transparency and predictive artificial intelligence technologies may make finding counterparties increasingly probable, if not frictionless.¹⁶ Innovations in decentralized finance, moreover, aspire to renovate or even supplant existing trading systems, services, and technologies.¹⁷

The SEC's proposals nevertheless do not engage with these issues directly. The Commission is understandably scrambling to codify a consensus among financial regulators to contain systemic risks while addressing potentially problematic business practices. Nevertheless, there is a risk that its current proposals, while individually defensible, will collectively entrench markets around existing dealer and interdealer systems. At least, of course, if they do not simultaneously shape incentives for both established intermediaries and disruptive technologies to rethink how pricing, negotiating and execution services interact.

In this Article, I argue that the SEC's bond market agenda provides inadequate incentives for dealers, trading systems, and other market services to create meaningful information about bond prices and meaningful opportunities for such access. I contend that the SEC could enhance the efficiency of bond markets by giving operators of trading

C.F.R. pt. 240) (proposing to amend standards for covered clearing agencies to promote centralized clearing of secondary market transactions in Treasury securities). As this Article goes to press, the Commission has adopted, with some modifications, its proposed amendments to the definition of the phrase "as a part of a regular business" in the definition of "dealer" and "government securities dealer" and to the standards for covered clearing agencies. Further Definition of "As a Part of a Regular Business" in the Definition of Dealer and Government Securities Dealer in Connection with Certain Liquidity Providers, Exchange Act Release No. 99447, 89 Fed. Reg. 14938 (Feb. 29, 2024); Standards for Covered Clearing Agencies for U.S. Treasury Securities and Application of the Broker-Dealer Customer Protection Rule with Respect to U.S. Treasury Securities, Exchange Act Release No. 99149, 89 Fed. Reg. 2714 (Jan. 16, 2024).

14. ALAIN CHABOUD ET AL., FED. RESRV. BANK OF N.Y., STAFF REP. NO. 1036, ALL-TO-ALL TRADING IN THE U.S. TREASURY MARKET (2022) [hereinafter ALL-TO-ALL TRADING REPORT].

15. See *infra* Part IV.A & B; see also 2021 TREASURY MARKET REPORT, *supra* note 10, at 25.

16. See *infra* Part IV.C.

17. See *infra* Part IV.D.

systems and technologies greater incentives, authority, and flexibility to promote price discovery, access, and interoperability. I suggest three broad principles for doing so:

- Information exchange—such as the negotiation and pricing of bond trades—is a non-fiduciary commercial service that can be offered and regulated independently of trade execution and advisory services;
- Regulated trading systems can and should be empowered to better enforce and validate the fairness of the terms at which trades executed through their systems take place; and
- Trading systems and services should have the flexibility to experiment with pricing, negotiating, and trading protocols on decentralized platforms and other emergent technologies.

I argue that adhering to such principles can encourage market participants to take bolder steps to improve participation in bond trading systems and services and ultimately liquidity and efficiency in bond markets. Part II of this Article provides an overview of the organization of the bond market, while Part III reviews the regulation of bond trading today. Part IV catalogs some of the forces shaping the evolution of bond trading. Part V reviews several recent SEC rulemaking proposals and their implications for bond market structure. Part VI discusses my proposed principles in detail and how they might help shape a more vibrant bond market.

II. A BRIEF OVERVIEW OF THE U.S. BOND MARKET

Unlike stocks, options, futures, and other exchange-traded products—where trading is concentrated in a relative handful of instruments listed or admitted to trading¹⁸—bond markets facilitate trading in a broad variety of issues with different obligors, maturities, terms, and features.¹⁹ In this sense, there is no single market for bonds in the United States but, rather, a gamut of instruments that trade in similar ways but with differing degrees of liquidity.²⁰

It is useful, however, to review some of the old and new players in bond market structure. In primary market transactions, government, municipal, and corporate issuers

18. Most of the rules governing equity market trading—such as Regulation NMS—cover only “national market system securities.” 15 U.S.C. § 78k-1(a)(2). These include stocks, options, exchange-traded funds, and other securities listed for or admitted to trading by one or more registered securities exchanges. 17 C.F.R. § 242.600(b)(54) (2024). Futures exchanges similarly make available for trading “contracts that are not readily susceptible to manipulation.” 17 C.F.R. § 38.200 (2024).

19. See generally Hendrik Bessembinder, Chester Spatt & Kumar Venkataraman, *A Survey of the Microstructure of Fixed-Income Markets*, 55 J. FIN. & QUANT. ANALYSIS 1 (2020) (reviewing finance literature on bond market structure).

20. “Liquidity” can alternately be defined as the “cost or immediacy” of buying and selling opportunities in a security at any point in time. See, e.g., 2015 TREASURY MARKET REPORT, *supra* note 10, at 8 (explaining these concepts). Liquidity generally correlates to the size of an issuer, and how recently the instrument was issued. Bonds whose issuers’ stock is publicly traded also tend to be more liquid. See, e.g., Edith Hotchkiss & Gergana Jostova, *Determinants of Corporate Bond Trading: A Comprehensive Analysis*, 7 Q.J. FIN. 1750003-1, at 1750003-26 to -27 (2017) (studying the relationship between bond attributes and their liquidity); Amy K. Edwards, Lawrence E. Harris & Michael S. Piwowar, *Corporate Bond Market Transaction Costs and Transparency*, 62 J. FINANCE 1421, 1430–31 (2007).

(obligors) offer bonds to institutional investors, bond funds, and individual households through the intermediation of brokers, dealers, and banks acting as underwriters or placement agents.²¹ In the secondary market, dealers have traditionally intermediated bond transactions among investors, regularly acting as a trading counterparty (principal) rather than as a broker.²² The emergence of new classes of trading systems, technologies and services, however, has radically transformed the relationship between investors and intermediaries in the secondary marketplace.

A. Obligors

Bonds (for purposes of this Article) are obligations of an entity that promises to repay borrowed money at a rate of interest for a specified time.²³ While all bonds are generally “securities” within the meaning of U.S. securities law,²⁴ how they are regulated turns in principal part on who the obligor is. Among the major obligors in U.S. trading markets are the U.S. government; U.S. government agencies and government-sponsored enterprises (GSEs); state, county, and local governments and related entities; and corporations or other business entities. This Part provides a brief summary of their principal attributes.

U.S. Treasury. The market for U.S. Treasury securities—backed by the full faith and credit of the U.S. government—is considered “the most liquid and efficient fixed-income market in the world.”²⁵ Competitive bidding and secondary market trading in Treasury markets, together, set the daily U.S. yield curve against which many debt securities are

21. Corporate bonds are generally issued under the same Securities Act framework for public offerings and private placements of equity securities, while U.S. government and municipal securities offerings are exempt from the Securities Act and are offered under bespoke regimes. See Michael J. Fleming & Frank J. Fabozzi, *U.S. Treasury Securities*, in HANDBOOK, *supra* note 8, at 171, 173–78 (describing primary transactions in government securities); Sylvan G. Feldstein et al., *Municipal Bonds*, in HANDBOOK, *supra* note 8, at 201, 227–28 (describing primary market transactions in municipal securities); Felicia H. Kung, *The Regulation of Corporate Bond Offerings: A Comparative Analysis*, 26 U. PA. J. INT’L ECON. L. 409 (2005) (contrasting the regulation of corporate bond offerings in the United States and the EU).

22. Because bond dealers typically trade with customers as a counterparty, rather than as an agent, they collect compensation in the form of a “mark-up/mark-down” over their acquisition cost rather than a trading commission. The mark-up or mark-down compensates dealers for the risk of holding bonds in inventory to the extent that (i) the odds of finding a counterparty to a trade are low, (ii) the search costs of finding a counterparty are relatively high, and (iii) there is sparse information about trading interest. Ryan J. Davies & Erik R. Sirri, *The Economics and Regulation of Secondary Trading Markets* 82 (July 20, 2017) (unpublished manuscript) (presented as part of the New Special Study of the Securities Markets at Columbia University), <https://dx.doi.org/10.2139/ssrn.3012536> [<https://perma.cc/8UPQ-VEMG>].

23. For purposes of this Article, I use the term “bond” loosely to refer to a spectrum of debt securities that are offered under different names, including bills, notes, and debentures, as appropriate.

24. *Reves v. Ernst & Young*, 494 U.S. 56, 63 (1990); see 15 U.S.C. § 77(a)(1) (defining the term “security” under the Securities Act of 1933); 15 U.S.C. § 78c(a)(10) (defining and applying the term “security” under the Securities Exchange Act of 1934).

25. GREENWICH ASSOCIATES & SIFMA INSIGHTS, UNDERSTANDING FIXED INCOME MARKETS IN 2023 5 (2023), <https://www.sifma.org/wp-content/uploads/2023/05/Understanding-Fixed-Income-Markets-2023-23-2007.pdf> [<https://perma.cc/2XL5-9TQ3>].

priced.²⁶ As historically “safe” instruments,²⁷ they are treated as near cash equivalents in the prudential regulation of financial institutions and intermediaries.²⁸ Their price stability also facilitates ready financing, which allows dealers to maintain deep inventory.²⁹ Positions in Treasury securities are issued or maintained in one of various book-entry systems.³⁰

U.S. Government Agencies and GSEs. In addition to U.S. Treasuries, various government agencies and GSEs periodically issue bonds as part of their mission to provide access to credit to targeted sectors of the U.S. economy. As such, their terms often reflect the underlying economics of the cash flows they support.³¹ Agency securities are backed by the full faith and credit of the U.S. government, while the U.S. government’s willingness to implicitly guarantee GSE securities is “widely recognized *ex ante*.”³² They are recognized as “government securities” for most regulatory purposes.³³

U.S. Municipalities. Securities issued by state, municipal and local governments play a vital role in financing much of the infrastructure of the United States.³⁴ There are over 50,000 municipal issuers in the United States and over 1 million issues of municipal securities outstanding with varying maturities, attributes and creditworthiness.³⁵ Municipal

26. *Interest Rate Statistics*, U.S. DEP’T OF THE TREAS., <https://home.treasury.gov/policy-issues/financing-the-government/interest-rate-statistics> [<https://perma.cc/Z4E5-2MQP>].

27. Anna Gelper & Erik F. Gerding, *Inside Safe Assets*, 33 YALE J. ON REGUL. 363, 383–85 (2016). Both S&P Global Ratings and Fitch have nevertheless questioned the safety of U.S. Treasury debt in light of recurring controversies over the U.S. debt ceiling and concerns about the “erosion of governance.” See Matt Grossman & Andrew Duehren, *Fitch Downgrades U.S. Credit Rating*, WALL ST. J. (Aug. 1, 2023), <https://www.wsj.com/articles/fitch-downgrades-u-s-credit-rating-56c73b89> (on file with the *Journal of Corporation Law*).

28. See, e.g., 12 C.F.R. § 329.20 (2024) (classifying Treasury securities as a “level 1 liquid asset”); 17 C.F.R. § 270.2a-7(a)(11) (2024) (classifying Treasury securities as “eligible securities” for money market funds); 17 C.F.R. § 1.25 (2024) (permitting futures brokers to invest customer funds in Treasury securities).

29. For example, the low risk of default on Treasury securities facilitates a deep market for “repurchase agreements,” in which holders of securities seeking financing sell (“repo out”) title to securities overnight to a counterparty providing financing, subject to an agreement to repurchase equivalent securities at a premium that reflects the overnight financing rate; dealers providing such financing are said to “reverse in” securities as counterparty. 2021 TREASURY MARKET REPORT, *supra* note 10, at 3–4; see also Kenneth C. Kettering, *Securitization and Its Discontents: The Dynamics of Financial Product Development*, 29 CARDOZO L. REV. 1553, 1640–55 (2008) (describing the evolution of the repo market). The repo markets have evolved into important tools for managing the money supply. *Repo and Reverse Repo Agreements*, FED. RESRV. BANK OF N.Y., <https://www.newyorkfed.org/markets/domestic-market-operations/monetary-policy-implementation/repo-reverse-repo-agreements> [<https://perma.cc/W3Z6-8LFC>].

30. 31 C.F.R. § 356.4 (2024) (describing the National Book-Entry System for Federal Reserve Banks, TreasuryDirect, and Legacy TreasuryDirect).

31. See generally Mark Cabana, *Agency Debt Securities*, in HANDBOOK, *supra* note 8, at 185. Such federal government agencies include the Federal Housing Administration (FHA), the Small Business Administration (SBA), and the Government National Mortgage Association (GNMA). GSEs include the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Association (Freddie Mac), *inter alia*.

32. See Gelper & Gerding, *supra* note 27, at 399–402.

33. See, e.g., 15 U.S.C. § 78c(a)(42) (defining government securities).

34. Municipal securities may be structured as general obligations of a specific municipality or municipal entity, as obligations of an investment conduit for multiple municipal entities, or as obligations tied to a specific municipal project. See 15 U.S.C. § 78c(a)(29) (defining “municipal securities”).

35. MUN. SECS. RULEMAKING BD., MUNI FACTS (2022), <https://www.msrb.org/sites/default/files/2022-09/MSRB-Muni-Facts.pdf> [<https://perma.cc/FM8U-9W4G>].

securities are generally exempt from federal (and often state and local) taxation, which allows municipal issuers to borrow at lower yields than corporate borrowers.³⁶ Municipal securities trading is dominated by retail sized orders.³⁷ The Municipal Securities Rulemaking Board (MSRB) oversees dealers and bond departments of depository institutions that act as dealers in this market³⁸ as well as the distribution of offering documents and periodic disclosures in connection with municipal securities.³⁹

Corporations and Other Business Entities. Corporate bonds serve as an alternative to short-term commercial paper or even bank financing for blue-chip companies.⁴⁰ Corporations issue bonds in public offerings or private placements with institutional buyers pursuant to federal securities law.⁴¹ Some high-quality corporate and municipal bonds might be listed on a national securities exchange (such as the New York Stock Exchange), yet most corporate bonds trade in the over-the-counter market.⁴² Bonds placed for sale under Rule 144A may trade among qualified institutional buyers through dealers or designated trading platforms.⁴³ There is empirical evidence that bond prices incorporate corporate earnings information and other issuer disclosures.⁴⁴

Tables 1, 2, and 3 set forth the annual net issuances, outstanding float, and average daily trading volume for each category of obligor.⁴⁵ One immediate observation is that the low-interest rate environment of the past decade has led many governments and corporations to finance operations through bond issuances, with the result that outstanding float and net issuances have increased significantly. While this Article focuses on U.S.

36. 26 U.S.C. § 103 (excluding from gross income interest on any state or local bond except a private activity bond that is not a qualified bond, an arbitrage bond, or an unregistered bond).

37. See, e.g., John Chalmers, Yu (Steve) Liu & Z. Jay Wang, *The Difference a Day Makes: Timely Disclosure and Trading Efficiency in the Muni Market*, 139 J. FIN. ECON. 313, 317, 318 tbl.2 (2021) (finding that “retail size trades (less than \$25,000)” accounted for over half of the total number of daily trades in 2011–2012).

38. 15 U.S.C. § 78o-4(b). Because depository institutions have historically traded or dealt in municipal securities, the MSRB promulgates business conduct rules for municipal dealers, which are enforced by the “appropriate regulatory agency” for such dealers based on whether they are organized as a bank or broker-dealer. *Id.* § 78o-4(b)(2), (c); see also *id.* § 78c(a)(34) (defining “appropriate regulatory agency” with respect to a “municipal securities dealer”). For banks, these include the Comptroller of the Currency, the Federal Reserve Board, or the Federal Deposit Insurance Corporation. 15 U.S.C. § 78c(a)(34).

39. The SEC and the MSRB may not compel a municipal issuer to file an offering document prior to the sale of municipal securities. 15 U.S.C. § 78o-4(d)(1). They can, nevertheless, compel dealers participating in a municipal securities offering to “furnish to the Board or purchasers or prospective purchasers of municipal securities applications, reports, documents, and information with respect to the issuer thereof which is generally available from a source other than such issuer.” 15 U.S.C. § 78o-4(d)(2). They do. 17 C.F.R. § 240.15c2-12 (2024).

40. SIFMA, 2022 CAPITAL MARKETS FACT BOOK 6 (2022) (finding U.S. non-financial corporations appear to rely on debt capital markets for 77.5% of total debt financing—versus 22.5% bank lending—whereas firms in the Euro area, U.K., Japan, and China appear to rely on bank lending for over 70% of their debt financing).

41. 15 U.S.C. §§ 77d(a)(2), 77e. Debt with a maturity of less than one year is typically placed with institutional investors as “commercial paper” outside of federal securities law. *Id.* § 77c(a)(3).

42. See Edwards, Harris & Piwowar, *supra* note 20, at 1426–27 (noting that, for a 2003–2004 sample period, “[f]ewer than 5% of all bonds are listed on the NYSE” and that NYSE transactions, “which are almost all small retail trades, represent from zero to 40% of all transactions” for those bonds); see also *infra* note 80.

43. 17 C.F.R. § 230.144A (2024).

44. Bessembinder, Spatt & Venkataraman, *supra* note 19, at 15.

45. See SIFMA, U.S. FIXED-INCOME SECURITIES STATISTICS (2023). While some of the discussion in this Part is also applicable to secondary trading in other “fixed-income” securities—such as foreign sovereign debt, mortgage- and asset-backed securities—these securities are offered under idiosyncratic regulatory regimes.

bond market regulation, this is a global phenomenon preoccupying foreign securities and banking regulators as well.⁴⁶ Increased public and private sector borrowing in a low-interest rate environment can have significant long-term costs.⁴⁷

B. Investors

The viability of a secondary market for any security turns on the investment and liquidity needs of investors. Shares of stock—as quintessential “locked-in capital”—are, by default, freely alienable; investors seeking liquidity are generally expected to resell their shares rather than seek redemption.⁴⁸ By contrast, bonds offer built-in liquidity events at stated coupon, prepayment, and maturity dates. Newly issued bonds frequently change hands while “on the run,” but they rarely trade thereafter.⁴⁹ The happiest bonds, one might imagine, are “like museum pieces: they get put away in insurance companies’ portfolios, never to trade again.”⁵⁰ For bonds that struggle to find a forever home, the secondary market manages supply and demand as interest rates fluctuate, the fortunes of obligors change, and the investment objectives of holders evolve.

Traditional institutional investors—such as insurance companies and pension funds—account for much of the demand for U.S. bonds. Such investors generally invest premiums, retirement contributions, and other income in a portfolio that is able to pay out anticipated claims based on actuarial assumptions.⁵¹ Regulatory authorities may restrict the allocation of securities in institutional portfolios, historically with a significant allocation to investment-grade bonds.⁵² Such institutions trade in secondary markets not only to adjust portfolios reactively but also to maximize total return on invested capital within tax, accounting, and other regulatory constraints.⁵³

46. See INT’L ORG. OF SEC. COMM’NS [IOSCO], *EXAMINATION OF LIQUIDITY OF THE SECONDARY CORPORATE BOND MARKETS*, at 5–11, No. FR05/2017 (Feb. 2017), <https://www.iosco.org/library/pubdocs/pdf/IOSCOPD558.pdf> [<https://perma.cc/HAD8-G7F7>].

47. See, e.g., JEAN TIROLE, *ECONOMICS FOR THE COMMON GOOD* 336–39 (2017) (noting, among other consequences, redistribution of wealth from savers to borrowers, the emergence of financial bubbles, and increased risk-taking by financial institutions when borrowing and lending).

48. Margaret M. Blair, *Locking in Capital: What Corporate Law Achieved for Business Organizers in the Nineteenth Century*, 51 UCLA L. REV. 387, 392 (2003).

49. Michael A. Goldstein & Edith S. Hotchkiss, *Providing Liquidity in an Illiquid Market: Dealer Behavior in U.S. Corporate Bonds*, 135 J. FIN. ECON. 16, 23 (2020) (finding that “bonds in the lowest decile of trade count have a median trade count of 0.1 trades per month, versus 12.3 trades per month for the [top five deciles]”); see also Dan McCrum, *Most Bonds Don’t Trade*, FIN. TIMES (Sept. 10, 2018), <https://www.ft.com/content/3175772a-7ea0-3b61-ae53-063459e78c42> (on file with the *Journal of Corporation Law*) (citing Citi research that “on average, only 18% of the entire corporate bond universe (by CUSIP) traded on any given day” and that “[f]or issues that traded 5 times or more on a given day, the percentage was in the single digits at about 8%”).

50. *A New Epoch for Retail Investors Is Just Beginning*, THE ECONOMIST (Feb. 6, 2021), <https://www.economist.com/finance-and-economics/2021/02/06/a-new-epoch-for-retail-investors-is-just-beginning> (on file with the *Journal of Corporation Law*) (quoting Richard Schiffman of MarketAxess).

51. See, e.g., E. PHILIP DAVIS & BENN STEIL, *INSTITUTIONAL INVESTORS* 12–18 (2001) (describing the main types of institutional investor and their investment and allocation strategies).

52. Jack Malvey, *Global Credit Bond Portfolio Management*, in HANDBOOK, *supra* note 8, at 1391, 1404–05 (describing “portfolio constraints” on investment strategies and their impact on bond market efficiency).

53. *Id.* at 1405–06 (discussing the reasons for the prevalence of “buy-and-hold” investment strategies for asset/liability managers).

Individual households—typically closer to retirement or higher in net worth—may buy bonds as part of a “laddered” portfolio that sequences issues with serial maturities to generate a stable stream of income.⁵⁴ Retail investors in higher income brackets are particularly motivated to purchase tax-advantaged instruments such as municipal bonds.⁵⁵ Some corporate issuers list bonds tradable in smaller denominations for retail investors as well (baby bonds).⁵⁶

Mutual funds and *exchange traded funds* (ETFs) allow retail investors to hold a diversified investment in the bond market. Funds may be actively managed or passively track a bond index.⁵⁷ Unlike insurance companies and pension funds, mutual funds must stand ready to create or redeem shares based on the liquidity needs of their shareholders. Accordingly, such funds rely on the availability of a secondary market to purchase or sell securities as necessary to meet investor demand.⁵⁸ For ETFs, “authorized participants” may similarly acquire bonds to create new bond ETF shares and dispose of bonds from the redemption of bond ETF shares.⁵⁹

Proprietary traders—including investment banks and hedge funds—account for a significant percentage of trading on automated trading systems.⁶⁰ While some specialized hedge funds may acquire bonds for purposes of exercising consent or veto rights, most hedge funds trade with the intention of profiting from trading strategies.⁶¹ Proprietary traders may use a variety of high-frequency trading techniques, including arbitrage and “passive” market making, which generate a high volume of orders and cancellations relative to their net position.⁶² As a result, they concentrate their trading activity in the

54. *Understanding Municipal Bond Ladders in a Rising Rate Environment*, PIMCO, <https://www.pimco.com/en-us/resources/education/understanding-municipal-bond-ladders-in-a-rising-rate-environment/> [<https://perma.cc/T6JR-PBSN>] (explaining how a laddered approach can create a schedule of structured payments); see also Gueorgui S. Konstantinov & Momtchil Pojarliev, *Electronic Trading*, in HANDBOOK, *supra* note 8, at 117–23 (discussing how improvements to electronic bond trading impact the market).

55. Feldstein et al., *supra* note 21, at 225–27, 246–49.

56. See *infra* note 78 (describing exchange-listed bonds).

57. Bond indexes use a sample of securities with specified attributes instead of a definitive list of component securities. Frank K. Reilly & David J. Wright, *Bond Market Indexes*, in HANDBOOK, *supra* note 8, at 1125–31, 1145.

58. See, e.g., Itay Goldstein, Hao Jiang & David T. Ng, *Investor Flows and Fragility in Corporate Bond Funds*, 126 J. FIN. ECON. 592, 611–12 (2017); see also *infra* notes 170–73.

59. See, e.g., Henry T. C. Hu & John D. Morley, *A Regulatory Framework for Exchange-Traded Funds*, 91 S. CAL. L. REV. 839, 853 (2018). Several industry participants have argued that systems facilitating the creation and redemption of ETF shares should not be regulated as “exchanges” under the SEC’s proposed rules discussed below. E.g., Inv. Co. Inst., Comment Letter on Proposed Rule to Amend the Definition of “Exchange” (Apr. 18, 2022), <https://www.ici.org/system/files/2022-04/34120a.pdf> [<https://perma.cc/S89Q-CM3Z>].

60. Further Definition of “As a Part of a Regular Business” in the Definition of Dealer and Government Securities Dealer, 87 Fed. Reg. 23054, 23055, 23080 (proposed Apr. 18, 2022) (to be codified at 17 C.F.R. pt. 240). The SEC notes, for example, that unregistered market participants have represented a majority of the trading volume in the electronic interdealer market for Treasury securities since 2014. *Id.* at 23055.

61. Ellen Rachlin, Chris P. Dialynas & Vineer Bhansali, *Hedge Fund Fixed-Income Strategies*, in HANDBOOK, *supra* note 8, at 1467, 1467–69 (describing strategies).

62. Further Definition of “As a Part of a Regular Business,” 87 Fed. Reg. at 23055 n.12; see also Yadav, *supra* note 9, at 40–43.

most liquid securities and seek “direct market access” to automated interdealer trading systems.⁶³

C. Intermediaries

While some classes of bonds trade on an exchange, the majority of bond market participants rely on dealers to intermediate trades.⁶⁴ In recent decades, trading systems, services, and technologies have developed a variety of auction mechanisms, public display facilities, and negotiation platforms to match buying and selling interest directly. I discuss each in turn.

1. Dealers

Bond dealers, like equity market makers, have historically held themselves out as being willing to trade specific classes of securities or to facilitate customer transactions.⁶⁵ When dealers match a buyer and seller, they may execute the trade as “agent” or as a “riskless principal.”⁶⁶ More often, they buy or sell bonds with a view to holding them for their own account (as “principal”) until they can find a counterparty. Dealers ostensibly earn profits from the difference (“spread”) between the prices at which they hold themselves out as willing to buy (bid) and sell (ask) bonds in the marketplace.⁶⁷ Unlike equity market makers,⁶⁸ bond dealers must often hold securities in inventory for extended

63. See 17 C.F.R. § 240.15c3-5 (2024); see also Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15552–53 (proposed Mar. 18, 2022) (to be codified at 17 C.F.R. pts. 232, 240, 242, 249) (seeking disclosure of direct market access arrangements).

64. LARRY HARRIS, TRADING AND EXCHANGES 92–96 (2003).

65. See Definition of Terms in and Specific Exemptions for Banks, Exchange Act Release No. 47364, 68 Fed. Reg. 8686, 8688–90 (Feb. 24, 2003) (to be codified at 17 C.F.R. pt. 240) (suggesting, in the context of distinguishing “traders” from “dealers,” that dealers generally provide liquidity services in transactions with investors, while market makers generally provide such services in transactions with other professionals).

66. When a dealer acts as a “riskless principal,” it matches a buyer and seller through a prearranged trade on both sides of its ledger. Regulation Best Execution, 88 Fed. Reg. 5440, 5476, 5556 (proposed Jan. 27, 2023) (to be codified at 17 C.F.R. pts. 240, 242). In such transactions, the dealer may charge a mark-up or mark-down on the transaction. *Id.* At 5478 (seeking comment as to whether it “would it be more appropriate to require the two legs of a riskless principal trade to be executed at the same price”); see also *supra* note 24. When a dealer brokers a trade as an “agent,” it collects a commission for effecting the trade between the parties. In equity markets, where market centers actively compete for orders, retail brokers also receive compensation in connection with order routing arrangements such as exchange rebates or payment for order flow. *Id.* At 5446–47 (discussing the conflicts of interest created by exchange rebates and payment for order flow).

67. See, e.g., 17 C.F.R. § 255.4(b)(2) (2024); 17 C.F.R. pt. 255 app. A ¶ IV.b (2024) (source-of-revenue measurements).

68. Stanislav Dolgoplov, *Risks and Hedges of Providing Liquidity in Complex Securities: The Impact of Insider Trading on Options Market Makers*, 15 FORDHAM J. CORP. & FIN. L. 387, 400 n.41 (2010) (listing empirical studies suggesting that “equity market makers can rebalance their inventories relatively quickly,” often overnight).

periods of time.⁶⁹ Accordingly, bond dealers must not only finance their inventory positions,⁷⁰ but they must also manage their market, liquidity, and concentration risk.⁷¹

Retail dealers generally trade with individuals and entities with whom they have customer relationships. Such activity generally encompasses buying securities for resale to customers or purchasing unwanted securities from customers. Retail dealers also make investment and trading recommendations and provide research reports and other incidental advisory and financial services. Rather than maintain inventory, retail dealers often contemporaneously acquire or dispose of securities in transactions with wholesale dealers.⁷² As discussed in the next Part, retail dealers increasingly operate or participate in electronic systems that display firm quotes or indicative prices aggregated from other market centers.

Wholesale dealers in turn facilitate larger transactions within a network of dealer and institutional investor relationships.⁷³ For example, investment and commercial banks that underwrite primary market bond offerings often informally commit to creating markets in those bonds for investors to sustain secondary liquidity.⁷⁴ Wholesale dealers are also better positioned to accommodate block transactions on behalf of institutional investors, which eases the impact of otherwise potentially market moving activity.⁷⁵ Because wholesale

69. Paul Schultz, *Inventory Management by Corporate Bond Dealers 2–4* (May 11, 2017) (unpublished manuscript), <https://dx.doi.org/10.2139/ssrn.2966919> [<https://perma.cc/P3QC-9WH2>] (discussing the “half-life” of inventory as metric); cf. Seha M. Tinic, *The Economics of Liquidity Services*, 86 Q.J. ECON. 79, 81 (1972) (indicating that dealer specialists must hold larger positions for longer periods of time to provide adequate liquidity to the market when dealing in inactive stock issues). Inventory turnover and aging were among the attributes federal financial regulators initially used when distinguishing “market making” from “proprietary trading” under the Volcker Rule. Prohibitions and Restrictions on Proprietary Trading and Certain Interests, 79 Fed. Reg. 5536, 5800 (Jan. 31, 2014) (codified at 12 C.F.R. pts. 44, 248, 255, 351). *But see* Prohibitions and Restrictions on Proprietary Trading and Certain Interests in, and Relationships with, Hedge Funds and Private Equity Funds, 84 Fed. Reg. 61974, 62031–33 (Nov. 14, 2019) (revising these metrics).

70. A bond position may be financed, for example, by borrowing against the bond as collateral (“hypothecation”) or selling the bond to a counterparty subject to an obligation to repurchase it for a premium representing the cost of borrowing (“repurchase agreement”).

71. *See, e.g.*, Lael Brainard, Governor, Fed. Rsv. Bd., *Speech at the Policy Maker’s Panel on Financial Intermediation at the Salzburg Global Forum on Finance in a Changing World: Complexities and Risks for the Future of Financial Intermediation: Banking, Securities Markets, or Something New?* (July 1, 2015), 2015 WL 4064974, at *2.

72. Unlike in equity markets, however, retail bond dealers do not generally collect a commission but instead typically “mark-up” bonds for resale or “mark-down” bonds for repurchase. Larry Harris, *Transaction Costs, Trade Throughs, and Riskless Principal Trading in Corporate Bond Markets 2–4* (Oct. 22, 2015) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2661801 [<https://perma.cc/MBA9-57SS>].

73. *See, e.g.*, Bessembinder, Spatt & Venkataraman, *supra* note 19, at 25–26 (citing research into dealer networks). The authors note, for example, that “central or core dealers are highly interconnected” and “participate in intermediation chains that can involve multiple dealers.” *Id.* at 25. For this reason, their trading activity is considerably more difficult to distinguish from proprietary trading under the Volcker Rule. Schultz, *supra* note 69, at 7–8.

74. *See, e.g.*, DAVID P. STOWELL, *AN INTRODUCTION TO INVESTMENT BANKS, HEDGE FUNDS, AND PRIVATE EQUITY* 98 (2010). In the case of U.S. government securities, the Federal Reserve Bank of New York (FRBNY) designates primary dealers, as trading counterparties, “to make markets for the New York Fed on behalf of its official accountholders as needed, and to bid on a pro-rata basis in all Treasury auctions at reasonably competitive prices.” *Primary Dealers*, FED. RSRV. BD. OF N.Y., <https://www.newyorkfed.org/markets/primarydealers> [<https://perma.cc/S983-D5Y7>].

75. *See, e.g.*, HARRIS, *supra* note 64, at 328–32 (2003).

dealers take on a greater inventory and trade more frequently with other dealers, including retail dealers, their activities require considerable capital commitment.⁷⁶ One recent study found market making activity in individual corporate bonds to be highly concentrated in a handful of dealers.⁷⁷

2. Trading Systems

Trading “systems”—whether organized as trading posts, coffeehouses, rolodexes, exchanges, or software protocols—match buying and selling interest together. Historically, *securities exchanges* played this role: even when traders negotiated trades “upstairs” or with rivals at the “curbside” rather than on the “floor” or using the “cabinet,” exchange facilities have served as a locus of price discovery for stocks and bonds alike.⁷⁸ Curiously, bond trading has largely migrated away from traditional floor-based exchanges since the mid-20th century.⁷⁹ Nevertheless, the SEC’s statutory authority to directly regulate trading systems (as discussed in Part V below) continues to derive from the Exchange Act’s definition of an “exchange.”

Today, *interdealer brokers* or *brokers’ brokers* facilitate trading among dealers as well as certain other subscribers.⁸⁰ These systems help dealers manage the risk of holding large or concentrated inventory positions. Such systems have traditionally facilitated trades

76. This creates problems under the Volcker Rule because “customer-facing activity” is one of the indicators of “market making” activity. 12 C.F.R. § 248.4(b)(2)(ii) (2024) (limiting scope of permitted “market making-related activities” to “the reasonably expected near term demands of clients, customers, or counterparties”); see also Schultz, *supra* note 69, at 7–8, 26 (noting that “[u]nder the Volcker Rule, dealers are discouraged from engaging in a lot of interdealer trades”).

77. Maureen O’Hara, Yihui Wang & Xing (Alex) Zhou, *The Execution Quality of Corporate Bonds*, 130 J. FIN. ECON. 308, 309 (2018) (finding that the top dealer does “on average 69% of the volume” and the top three dealers have a “92% market share” for the average corporate bond sampled).

78. The New York Stock Exchange has designated NYSE Bonds as its electronic system for receiving, processing, executing, and reporting orders in bonds. Order Approving NYSE Proposed Rule Change Relating to Additional Order Types to the NYSE BondsSM Platform, Exchange Act Release No. 77880, File No. SR-NYSE-2016-17, 81 Fed. Reg. 33563 (May 26, 2016); see also NYSE BONDSSM, Rule No. 86 (N.Y. STOCK EXCH. 2016) (codified rule). Nasdaq similarly offers the Nasdaq Bond Exchange. *Nasdaq Bond Exchange*, NASDAQ, <https://www.nasdaq.com/solutions/nasdaq-bond-exchange> [<https://perma.cc/5JJD-XK95>]. As of August 26, 2023, there were approximately 8076 non-convertible corporate bonds, 9 general obligation municipal bonds, 14 federal agency bonds, and 17 U.S. Treasury bonds and notes listed on the New York Stock Exchange. See, e.g., *New York Stock Exchange Bonds*, NYSE, <https://www.nyse.com/products/bonds> [<https://perma.cc/HRB6-WREG>] (dataset enclosed within webpage). One estimate puts trading volume in listed bonds at around \$19 billion as of January 2020. See Eric Uhlfelder, *A Forgotten Investment Worth Considering: Exchange-Traded Bonds*, WALL ST. J. (Jan. 5, 2020), <https://www.wsj.com/articles/a-forgotten-investment-worth-considering-exchange-traded-bonds-11578279781> (on file with the *Journal of Corporation Law*) (cited in Exchange Act Release No. 94062, 87 Fed. Reg. 15496, 15604 n.863 (Mar. 18, 2022)). See also *supra* note 24.

79. Bruno Biais and Richard Green observe that customer transaction costs were lower for corporate and municipal securities traded on exchanges in the early 20th century than contemporary dealer costs. They posit various theories for the shift from exchange trading to over-the-counter trading, including the decreased floor capacity of the NYSE during the Roaring Twenties, as well as the rise in institutional trading. Bruno Biais & Richard Green, *The Microstructure of the Bond Market in the 20th Century*, 33 REV. ECON. DYNAMICS 250, 251–52 (2019).

80. The term “broker’s broker” is primarily used in the municipal securities industry to refer to municipal securities dealers who broker trades between dealers. The term “interdealer broker” is generally used for other products. I will use the term “interdealer broker” throughout to refer to both.

on a purely agency basis and operate today like an automated central limit order book. In Treasury markets, a handful of interdealer brokers dominate secondary market trading.⁸¹ Participants in these systems include dealers, hedge funds, proprietary traders, and some institutional investors.⁸² Transactions may be cleared bilaterally between parties or through the interdealer broker as counterparty.⁸³

To the extent it has the authority to do so,⁸⁴ the SEC generally regulates such interdealer brokers under the rubric of *alternative trading systems* (ATSs) exempt from exchange registration.⁸⁵ Other execution systems under the ATS rubric also match buying and selling interest on a purely agency basis. These systems generally execute transactions among subscribers through the application of predetermined rule sets governing the operation of “auctions” or periodic “crossing” sessions.⁸⁶ To maximize participation in such services, many ATSs facilitate transactions among anonymous counterparties as a clearing broker.⁸⁷

According to the SEC, interdealer trading systems collectively account for nearly 50% of trading volume in “on the run” Treasury securities.⁸⁸ Moreover, “principal trading firms” account for half of ATS trading volume in such securities.⁸⁹ As discussed below, such proprietary trading firms employ the same high-frequency and algorithmic trading strategies that embroil stock and futures markets.⁹⁰ In the absence of consolidated last-sale data, the transaction information generated by several such ATSs has served as a proxy for real-time information about Treasury rates; such data feeds may therefore be used in a variety of real-time pricing mechanisms for other debt securities.⁹¹

Single-dealer systems, by contrast, execute firm “quotations” and “orders” on a non-discretionary, fully automated basis for the account of a single dealer. For example, dealer algorithms may generate firm quotations and execute trades against incoming interest

81. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15595–97 tbls.viii.1 & viii.2 (Mar. 18, 2022) (noting that, of the 17 ATSs that trade government or agency securities, the “largest ATS by Treasury dollar volume has 15.2 percent of the total Treasury Securities market reported to TRACE. Two Government Securities ATSs have dollar volumes that are over five percent of the total TRACE volume figure, and four have dollar volumes over three percent”).

82. Amendments Regarding the Definition of “Exchange,” 87 Fed. Reg. at 15512–14, 15598 tbl.viii.3.

83. See *infra* note 143 and accompanying text (discussing how clearing agencies act as central counterparties).

84. See *infra* Part V.A.1 The SEC lacks the authority to comprehensively regulate broker-dealers who exclusively trade government securities (government securities broker-dealers) as well as entities that exclusively act as agents or brokers solely with respect to municipal securities transactions (municipal securities brokers). As a result, the SEC has historically exempted certain government and municipal securities trading systems from regulation.

85. See *infra* Part V.A.1.

86. The timeframe for bond auctions may last hours—in contrast to the opening, closing, and after-hours auctions common in equity markets—and may include a limited number of participating bidders. See, e.g., 2017 *Fixed-Income Hearing*, *supra* note 2, at 17 (testimony of Marc Andreessen discussing how bond trading systems operate).

87. Such ATSs are clearing members of the relevant bond clearing agencies and may enter clearing arrangements with subscribers who are not otherwise “self-clearing.” See *infra* note 330 and accompanying text.

88. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15597 tbl.viii.2 (Mar. 18, 2022).

89. *Id.*

90. *Id.* at 15597.

91. See *infra* text accompanying notes 139–41.

without human intervention as well as automatically generate and route orders to other markets to hedge customer transactions or execute multi-security arbitrage strategies. The SEC has, to date, exempted such systems from classification as ATs because they do not bring “multiple” buyers and sellers together but, rather, automate the traditional process by which a dealer interacts with its customers.⁹²

3. Trading Services and Technologies

In addition to traditional auction and dealer platforms, buyers and sellers use a variety of platforms to facilitate negotiation without necessarily matching interest or setting the terms of a trade. From a technological angle, their utility lies in the manner in which users can share trading intentions without giving away the extent of their holdings, reservation prices, or trading strategy. Much like traditional network technologies, their relative value derives in part from the number of subscribers who use their services.⁹³ As a result, they have become both an important part of the bond market’s infrastructure and a conduit of information that regulators would love to see (and share).

The catch-all term “electronic trading” does not do these technologies justice since all trading today involves some degree of automation and standardization.⁹⁴ The SEC’s proposed formulation—“communication protocol systems”—attempts to capture the idea of “establish[ing] protocols to communicate, negotiate and agree to the terms of the trade without relying solely on the use of orders.”⁹⁵ For purposes of this Article, I will use the terms “trading services” and “trading technologies” to distinguish such platforms from the execution systems described in the previous Part. However described, an increasing volume of transactions take place using such platforms. A brief taxonomy of services and technologies may be helpful.⁹⁶

For example, most fixed-income transactions in the United States still take place by technology-assisted *voice trading*—which generally includes telephonic, direct messaging, and other human-to-human communications. A chat or voice-assisted messaging system might transcribe, encode, and transmit deal terms to help assure their accuracy and completeness. Other systems may simply operate chat or bulletin board features that offer

92. 17 C.F.R. § 240.3b-16(b)(2) (2024).

93. David C. Donald, *From Block Lords to Blockchain: How Securities Dealers Make Markets*, 44 J. CORP. L. 29, 44 (2018) (discussing the network externalities of trading platforms).

94. It would be awkward to classify all communications technology as “brokerage” or “exchange” operations. For example, neither the Internet nor the telephone is a stock exchange, even though they are an accepted medium for “communicating, negotiating, or agreeing” to the terms of a trade. The SEC attempts to distinguish regulated trading systems from other trading services or technologies based on the degree to which they structure “trading interest.” See *infra* note 265.

95. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15500 (Mar. 18, 2022).

96. There is no standard taxonomy of systems, though I have relied on the classifications suggested by (i) the SEC in the 2022 Exchange Release, Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems (ATs) That Trade U.S. Treasury and Agency Securities, National Market System (NMS) Stocks, and Other Securities, 87 Fed. Reg. 15496 (proposed Mar. 18, 2022) (to be codified at 17 C.F.R. pts. 232, 240, 242, 249); (ii) Bloomberg L.P. in its letter to the SEC commenting on the Release, Bloomberg L.P., Comment Letter on Proposed Rule to Amend the Definition of “Exchange” (Apr. 18, 2022), <https://www.sec.gov/comments/s7-02-22/s70222-20123988-280131.pdf>; and (iii) Marshall Nicholson, *Electronic Trading*, in HANDBOOK, *supra* note 8, at 51–68.

enough additional parameters or structure to narrow the universe of counterparties.⁹⁷ Systems that support voice trading are not generally classified as “electronic trading” in the sense that deal terms are negotiated by human traders and are not constrained by the format of interaction.

Automated services peripherally assist the negotiation or consummation of trades as well. Most trades are confirmed, cleared, settled, reported, and documented through automated *straight-through processing*. Similarly, most bond traders use graphical user interfaces (GUIs) or application programming interfaces (APIs) with trading systems, trading services, and data vendors to monitor and analyze trading data from various information feeds and trading centers. Many bond market participants also use a common messaging protocol (FIX) for trading information.⁹⁸ Such clerical or administrative services do not themselves structure trading in any substantive sense.

Multi-dealer client systems offer specific protocols for an individual buyer or seller to interact with multiple dealers (and in some cases, other customers).⁹⁹ Some might allow a user to submit a “request for quote” (RFQ) in a single security or for a list of securities to one or more dealers.¹⁰⁰ Institutions frequently use RFQs when selling securities to avoid information leakage:¹⁰¹ for example, the user may selectively request bids from dealers with whom the user has a relationship, and dealers may offer firm quotations against which the user may then trade.¹⁰² Similarly, dealers may provide displays of firm or non-firm trading interest in specific securities to customers through continuous quotations (stream axes), which a customer may then choose to accept or use to launch a negotiation using “click-to-trade” functionality.¹⁰³

Asset managers require additional support when managing trading among multiple accounts or funds. Such firms may employ *order or execution management systems* to reduce the costs of finding and communicating with counterparties.¹⁰⁴ Firms typically use

97. The SEC suggests, for example, that chat features may constitute “communication protocols” under its new definition if, *inter alia*, they set minimum criteria for message contents, time period for responses, limitations on the number of recipients, or limitations on the minimum size or types of securities. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. at 15507. By contrast, bulletin boards would not constitute “communication protocols” because they do not establish methods for interaction. *Id.*

98. FIX is maintained by FIX Protocol, Ltd. See FIX Protocol, <https://www.fix-events.com/Archives/2010/about.html> [<https://perma.cc/ZBJ4-3HTE>].

99. See *infra* note 354 (explaining major multi-dealer client systems are often established by consortia of dealers, though this can raise antitrust problems).

100. See, e.g., Maureen O’Hara & Xing Alex Zhou, *The Electronic Evolution of Corporate Bond Dealers*, 140 J. FIN. ECON. 368, 370 (2021) (describing the Market Axess RFQ process).

101. Regulation Best Execution, 88 Fed. Reg. 5440, 5514 (Jan. 27, 2023); see also *Execution Management Systems: A Must-Have for Fixed Income*, THE TRADE (Apr. 2022), <https://www.thetradenews.com/thought-leadership/execution-management-systems-a-must-have-for-fixed-income> [<https://perma.cc/ZUC7-3HAE>] (interviewing David Landisman, Senior Director at FactSet).

102. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. at 15594 (discussing the tradeoffs in including more or fewer dealers in an RFQ). As noted in Table 6, *infra*, approximately 19% of trades in corporate bonds are effected using RFQ, while 71% are effected by voice.

103. *Id.* at 15500–01, 15554.

104. See, e.g., Bloomberg L.P. Comment Letter, *supra* note 96; SIFMA Asset Mgmt. Grp., Comment Letter on Proposed Rule to Amend the Definition of “Exchange” (Apr. 18, 2022), <https://www.sifma.org/wp-content/uploads/2022/04/SIFMA-ATS-Proposal-Comment-Letter-4-18-22.pdf> [<https://perma.cc/N55N-MWSX>]; Inv. Co. Inst. Comment Letter, *supra* note 59.

such technologies to help manage their internal operations. An order management system (OMS) might keep track of trading interest among different desks within the firm and cross orders internally between accounts at benchmark prices. When processing net trading interest, an execution management system (EMS) might monitor trading in the broader marketplace, determine a fair price for liquidity, and determine whether and how to access counterparty interest.

Classifying multi-dealer systems or execution management systems as either “trading systems” or “trading services” is tricky. On the one hand, they automate trading by allowing customers to execute against actionable indications of interest (e.g., a firm quote). On the other hand, they do not set the terms of a trade themselves. One can easily analogize such functionalities to voice-age practices: an RFQ system isn’t very different from a buyer soliciting quotes from multiple dealers,¹⁰⁵ and a “stream-axe” feed isn’t that different from a dealer publishing continuous quotes against which customers can seek execution.¹⁰⁶ Likewise, an OMS or EMS isn’t much different than a trading desk collecting orders from within a firm, crossing some,¹⁰⁷ and routing others.

For this reason, OMS or EMS providers and users argue that they are mere “information conduits” or “workflow” applications.¹⁰⁸ This argument may be especially persuasive with respect to systems that fully disclose the identities of parties to facilitate bilateral clearing and therefore do not themselves effect transactions as a broker might.¹⁰⁹ At the same time, their advanced functionalities often bring them very close to the conceptual line separating “brokers” or “exchanges” subject to SEC registration from mere service providers.¹¹⁰ In addition, the more volume such systems handle, the more important it may be to ensure their operational capacity during periods of market stress (as well as access to the information they process).

105. Former Rule 2320(f) of the National Association of Securities Dealers (the predecessor to FINRA) used to require a member broker-dealer to “contact and obtain quotations from three dealers (or all dealers if three or less) to determine the best inter-dealer market” for a security for which continuous, two-sided public quotations were not available. NASD RULE 2320(f), <https://www.finra.org/rules-guidance/rulebooks/retired-rules/2320> [<https://perma.cc/T4ZU-37WC>] (retired by FINRA RULE 5310); *see also* Order Granting Approval of Proposed FINRA Rule Change, Exchange Act Release No. 65895, 76 Fed. Reg. 77042, 77042–43 (Dec. 9, 2011) (discussing the “Three Quote Rule” and the reasons for its revision as part of the FINRA rulebook consolidation).

106. Several industry commenters stress that EMSs do not decide how orders interact, but merely “import[] . . . parameters and fields” from each recipient’s systems in order to convey trading interest to recipients “based on the functionality offered . . . by th[e] connected venue and its rules or methods.” Inv. Co. Inst. Comment Letter, *supra* note 59, at 7. For example, the concepts of “limit order” and “quotation” are defined by SEC rules in a variety of areas, even as the SEC is not an information conduit. 17 C.F.R. § 242.600 (2024).

107. *Cf.* 17 C.F.R. § 270.17a-7 (2024) (exempting crossed transactions from section 17(a) of the Investment Company Act).

108. *See supra* note 104 (identifying SEC comment letters).

109. SIFMA Asset Mgmt. Grp. Comment Letter, *supra* note 104, at 6–9 (advocating that any expansion in the definition of an “exchange” should not include single user systems, order and execution management systems, or ETF creation and redemption portals); *see also* Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15595 (Mar. 18, 2022).

110. *See* 15 U.S.C. § 78c(a)(4) (discussing the distinction between “brokerage” and other services). For example, some EMSs can “scrape” latent trading interest from one client’s system for purposes of identifying potential counterparty sources of liquidity to another client, in a manner similar to an unlit order book. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. at 15500–01, 15500 n.57. As such, they have the capacity to identify, if not hold, resting liquidity.

Other services facilitate transactions among parties who may not have established clearing relationships or who do not wish to disclose their identities.¹¹¹ For example, much like online marketplaces, *conditional order systems* may set up potential trading partners based on non-actionable indications of interest: parties may enter into the system the size and side of a trade in a security without a price; participants matched by the system may then “firm up” a trade through negotiation.¹¹² Like other trading systems, these systems may limit subscribers’ trading to parties who have an established clearing relationship, while others may choose to act as clearing broker for non-clearing counterparties.¹¹³

Such technologies have unquestionably reduced the cost of trading, but the benefits of such cost reductions do not equally benefit all market participants. For example, automated trading appears to be concentrated in two areas: (i) “interdealer” trading systems that facilitate trading among dealers and proprietary traders,¹¹⁴ and (ii) execution platforms that enable dealers to provide executable retail-sized quotations in the most liquid securities to customers.¹¹⁵ The SEC’s demarcation of “communication protocols,” by contrast, appears to extend to negotiated dealer-to-customer transactions. Fostering trading among investors—or “all-to-all” trading—is still frustratingly limited.¹¹⁶

There are plausible reasons why customers may be “hesitant or unmotivated” to demand “all-to-all” trading.¹¹⁷ First, to the extent that institutional and retail end-users are more likely to buy newly issued debt securities to hold, selling interest in secondary markets may outweigh buying interest, making dealer intermediation indispensable.¹¹⁸ Institutions may also prefer to negotiate large transactions with dealers with whom they have an established relationship,¹¹⁹ especially during periods of stress.¹²⁰ They may also prefer not to disseminate sensitive trading interest to multiple counterparties.¹²¹ It is also

111. As the universe of potential counterparties grows, users must display interest in multiple venues and must therefore be able to manage the “firmness” of their shared interest to avoid double execution. 87 Fed. Reg. 15496, 15502 n.65.

112. See, e.g., James J. Angel, Lawrence E. Harris & Chester S. Spatt, *Equity Trading in the 21st Century*, 1 Q.J. FIN. 1, 21–22 (2010) (analogizing such services to Craigslist).

113. 87 Fed. Reg. 15496, 15594–95.

114. See, e.g., *2017 Fixed-Income Hearing*, *supra* note 2, at 21 (although such systems have been open to selected non-dealer participants since the 2000s).

115. See O’Hara & Zhou, *supra* note 100, at 369 (finding that electronic trading in corporate bonds is “almost entirely constrained to small trade sizes”); see also SIMON Z. WU, JOHN BAGLEY & MARCELO VIEIRA, ANALYSIS OF MUNICIPAL SECURITIES PRE-TRADE DATA FROM ALTERNATIVE TRADING SYSTEMS 13–14 (2018), <https://www.sec.gov/spotlight/fixed-income-advisory-committee/msrb-staff-analysis-of-municipal-securities-pre-trade-data.pdf> [<https://perma.cc/4KWY-AVAZ>]; see also SIMON Z. WU & JOHN BAGLEY, MUNICIPAL SECURITIES PRE-TRADE MARKET ACTIVITY: WHAT HAS CHANGED SINCE 2015? (2020), <https://www.msrb.org/sites/default/files/MSRB-Pre-Trade.pdf> [<https://perma.cc/44SX-U288>].

116. See, e.g., *A New Epoch for Retail Investors Is Just Beginning*, *supra* note 50 (noting that “a third of the transactions MarketAxess facilitates on its platform are such ‘all-to-all’ transactions”).

117. ALAIN CHABOUDET AL., *supra* note 14, at 15–16.

118. Both MSRB studies observed that dealers’ “offer quotes” and investors’ “requests for bid” outweigh “bid quotes” and “requests for offers.” WU & BAGLEY, *supra* note 115, at 12 tbl.3, 16 tbl. 7; WU, BAGLEY & VIEIRA, *supra* note 115, at 15 tbl.4, 20 tbl. 10.

119. See, e.g., STOWELL, *supra* note 74, at 110 (providing a narrative example of a negotiated bond trade).

120. O’Hara & Zhou, *supra* note 100, at 389–90.

121. See, e.g., ALAIN CHABOUDET AL., *supra* note 14, at 15–16; Ryan Lewis & Michael Schwert, The Effects of Transparency on OTC Market-Making 29 (unpublished manuscript), <https://dx.doi.org/10.2139/ssrn.3286731>

difficult for non-dealers to price trades among themselves fairly without a significant investment in talent and infrastructure.¹²² Absent innovations that “straddle the divide” between soliciting quotes and placing orders, such trading services may have the perverse effect of entrenching dealer intermediation.¹²³

III. HOW INTERMEDIATION IS REGULATED

The regulation of trading in bond markets is historically rooted in the business conduct and financial responsibility rules of the securities self-regulatory organizations. For example, the Municipal Securities Rulemaking Board (MSRB) promulgates business conduct and transparency rules for dealings in municipal securities,¹²⁴ while FINRA promulgates rules governing trading in corporate debt and all other fixed-income securities.¹²⁵ FINRA and the MSRB each have adopted rules to regulate principal-agent conflicts in connection with “customer-facing” transactions. These rules generally include the duty to make suitable recommendations,¹²⁶ the duty to seek best execution,¹²⁷ and the duty to charge fair mark-ups and commissions.¹²⁸

“Customer-facing” duties, however, may not be enough to ensure that investors—particularly retail investors—get the best prices.¹²⁹ Over the past several decades, the SEC has expanded its direct authority over trading mechanisms in bond markets as part of its expansion of traditional “exchange” regulation to encompass a variety of alternative trading systems and venues. In some cases, it has relied on SROs to build the market mechanisms necessary to collect, process, and disseminate transaction information. With emerging crises in the Treasury markets, the SEC has also asserted a direct role for itself in regulating the clearance, settlement, and reporting of transactions in government securities. This Part discusses these developments in turn.

[<https://perma.cc/JJ7X-ALDQ>] (finding weaker incentives for informed investors to participate in corporate bond markets as a result of trade dissemination); O’Hara & Zhou, *supra* note 100, at 369 (noting relative size of retail and investment-grade trades); *see also* Angel, Harris & Spatt, *supra* note 112, at 22–24 (discussing adverse selection in the context of equity trading).

122. The SEC acknowledges that dealers are more likely to use trading systems to negotiate transactions that are difficult to price. Regulation Best Execution, 88 Fed. Reg. 5440, 5514 (Jan. 27, 2023) (citing SIMON Z. WU, MUNICIPAL SEC. RULEMAKING BD., CHARACTERISTICS OF MUNICIPAL SECURITIES TRADING ON ALTERNATIVE TRADING SYSTEMS AND BROKER’S BROKER PLATFORMS (2021), <https://www.msrb.org/sites/default/files/MSRB-Trading-on-Alternative-Trading-Systems.pdf> [<https://perma.cc/R4TY-DLMS>]).

123. Letter from Timothy W. Cameron, Asset Mgmt. Grp.—Head, SIFMA, to Mary Jo White, Chair, SEC (May 19, 2015), <https://www.sifma.org/wp-content/uploads/2017/05/sifma-amg-submits-comments-to-the-sec-on-potential-market-and-regulatory-changes-to-strengthen-liquidity-in-the-fixed-income-markets.pdf> [<https://perma.cc/2F8M-583D>] (“New protocols will also need to be developed that straddle the request-for-quote (‘RFQ’) and central limit order book (‘CLOB’) divide.”).

124. Municipal securities dealers (including divisions of a bank) must comply with the rules of the Municipal Securities Rulemaking Board. 15 U.S.C. § 78o-4(d)(1).

125. In each case, however, the Exchange Act relies on an intermediary’s “appropriate regulatory agency” to enforce such rules. *See supra* note 40.

126. FINRA, RULE 2111 (2012); MSRB, RULE G-19 (2020).

127. FINRA, RULE 5310 (2009); MSRB, RULE G-18 (2015).

128. FINRA, RULE 2121 (2014); MSRB, RULE G-30 (2016).

129. Michael S. Piowar, *Corporate and Municipal Bonds*, PIABA BAR J., Summer 2007, at 55, 58–62 (discussing the difficulty of enforcing such rules).

A. Trade Execution

The Exchange Act envisioned that organized trading in securities would take place through securities exchanges that matched buying and selling interest pursuant to trading rules adopted through a process of member self-regulation overseen by the SEC.¹³⁰ Dealer markets for both listed and unlisted securities have co-existed alongside exchanges as well, and they were subjected to a similar model of member self-regulation by national securities associations.¹³¹ The emergence of automated interaction based solely on algorithmic instructions—rather than rules applicable to human conduct—required regulators to rethink the corpus of rules necessary to regulate agency trading and information dissemination by electronic trading systems and services.

The SEC's Regulation ATS—which applies to both equity and debt trading systems—is the culmination of these efforts.¹³² Since 1998, non-discretionary trading systems that elect not to be regulated as an “exchange” must register as broker-dealers with the SEC and become members of FINRA or an exchange.¹³³ Among other requirements, these systems must maintain books and records regarding their subscribers and their daily order handling and trading activity as well as adequate safeguards and procedures to prevent abuse of their subscribers' confidential trading information.¹³⁴ As discussed further below, additional fair access and security, capacity, and integrity (SCI) requirements are designed to apply to systems that meet certain volume thresholds.¹³⁵

In promulgating Regulation ATS, the SEC specifically contemplated that municipal and corporate debt trading systems would fall within its ambit, but the SEC excluded trading systems for government securities and related transactions, such as repurchase agreements.¹³⁶ Among other considerations, the SEC lacked the authority to require banks that operated trading systems in government securities to register as a broker-dealer absent some other statutory basis for asserting jurisdiction.¹³⁷ In the wake of recent events, the SEC has proposed to require government securities trading systems to comply with Regulation ATS. Part IV.A discusses these developments further.

130. 15 U.S.C. § 78f.

131. 15 U.S.C. § 78o-1.

132. 17 C.F.R. §§ 242.300–04 (2024).

133. 17 C.F.R. § 240.301(a)(1) (2024).

134. 17 C.F.R. § 242.301(b) (2024); *see, e.g.*, *City of Providence v. Bats Glob. Mkts., Inc.*, 878 F.3d 36, 40 (2d Cir. 2017) (considering allegations that defendant securities exchanges misled institutional investors about products and services sold to [HFT] firms, “which purportedly created a two-tiered system that favored those firms at the plaintiffs' expense”).

135. 17 C.F.R. § 242.301(b)(5) (2024) (setting fair access thresholds for ATSs by product); 17 C.F.R. § 242.1001 (2024) (defining “SCI alternative trading system” by reference to transaction volume). The 2022 Exchange Release would lower the fair access thresholds for Treasury securities to cover additional ATSs. *Compare* Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15647 (proposed amendments to Rule 301(b)(5)(E), *with id.* at 15649 (proposed amendments to the definition of “SCI alternative trading system”).

136. 17 C.F.R. § 242.301(a)(4) (2024).

137. Regulation of Exchanges and Alternative Trading Systems, 63 Fed. Reg. 70844, 70860 (Dec. 22, 1998) (professing that “surveillance of trading in government securities is coordinated among the Treasury, the Commission, and the Board of Governors of the Federal Reserve System”).

B. Trade Reporting

To promote greater transparency in pricing, both FINRA and the MSRB have adopted rules requiring the real-time reporting of post-trade data regarding transactions in fixed-income securities. FINRA requires its members to report secondary transactions in eligible corporate debt securities to its Trade Reporting and Compliance Engine (TRACE).¹³⁸ Under MSRB rules, broker-dealers and bank divisions that act as municipal securities dealers are similarly required to submit reports of transactions in municipal securities to its Real-Time Transaction Reporting System (RTRS).¹³⁹ Both TRACE and RTRS not only make last-sale data feeds available directly to investors, but they also provide tools for industry participants and academic researchers to assess and contribute to quality of markets.¹⁴⁰

No effort was made to create a comprehensive database of trades in the U.S. government securities market until fairly recently and only after Treasury market disruptions exposed the lack of a comprehensive “official” trail of last-sale data from which to reconstruct trading.¹⁴¹ Beginning in 2017, FINRA required its member broker-dealers to report transactions in Treasury securities to TRACE, though it did not have the authority to mandate that non-member banks and government securities brokers and dealers do the same.¹⁴² In September 2022, the Federal Reserve System began requiring government securities brokers and dealers regulated as banks to report trades to TRACE as well.¹⁴³

C. Clearance and Settlement

Once a trade takes place, it must be cleared and settled: each party or its carrying broker must acknowledge and confirm the terms of the trade and demonstrate that the party has adequate cash, securities, or credit to perform before cash and securities change hands.¹⁴⁴ Trades effected on stock, options, and futures exchanges are generally cleared

138. FINRA, RULE 6720 (2015); see Stephanie Dumont & Ola Persson, *TRACE at 20—Reflecting on Advances in Transparency in Fixed Income*, FINRA (June 28, 2022), <https://www.finra.org/media-center/blog/trace-at-20-reflecting-advances-transparency-fixed-income> [<https://perma.cc/5LF8-SRDL>].

139. MSRB, RULE G-14 (2016).

140. See *Trade Reporting and Compliance Engine (TRACE) Report Cards*, FINRA, <https://www.finra.org/compliance-tools/report-center/trace> [<https://perma.cc/QZ5J-Y3P9>]; *TRACE Independent Academic Studies*, FINRA, <https://www.finra.org/filing-reporting/trace/trace-independent-academic-studies> [<https://perma.cc/9UD3-S675>].

141. 2021 TREASURY MARKET REPORT, *supra* note 10, at 26–27. The Treasury and the Federal Reserve System instead relied on interdealer brokers and other dealers to determine how much pre- and post-trade transparency to provide to information vendors. See Fabozzi, *supra* note 8, at 199–205.

142. See Notice of Filing of a Proposed Rule Change to Amend FINRA Rule 6730 to Enhance TRACE Reporting Obligations for U.S. Treasury Securities, 87 Fed. Reg. 33844, 33844–45 (proposed June 2, 2022) (describing the timeline of recent events).

143. Agency Information Collection Activities, 86 Fed. Reg. 59716, 59716 (Oct. 28, 2021) (requiring banks to report daily transactions of marketable U.S. Treasury securities and government securities to TRACE).

144. Members of a clearing agency clear trades on behalf of their own proprietary and customer accounts as well as customer and correspondent accounts “carried” for non-clearing broker-dealers. See FINRA, RULE 3230 (2013).

through the systems of the related clearinghouse.¹⁴⁵ FINRA and MSRB Rules further require all over-the-counter municipal and corporate bond trades between broker-dealers to be cleared through the automated system of a central clearing agency if eligible.¹⁴⁶ Trades effected and bilaterally settled between non-broker-dealers, however, may not be subject to centralized clearing or reporting requirements.¹⁴⁷

Practices vary in the Treasury market.¹⁴⁸ Some interdealer brokers may arrange to centrally clear trades on behalf of non-clearing members (such as proprietary traders)¹⁴⁹ while others might simply “introduce” trades among subscribers—who must then arrange to clear those trades outside of the trading system.¹⁵⁰ A recent U.S. Treasury white paper observed that only about half of interdealer trades (representing about a quarter of the total cash market) were centrally cleared.¹⁵¹ Repurchase agreements, moreover, may be cleared bilaterally or through a third-party custodian (triparty repo), on or off the books of a central clearing agency.¹⁵²

These arrangements have several implications. First, it is difficult for regulators to develop a “thorough picture” of potentially deleterious trading activity in Treasury securities if not all trades in a security are cleared and settled through a central counterparty.¹⁵³ Second, interdealer broker trading systems that act as clearing members for proprietary traders and other non-clearing members can take on significant operational risk during times of market stress.¹⁵⁴ The rise in high-frequency trading may stress the ability of clearing members to calculate margin, collect collateral, and assess risk thresholds in real time—particularly if they offer clients “direct market access” to expedite interaction with trading engines.¹⁵⁵

145. Equity, options, and futures exchanges generally require their members to be registered as securities or futures broker-dealers and to have clearing relationships with a single central clearing agency that acts as counterparty to all trades. Because equity market ATSS are registered as broker-dealers, moreover, they can clear transactions on behalf of their institutional subscribers in order to facilitate straight-through processing.

146. FINRA, RULE 11900 (2020); MSRB, RULE G-12 (2019). The National Securities Clearing Corporation (NSCC)—a subsidiary of the Depository Trust & Clearing Corporation registered as a clearing agency under section 17A of the Exchange Act, 15 U.S.C. § 78q-1—performs this function for virtually all broker-to-broker transactions in municipal and corporate debt securities. Order Approving Proposed Rule Change to Implement Real-Time Trade Matching for Fixed Income Securities, Exchange Act Rel. No. 49294, 69 Fed. Reg. 9668 (Mar. 1, 2004).

147. See FINRA, RULE 6730(b) (2023) (generally limiting members’ trade reporting obligations to trades between members or a member and a customer).

148. The Fixed-Income Clearing Corporation (FICC) offers “clearing, netting, settlement, risk management, and a guarantee of trade completion” for government securities. 78 Fed. Reg. 39027, 39029. It is the only existing Treasury CCP. Standards for Covered Clearing Agencies for U.S. Treasury Securities, Exchange Act Release No. 99149, 89 Fed. Reg. 2714 (Jan. 16, 2024).

149. The interdealer broker might either become a FICC member or introduce trades to a FICC member.

150. Proprietary traders might use a prime broker to clear trades with a clearing counterparty.

151. TREASURY MARKET PRACTICES GROUP, WHITE PAPER ON CLEARING AND SETTLEMENT IN THE SECONDARY MARKET FOR U.S. TREASURY SECURITIES 12 (2019), https://www.newyorkfed.org/medialibrary/Microsites/tmpg/files/CS_FinalPaper_071119.pdf [<https://perma.cc/H5FP-KDVU>].

152. 2021 TREASURY MARKET REPORT, *supra* note 10, at 3–4.

153. Yadav, *supra* note 9, at 1219–22.

154. See, e.g., 2021 TREASURY MARKET REPORT, *supra* note 10, at 21.

155. *Id.*

More generally, to the extent that trading in relatively illiquid securities takes place through systems that are not registered as exchanges or broker-dealers, institutional and retail investors are limited to trading with dealers with whom they have a clearing relationship. Granted, dealers can (and do) purchase securities from other dealers or customers to fulfill customer trading interest in agency and riskless principal trades—and charge for the privilege. But direct trading between customers through a trading service is only possible if trades are fully disclosed (so that customers can make their own clearing arrangements) or if the trading system is registered as a broker-dealer and clears customer trades as a clearing member.

IV. TECTONIC FORCES

Even as dealers have a strong incentive to maintain their central role in bond trading, market forces seem to tug toward greater centralization of bond trading. In particular, the cost of holding bonds in dealer inventory appears to be increasing, while the cost of finding trading counterparties appears to be decreasing. These developments portend that bond dealers may limit inventories to the most liquid securities and shift toward more agency or riskless principal trading. As a result, dealers and customers (to different degrees and for different reasons) might welcome disintermediated trading structures that create more opportunities for trading between investors without stressing dealer balance sheets.

A. Post-Crisis Prudential Regulation

Industry associations and some commentators fret that post-crisis financial regulation has adversely affected the behavior of bond dealers. Dodd-Frank subjected banks and their affiliates to more stringent capital requirements, leverage and liquidity coverage ratios, and limitations on proprietary trading.¹⁵⁶ These regulations affect bond dealing in several ways. For example, higher capital requirements and leverage ratios constrain dealers' capacity to hold bonds, while higher liquidity requirements require firms to hold more high-quality liquid bonds (HQLA) in inventory, and thereby displace less liquid bonds.¹⁵⁷ Moreover, the Volcker Rule's metrics for monitoring proprietary trading may not fully distinguish exempt "market making activities" from prohibited trading activities.¹⁵⁸

Industry associations have expressed concern that heightened prudential regulation has reduced the capacity of dealers to hold inventory.¹⁵⁹ Some studies lend support to the

156. See generally Matthew Richardson, Kermit L. Schoenholtz & Lawrence J. White, *Deregulating Wall Street*, 10 ANN. REV. FIN. ECON. 199 (2018) (arguing that "Dodd-Frank's approach to regulation is more burdensome than necessary for containing systemic risk").

157. See, e.g., Tobias Adrian et al., *Market Liquidity After the Financial Crisis*, 9 ANN. REV. FIN. ECON. 43, 46–51 (2017).

158. See, e.g., Bessembinder, Spatt & Venkataraman, *supra* note 19, at 32–34.

159. See, e.g., Eric Pan, *Liquidity Strains in Markets Need Structural Fixes*, FIN. TIMES (July 4, 2022), <https://www.ft.com/content/8bf44db8-8c6b-4376-b11c-b59422c0604e> (on file with the *Journal of Corporation Law*); Darrell Duffie, *Still the World's Safe Haven?: Redesigning the U.S. Treasury Market After the COVID-19 Crisis* 2–3 (Hutchins Ctr., Working Paper No. 62, 2020), https://www.brookings.edu/wp-content/uploads/2020/05/WP62_Duffie_v2.pdf [<https://perma.cc/F24Q-687V>].

argument that dealer inventories have declined in the wake of Dodd-Frank.¹⁶⁰ Bessembinder, Jacobsen, Maxwell, & Venkataraman observe declines in dealer capital commitment, turnover, block trade frequency, and average trade size after the financial crisis.¹⁶¹ Schultz similarly finds that dealers are more reluctant to hold bonds in inventory, preferring instead to engage in prearranged trades or to unwind inventory positions quickly.¹⁶² Several studies similarly observe an increase in “agency,” “riskless principal,” and “prearranged trades” post Dodd-Frank whereby end-users provide liquidity to other end-users.¹⁶³

There is more debate as to whether the decline in inventories has adversely affected liquidity or efficiency. For example, one study using TRACE data suggests that there is a statistically strong, positive relationship between dealer inventory and traditional liquidity measures.¹⁶⁴ At the same time, this study and others have not observed significant impairment of liquidity, at least as measured by trading costs: this is attributed to a number of factors, including greater transparency; a shift to prearranged trades; and trade matching through alternative trading systems.¹⁶⁵ Such studies do not necessarily take into account the opportunity cost of forgone trades.¹⁶⁶ Other measures of efficiency—such as resilience of prices or dealer networks in times of stress—are mixed.¹⁶⁷

Regulation of the banking sector wouldn’t necessarily be as much of a problem if independent brokers or traders could pick up the slack. Duffie predicted that independent

160. Of course, it may be inappropriate to make comparisons with dealer inventories immediately prior to the passage of Dodd-Frank. See *2017 Fixed-Income Hearing*, *supra* note 2, at 46 (testimony of Jonah Crane, Former Deputy Assistant Secretary, Financial Stability Oversight Council, U.S. Department of the Treasury).

161. Hendrik Bessembinder et al., *Capital Commitment and Illiquidity in Corporate Bonds*, 73 J. FINANCE 1615, 1658–59 (2018).

162. Schultz, *supra* note 69, at 26 (noting declining half-life of median bond in inventory); see also Charles K. Whitehead, *The Goldilocks Approach: Financial Risk and Staged Regulation*, 97 CORNELL L. REV. 1267, 1292–93 (2012) (discussing unforeseen consequences of greater transparency for bond inventories).

163. See, e.g., Jack Bao, Maureen O’Hara & Xing (Alex) Zhou, *The Volcker Rule and Corporate Bond Market-Making in Times of Stress*, 130 J. FIN. ECON. 95, 96 (2018); Jaewon Choi, Yesol Huh & Sean Seunghun Shin, *Customer Liquidity Provision: Implications for Corporate Bond Transaction Costs*, 70 MGMT. SCI. 187, 187–88 (2024).

164. Plamen Ivanov, Alexei G. Orlov & Michael Schihl, *Bond Liquidity and Dealer Inventories: Insights from U.S. and European Regulatory Data 20* (Feb. 11, 2020) (unpublished manuscript), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3529801 [<https://perma.cc/7H5B-39DS>]. Traditional measures of liquidity include the number of trades, zero-trading days, and par value traded, while efficiency-based metrics may look to the cost of completing trades. *Id.*

165. Adrian et al., *supra* note 157, at 52–56; Schultz, *supra* note 69, at 26; Choi, Huh & Seunghun, *supra* note 163, at 1 (finding that “trades in which dealers provide liquidity using their inventory capacity incur up to 60% higher transaction costs than before the crisis” as compared with agency and riskless principal trades).

166. See, e.g., Adrian et al., *supra* note 157, at 45–46 (suggesting that “a wider range of data and methodological improvements” are necessary for empirical studies to “account for any trades that have not taken place”).

167. *Id.* at 45 (finding no “strong quantitative evidence of a widespread deterioration in bond market liquidity in the years after the crisis”); Bao, O’Hara & Zhou, *supra* note 163, at 112; Marco Di Maggio, Amir Kermani & Zhaogang Song, *The Value of Trading Relations in Turbulent Times*, 124 J. FIN. ECON. 266, 283–84 (2017) (explaining how “prior bilateral relations between financial institutions sometimes serve as a buffer in times of stress” but may also “heighten the fragility of the system”); O’Hara & Zhou, *supra* note 100, at 381–82 (finding electronic trading reduces reliance on interdealer trading).

broker-dealers might “fill some of the resulting void in market making capacity,”¹⁶⁸ though other studies question whether independent dealers have the capacity to absorb enough inventory to make up the difference.¹⁶⁹ Proprietary traders have emerged as an alternative source of liquidity, though their short-term horizon may exacerbate (rather than dampen) market volatility.¹⁷⁰ The SEC at one point was concerned enough about these trends to issue guidance to funds and their advisors about “broader structural changes [in bond market-making capacity] such as fewer proprietary trading desks at broker-dealers and increased regulatory capital requirements at the holding company level.”¹⁷¹

Insurers and bond funds might present an alternative source of liquidity for bond traders.¹⁷² One study finds that insurers may supply liquidity to their dealer networks (and to their dealers’ customers), but only when they are able to do so.¹⁷³ Bond funds are not necessarily capable of absorbing liquidity during periods of market stress because, in part, of the mismatch between the relative liquidity of fund shares and the bonds they hold.¹⁷⁴ The SEC seems to share this concern. The SEC promulgated rules requiring mutual funds and “in-kind” ETFs to “adopt and implement a written liquidity risk management program,” which (among other requirements) requires periodic review of liquidity risk, maintenance of a high liquid investment minimum, and restrictions on investments in illiquid assets.¹⁷⁵

Policymakers, industry leaders, and commentators have suggested a variety of approaches in response. The banking industry has persuaded federal financial regulators to roll back the application of some aspects of the Volcker Rule, such as by raising the threshold for the rule’s application and refining the presumptions surrounding legitimate

168. See Darrell Duffie, *Market Making Under the Proposed Volcker Rule 3* (Rock Ctr. For Corp. Governance at Stan. Univ., Working Paper No. 106, 2012), <http://dx.doi.org/10.2139/ssrn.1990472> [<https://perma.cc/3BD8-KCCW>] (noting, however, the “unpredictable impact on the safety and soundness of financial markets”).

169. Bao, O’Hara & Zhou, *supra* note 163, at 112 (“While weak evidence exists that dealers not affected by the Volcker Rule have stepped in to provide some liquidity, we find that the net effect is a less liquid corporate bond market.”); Bessembinder et al., *supra* note 161, at 1659 (finding that non-bank dealers have only “partially supplanted bank-affiliated dealers”).

170. For example, in its analysis of the 2014 Flash Rally, the study group noted that proprietary trades were moderately concentrated in a smaller number of firms, which were also responsible for a higher cancellation volume and incidents of wash sales than other categories of traders. 2015 TREASURY MARKET REPORT, *supra* note 10, at 30–34.

171. DIV. OF INV. MGMT. SEC. & EXCH. COMM’N, NO. 2014-01, GUIDANCE UPDATE: RISK MANAGEMENT IN CHANGING FIXED INCOME MARKET CONDITIONS 4 (2014) <https://www.sec.gov/divisions/investment/guidance/im-guidance-2014-1.pdf> [<https://perma.cc/AFW9-Y2K5>] (noting that a “significant reduction in dealer market-making capacity has the potential to decrease liquidity and increase volatility in the fixed income markets”).

172. For example, dealers can create or redeem ETF shares as an additional inventory management tool. See Hu & Morley, *supra* note 59.

173. Choi, Huh & Seunghun, *supra* note 163, at 20–24. The authors observe that the ability of insurers to provide liquidity “decreases following bond downgrades” and “depends on their inventory holding levels.” *Id.* at 24.

174. Kevin Pan & Yao Zeng, *ETF Arbitrage Under Liquidity Mismatch* 38 (Jacobs Levy Equity Mgmt. Ctr., Working Paper, 2019), <https://ssrn.com/abstract=2895478> [<https://perma.cc/J89K-GKY7>]; Adrian et al., *supra* note 157, at 56–57. One study suggests that holders of bond funds may be significantly more sensitive to bad performance than holders of equity funds. Goldstein, Jiang & Ng, *supra* note 58, at 611–12.

175. 17 C.F.R. § 270.22e-4 (2024).

market making activity.¹⁷⁶ Some commentators have suggested more aggressive exemptions.¹⁷⁷ More generally, however, pressure on dealer intermediation may be reduced if more broadly accessible centralized clearing in Treasury securities and better opportunities for “all-to-all” trading were available.¹⁷⁸

B. Policy Interventions

The Federal Reserve Board (Fed) has long regarded the purchase and sale of Treasury securities—whether through overnight repurchase transactions or by taking such securities into inventory—as one of its levers for influencing the availability of credit.¹⁷⁹ As shocks now periodically rattle the economy, the Fed has evinced its willingness to deploy such “quantitative easing” more aggressively and in a broader variety of instruments. While policymakers characterize these measures as temporary interventions, the Fed’s forays into bond markets may prompt short- to medium-term changes in the behavior of market intermediaries and ultimately influence the structure of bond markets.

The Federal Reserve Board has developed a variety of “policy tools” designed to provide “quick and muscular government intervention in an incipient financial crisis.”¹⁸⁰ How the Board defines the scope of these facilities affects the behavior of bond market participants. During the 2008 financial crisis, the Fed launched facilities to support the market for asset-backed securities.¹⁸¹ By contrast, following the onset of the COVID pandemic in 2020, the Fed’s facilities were designed to help investment-grade companies maintain business operations and capacity.¹⁸² The Fed also offered primary dealers access to credit during both crises.¹⁸³

The wisdom of such interventions as tools of monetary policy and crisis remediation is hotly debated.¹⁸⁴ For purposes of this Article, however, such interventions affect how

176. See Abraham Jacob, *Revision of the Volcker Rule*, in INTERNATIONAL CAPITAL MARKETS & SECURITIES REGULATION §§ 31E:8 & 9, Westlaw (Harold S. Bloomenthal & Samuel Wolff eds., database updated Dec. 2023) (discussing statutory and regulatory changes to the Volcker Rule); see also 2017 *Fixed-Income Hearing*, *supra* note 2, at 18–29 (discussing impact of Volcker Rule and the Financial CHOICE Act passed by the House of Representatives in 2017).

177. See Bao, O’Hara & Zhou, *supra* note 163, at 112 (suggesting revisions to market-making criteria and possible exemptions for corporate bond trading and trading around certain events); Onnig H. Dombalagian, *The Expressive Synergies of the Volcker Rule*, 54 B.C. L. REV. 469, 513 (2013) (suggesting that regulators “consider whether transactions executed in certain qualified execution facilities would presumptively satisfy the market-making-related activities exemption”).

178. See, e.g., CHABOUDET AL., *supra* note 14, at 10.

179. See *supra* note 29.

180. Mark E. Van Der Weide & Jeffery Y. Zhang, *Tale of the Tape: Lessons from the 2008 and 2020 Financial Crises*, 26 STAN. J.L. BUS. & FIN. 413, 462 (2021) (describing these facilities).

181. It did so through facilities that supported the market for money market instruments and money-market funds and asset-backed securities, as well as funds designed to provide liquidity to primary dealers and other financial institutions. *Id.* at 431–34.

182. The Fed did so both by providing loans and buying bonds directly from such companies or lending them money through a Primary Market Corporate Credit Facility and purchasing bonds and shares in bond ETFs in the secondary market through a Secondary Market Corporate Credit Facility. *Id.* at 449–52.

183. *Id.* at 433.

184. Compare Saule T. Omarova, *The People’s Ledger: How to Democratize Money and Finance the Economy*, 74 VAND. L. REV. 1231, 1236 (2021) (arguing that “the Fed’s entire balance sheet should be redesigned

dealers and other intermediaries in bond markets perform their roles. For example, the Securities Industry and Financial Markets Association (SIFMA) has expressed some concern that the Fed’s quantitative easing policy by design removes some of the most liquid bonds from the public float.¹⁸⁵ As the Fed expands the range of securities it is willing to buy or accept as collateral for short-term lending (e.g., corporate bonds), it can create scarcity in more liquid issues while increasing demand for less liquid securities. This may make dealer inventory risk management more challenging.

At the same time, the Fed’s willingness to support primary dealers and ETFs suggests an expectation that it will act as the “market maker of last resort” in bond markets. One study found, for example, that in the wake of the pandemic, dealer inventories in investment grade bonds plummeted, direct customer-to-customer trading almost tripled, and trading costs increased.¹⁸⁶ The announcement of credit facilities for primary dealers and secondary market corporate debt nevertheless prompted primary dealers to begin restoring their inventories even before the Fed had begun purchases.¹⁸⁷ The study suggests that this kind of liquidity backstop may well encourage dealers to take on greater risk and leverage in corporate bond markets.¹⁸⁸

C. Algorithmic Trading and Pricing

Machine learning and the use of large data sets have helped to reduce search costs and enhance price discovery in a variety of markets, including the financial sector.¹⁸⁹ As trading in the most liquid bonds becomes increasingly automated, it is only natural that bond dealers, institutional investors, and proprietary traders would take advantage of advances in machine learning to generate and execute trades. Some of the growing pains of this transition are patent, such as market liquidity crises caused by high-frequency computer-generated transactions in U.S. government bonds and other actively traded securities. Others are more subtle, such as the role algorithms play in pricing illiquid bonds. I discuss each in turn.

to operate as . . . the ‘People’s Ledger’: the ultimate public platform for both modulating and allocating the flow of sovereign credit and money in the national economy”), with Christina Parajon Skinner, *Central Bank Activism*, 71 DUKE L.J. 247, 254 (2021) (arguing that as “the Fed bends or stretches its legal mandates to address social or economic problems of the day (if and as they might emerge), it engages in ‘activism’ that will present problems for society on a number of dimensions”).

185. *2017 Fixed-Income Hearing*, *supra* note 2, at 90–91.

186. Maureen O’Hara & Xing (Alex) Zhou, *Anatomy of a Liquidity Crisis: Corporate Bonds in the COVID-19 Crisis*, 142 J. FIN. ECON. 46, 66–67 (2021).

187. *Id.* at 66.

188. *Id.*

189. Chris Brummer & Yesha Yadav, *Fintech and the Innovation Trilemma*, 107 GEO. L.J. 235, 264 (2019) (noting that the contemporary Fintech movement is distinguished by “(i) a dependence on vast quantities of conventional as well as novel types of data in the design of fintech products; (ii) the automation of algorithmic programs that often showcase advances in artificial intelligence (AI) and machine learning; and (iii) the emergence of nontraditional, specialist firms whose business models seek to disintermediate financial transactions and take on the dominance of brand-name ‘one-stop shop’ Wall Street firms”).

The promise and perils of high-frequency trading have captured the public's imagination.¹⁹⁰ After several “flash crashes” triggered excessive volatility in stock markets, the national market system plans governing equity trading established firmer guardrails to limit the impact of such algorithms on market prices.¹⁹¹ In Treasury markets, the SEC has only proposed to extend security capacity and integrity rules and compliance responsibilities to trading systems whose activities reach a specific threshold.¹⁹² As noted above, the SEC has also sought comment on whether to extend Regulation SCI to debt trading systems more broadly.¹⁹³

But the effects of algorithmic innovation are not solely confined to the domain of high-speed markets. Many trading systems produce representative prices and other forms of pricing information designed to help investors negotiate trades. Those streams of information—generated through a combination of public and private data—are a valuable tool for the most illiquid segments of the marketplace. For example, insurance companies, mutual funds, and a variety of other asset managers rely on pricing services to determine the value of their portfolios and assure compliance with leverage, capital, and other regulatory requirements.¹⁹⁴ Some bond dealers may even automate pricing and execution of smaller-sized trades in bond markets.¹⁹⁵

Several information vendors have sought to develop commercial information products that generate price information about individual bond issues using such public, private, and third-party data points. For example, TradeWeb and MarketAxess tout the accuracy of their predictive AI technologies to generate price predictions for bonds traded through their systems.¹⁹⁶ As with most machine learning programs, these vendors train algorithms on

190. For popular commentary, see MICHAEL LEWIS, *FLASH BOYS: A WALL STREET REVOLT* 3 (2014) (“The U.S. stock market now trades inside black boxes What goes on in those boxes is hard to say”); Burton G. Malkiel & Arthur Levitt, *We’re All High-Frequency Traders Now*, WALL ST. J. (Apr. 10, 2014), <https://www.wsj.com/articles/SB10001424052702304640104579489273522701960> (on file with the *Journal of Corporation Law*) (“The goal [of regulating high-frequency trading] should be to make sure that the benefits of speed do not overwhelm the benefits that come with price transparency, fairness, liquidity and stability.”).

191. See Hilary J. Allen, *The SEC as Financial Stability Regulator*, 43 J. CORP. L. 715, 750–53 (2018) (discussing market structure reforms related to high-frequency trading).

192. Circuit breakers govern trading in Treasury futures on futures markets, which creates a risk of trading imbalances between cash and futures trading. See 2021 TREASURY MARKET REPORT, *supra* note 10, at 25.

193. Some industry commentators suggest that enhanced oversight should only apply to automated systems in which human beings cannot detect anomalies and intervene in real time. For example, human traders can replicate auction or RFQ functions in relatively illiquid markets through traditional voice trading in the event of a systems breakdown. Tradeweb Mkts., Inc., Comment Letter on Proposed Rule to Amend the Definition of “Exchange,” at 9–11 (Apr. 18, 2022), <https://www.sec.gov/comments/s7-02-22/s70222-20123933-280073.pdf> [<https://perma.cc/NYL9-FNGE>].

194. For mutual funds in particular, the “breadth and volume of data that is required—and in a hurry—to strike the [net asset value] for a mutual fund is daunting.” See, e.g., ERIC JACOBSON, MORNINGSTAR, *BOND PRICING: AGREEING TO DISAGREE* 1, 5 (2021), https://www.morningstar.com/content/dam/marketing/shared/research/foundational/Bond_Pricing_2021.pdf [<https://perma.cc/8MF8-92LJ>].

195. Bessembinder, Spatt & Venkataraman, *supra* note 19, at 3 (citing a Greenwich Associates report that “some liquidity providers now respond to corporate bond RFQs for trades below certain size thresholds using algorithms rather than human traders”).

196. See, e.g., Agam Shah, *To Make Bets on Bond Market More Accurate, MarketAxess Enlists Lessons from Big Tech*, WALL ST. J. (July 30, 2021), <https://www.wsj.com/articles/to-make-bets-on-bond-market-more-accurate-marketaxess-enlists-lessons-from-big-tech-11627677286> (on file with the *Journal of Corporation Law*).

the basis of reported transaction data to improve the accuracy with which they can predict the prices at which bonds will trade. Reference data points—for example, call and redemption rights, covenants, and conversion rights—may also have a quantifiable relationship with trading prices.¹⁹⁷

Endorsing predictive prices as a standard for execution may nevertheless implicate many of the concerns associated with “franchising” credit ratings or exchange quotations.¹⁹⁸ Pricing of illiquid bonds can be subject to the same arbitrariness as “offered rates” and other representative prices tarnished in the recent financial crisis.¹⁹⁹ Information products reliant on incomplete or sporadic data are thus susceptible to mispricing (or even manipulation) to the extent that a “critical mass of investors” does not actively participate in generating it.²⁰⁰

Responsibility for assuring the quality of such feeds therefore largely rests on the institutions who use them. For example, fund board members and their asset managers assume a fiduciary duty in selecting pricing services.²⁰¹ As one analyst notes, this may require the managers to set up a “pricing waterfall,” compiling the prices generated by numerous services to avoid relying on potential outliers.²⁰² The MSRB has also attempted to provide tools for retail investors to understand municipal securities pricing.²⁰³ The effectiveness of tools to inform retail investment decisions, however, are limited by the ability, motivation, or determination of investors to use them.²⁰⁴

197. See Hartzmark, Schipani & Seyhun, *supra* note 6, at 698–711 (critiquing the court’s analysis of whether AIG bonds traded in an efficient market for class certification purposes).

198. Kathryn Judge, *Intermediary Influence*, 82 U. CHI. L. REV. 573, 594–614 (2015) (describing these “positional and informational advantages”).

199. See, e.g., Bloomberg Fin. L.P., Exchange Act Release No. 11150, 2023 WL 369464 (Jan. 23, 2023) (imposing cease and desist order on Bloomberg for failing to disclose that “valuations for certain thinly-traded fixed income securities could, in certain circumstances, be largely driven by a single data input, such as a broker quote”); see also Gina-Gail S. Fletcher, *Benchmark Regulation*, 102 IOWA L. REV. 1929, 1947–62 (2017).

200. Cf. Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 2004 U. ILL. L. REV. 1, 19 (explaining why disclosure-focused securities regulation may be insufficient for bonds and other infrequently traded products); Robert P. Bartlett, III, *Inefficiencies in the Information Thicket: A Case Study of Derivative Disclosures During the Financial Crisis*, 36 J. CORP. L. 1, 55–56 (2010) (advocating that regulators both “economize the computational effort required to assess” disclosures about complex products and “enhance their salience” to inattentive investors).

201. See, e.g., 17 C.F.R. § 270.2a-5(a)(4) (2024) (requiring mutual fund boards, when determining “fair value in good faith with respect to a fund,” to “[e]valuate pricing services,” if used).

202. Jacobson’s study observed that September 2019 price-spread ranges across pricing services for corporate bonds in the AAA–AA cohort held by multiple mutual fund complexes were on the whole fairly tight but increased with each credit grade rating. JACOBSON, *supra* note 194, at 12. Moreover, ranges varied widely during the pandemic. *Id.* at 13.

203. See, e.g., *Compare Municipal Bonds*, ELEC. MUN. MKT. ACCESS, <https://emma.msrb.org/TradeData/PriceDiscovery> [<https://perma.cc/8VYZ-272Q>].

204. Robert Battalio, Shane A. Corwin & Robert Jennings, *Can Brokers Have It All? On the Relation Between Make-Take Fees and Limit Order Execution Quality*, 71 J. FINANCE 2193, 2232 (2016) (opining that the “inability of customers to assess a broker’s execution quality lies at the heart of the conflict of interest”). The skills required to use comparable transactions or contemporaneous market conditions to assess execution quality may nevertheless be “substantially beyond the expertise” of most retail investors. LARRY HARRIS, *REGULATED EXCHANGES: DYNAMIC AGENTS OF ECONOMIC GROWTH* 102–03 (2010).

D. Decentralized Finance

Decentralized finance (DeFi) provides yet another opportunity to rethink how financial services and service providers are organized. Its “backbone” is distributed ledger technology (“DLT,” or, colloquially, “blockchain”),²⁰⁵ which enables the issuance, holding, and transfer of cryptocurrencies and other digital assets on a “decentralized” network.²⁰⁶ By maintaining parallel records of verified transactions, DLT obviates the need for “centralized” intermediaries to process transactions and maintain ownership records.²⁰⁷ Some DLTs, such as Ethereum, further enable execution of “smart contracts” that, inter alia, transfer digital assets into and out of accounts, message other accounts, or take other actions based upon messages from users or other external data (via “oracles”).²⁰⁸

With these “primitive financial actions” or “primitives” in hand, developers can build a variety of increasingly complex and interoperable DeFi applications.²⁰⁹ Advocates contend that DeFi provides “concrete solutions” to the traditional flaws in “centralized” markets.²¹⁰ Among other claims, DeFi reduces the inefficiencies of “organizational overhead” by relying on smart contracts and decentralized applications (dApps) to perform financial operations.²¹¹ If scalable,²¹² DeFi could reduce access costs and thereby provide access to a broader range of users than current platforms.²¹³ The “open and contractual nature” of smart contracts and tokenization reduces opacity and also permits recombination of protocols, thus enabling interoperability of transactions.²¹⁴ And DeFi has the potential to reduce reliance on centralized government or institutional control over financial platforms.²¹⁵

DeFi can disrupt traditional bond markets in at least two ways. First, DeFi is creating new asset classes—such as stablecoins and other payment coins—that can serve as the basis for a range of new financial products and transactions. More generally, DeFi can tokenize real-world products in order to offer traditional issuers and market intermediaries

205. See Kevin Werbach, *Trust, but Verify: Why the Blockchain Needs the Law*, 33 BERKELEY TECH. L.J. 487, 498–510 (2018) (describing for a legal audience how the blockchain works); see generally FABIAN SCHÄR & ALEKSANDER BERENTSEN, *BITCOIN, BLOCKCHAIN AND CRYPTOASSETS: A COMPREHENSIVE INTRODUCTION* (2020) (providing a more technical discussion).

206. A bill sponsored by the leadership of the U.S. House Financial Services Committee and the U.S. House Agriculture Committee would define “decentralized finance” as a system of “blockchain protocols that allow users to engage in financial transactions in a self-directed manner so that a third-party intermediary does not effectuate the transactions or take custody of digital assets of a user during any part of the transactions.” Financial Innovation and Technology for the 21st Century Act, H.R. 4763, 118th Cong. § 505(d) (as introduced, July 20, 2023).

207. SCHÄR & BERENTSEN, *supra* note 205, at 36–46 (explaining how the Bitcoin blockchain can “guarantee transactional capacity, establish transactional legitimacy, and achieve transactional consensus” without a central authority).

208. See, e.g., CAMPBELL R. HARVEY, ASHWIN RAMACHANDRAN & JOEY SANTORO, *DEFI AND THE FUTURE OF FINANCE* 16–28 (2021) (describing how Ethereum’s smart contracting platform interacts with other DeFi elements); Carla L. Reyes, *A Unified Theory of Code-Connected Contracts*, 46 J. CORP. L. 981, 990 (2021).

209. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 29–57.

210. *Id.* at 58.

211. *Id.* at 58–60.

212. *Id.* at 138–41.

213. *Id.* at 60–62.

214. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 62–68.

215. *Id.* at 64–65.

“decentralized” options not only for holding and trading securities but also for finding and creating liquidity. As with other network technologies, the more users—and uses—distributed ledgers, cryptoassets, and cryptoasset trading platforms amass, the more potent the possibilities for complex financial transactions.²¹⁶

The development of stablecoin staking, lending, and other financing services signals the possibility of eventually offering fully decentralized cryptocurrency bonds.²¹⁷ For example, issuers might one day be able to create and issue a token representing the right to receive a fixed quantity of a specified currency at a specified date, like a zero-coupon bond.²¹⁸ The volatility of digital assets and the lack of an accepted framework for their regulation might make this prohibitive for now.²¹⁹ The Federal Reserve System, among other monetary authorities, is exploring the possibility of issuing a central bank digital currency.²²⁰ If successful, such initiatives could pave the way for more experimentation with fully decentralized instruments.

Even as many policymakers remain skeptical of stablecoins and other cryptocurrencies as stores of value,²²¹ distributed ledgers can more practically be used to “tokenize” traditional assets such as equity and debt securities.²²² DLT’s transparency and immutability can make it an attractive venue for recording traditional financial assets or transactions.²²³ For example, decentralized exchanges may publish trading protocols in the form of smart contracts, thereby providing traders with assurance of how their trading

216. See Donald, *supra* note 93, at 44–45 (explaining how “network externalities” on an exchange “increase the likelihood a potential buyer or seller will find a counterparty for a trade”).

217. Press Release, U.S. Dep’t of the Treas., President’s Working Group on Financial Markets Releases Report and Recommendation on Stablecoins (Nov. 1, 2021), <https://home.treasury.gov/news/press-releases/jy0454> [<https://perma.cc/AXV8-BLNB>].

218. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 105–09 (describing Yield Protocol).

219. See, e.g., PRESIDENT’S WORKING GROUP ON FINANCIAL MARKETS, REPORT ON STABLECOINS 12–19 (2021); Kara Bruce, Christopher K. Odet & Andrea Tosato, *The Private Law of Stablecoins*, 54 ARIZ. ST. L.J. 1073, 1119 (2022); see also Clarity for Payment Stablecoins Act of 2023, H.R. 4766, 118th Cong. 1, 37–38 (2023) (proposing to limit the authority to issue “payment stablecoins” to certain bank and qualified non-bank issuers and imposing a moratorium on “endogenously collateralized stablecoins”).

220. See BD. OF GOVERNORS OF THE FED. RSRV. SYS., MONEY AND PAYMENTS: THE U.S. DOLLAR IN THE AGE OF DIGITAL TRANSFORMATION 1–33 (2022) (exploring “the implications of, and options for, issuing” a central bank digital currency); see also *Central Bank Digital Currencies*, FED. RSRV. BANK OF BOS., <https://www.bostonfed.org/payments-innovation/central-bank-digital-currencies.aspx> [<https://perma.cc/EH33-B55S>] (describing Project Hamilton).

221. See, e.g., COUNCIL OF ECON. ADVISERS, 2023 ECONOMIC REPORT OF THE PRESIDENT 246–68 (2023) (rebutting claims).

222. See, e.g., Joshua A.T. Fairfield, *Bitproperty*, 88 S. CAL. L. REV. 805, 825–28 (2015) (discussing the advantages of representing property interests as tokens on a blockchain); Press Release, World Bank, World Bank Prices First Global Blockchain Bond, Raising A\$110 Million (Aug. 23/24, 2018), <https://www.worldbank.org/en/news/press-release/2018/08/23/world-bank-prices-first-global-blockchain-bond-raising-a110-million> [<https://perma.cc/44JB-6NSG>].

223. See, e.g., Yuliya Guseva, *A Conceptual Framework for Digital-Asset Securities: Tokens and Coins as Debt and Equity*, 80 MD. L. REV. 166, 183–84 (2020) (stating that investors’ “ultimate expectations are that transactions in digital assets be immutable and transparent” once the project is autonomous and decentralized).

interest will be handled.²²⁴ Decentralized autonomous organizations (DAOs) might also administer rule changes or trading decisions based on transparent voting protocols.²²⁵

In the United States, some bond issuers are keen to embrace DLT as a tool for raising capital, particularly in issuances targeted at higher-net-worth investors. Several state and local governments have signaled an interest in crypto-offerings of municipal securities²²⁶—whether as a tactic to increase retail investor appeal, to avoid the cost of traditional underwriting arrangements, or simply to signal a “cryptofriendly” regulatory environment. Such cryptobonds could take the form of “tokens” representing entitlements to interest and principal payments in real-world currencies maintained on a combination of centralized and decentralized ledgers.²²⁷

Decentralized exchanges, meanwhile, are implementing trading mechanisms—such as central limit order books and automated market making—through a combination of smart contracts and off-chain trading engines.²²⁸ Interoperable DeFi protocols offer the prospect of “composable liquidity” across applications in ways that traditional systems may not.²²⁹ Because DLT transactions take place at discrete intervals (as new blocks are validated and appended to the digital ledger), developers must tackle issues common to real-world and digital systems such as imbalances in trading interest, front running between blocks, and how much “slippage” to tolerate from benchmark prices.²³⁰

There are nevertheless a number of operational risks, among them custodial arrangements.²³¹ As broader user classes seek to acquire crypto-assets, a variety of platforms have emerged for holding them.²³² These include traditional custodians, centralized exchanges that facilitate trading, and a range of other DeFi transactions.²³³ In

224. Farshad Ghodoosi, *Contracting in the Age of Smart Contracts*, 96 WASH. L. REV. 51, 52 (2021).

225. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 69–77 (describing governance of MakerDAO). These systems, of course, still rely to a significant degree on their human creators and administrators, and the ability to game DAO governance rules has already created its share of controversy. SEC, Report of Investigation Pursuant to Section 21(a): The DAO, Exchange Act Release No. 81,207, at 3–4 (July 25, 2017).

226. See, e.g., Nic Querolo, *Startup Uses Blockchain for Muni-Bond Deals in an Industry First*, BLOOMBERG (Dec. 16, 2022), <https://www.bloomberg.com/news/articles/2022-12-16/alphaledger-uses-blockchain-for-muni-bond-deals-in-an-industry-first> [<https://perma.cc/KW4N-4B6X>] (discussing state and local interest in practical applications of crypto-currency).

227. See *id.* (describing “parallel recordkeeping” problem).

228. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 95–105, 110–19 (describing automated market making on UniSwap and the operation of an offchain order book on dYdX).

229. *Id.* at 50–54.

230. *Id.* at 99–100; David C. Donald & Mahdi H. Miraz, *Multilateral Transparency for Securities Markets Through DLT*, 25 FORDHAM J. CORP. & FIN. L. 97, 140 (2020); Kristin N. Johnson, *Decentralized Finance: Regulating Cryptocurrency Exchanges*, 62 WM. & MARY L. REV. 1911, 1963 (2021).

231. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 144–46.

232. See, e.g., Maria Teresa Chimienti, Urszula Kochanska & Andrea Pinna, *Understanding the Crypto-Asset Phenomenon, Its Risks and Measurement Issues*, EUR. CENT. BANK (2019), https://www.ecb.europa.eu/pub/economic-bulletin/articles/2019/html/ecb.ebart201905_03~c83aeaa44c.en.html [<https://perma.cc/UKM7-ADBH>] (noting that “while holders of crypto-assets can transfer crypto-asset units without an intermediary by accessing directly the decentralised crypto-asset network, user convenience has led to the emergence of service providers that facilitate the use of crypto-assets for payments”).

233. See Johnson, *supra* note 230, at 1951–60 (summarizing the origins and operation of cryptocurrency exchanges); Marco Dell’Erba, *Crypto-Trading Platforms as Exchanges*, MICH. ST. L. REV. (forthcoming 2024) (comparing centralized and decentralized exchanges).

the absence of a financial responsibility regime applicable to such platforms, of course, there is significant operational, legal, and intermediary risk with respect to such holdings.²³⁴ The SEC has created a tentative pathway for alternative trading systems to introduce transactions in digital asset securities,²³⁵ and a number of platforms have registered or begun the process of registering as brokers pursuant to interim guidance under the Exchange Act.²³⁶

Much is made of the disruptive potential of such technologies, though their impact may well be “evolutionary rather than revolutionary.”²³⁷ It is unlikely regulators will permit DeFi to supersede our financial infrastructure in the near future given that “the weakest link in the [DeFi] chain will bring down the entire house.”²³⁸ Some observers nevertheless believe that technology can democratize markets by providing broader, fairer access to trading opportunities and information,²³⁹ while others worry that technology may simply enable established intermediaries to entrench their asymmetries of information and access.²⁴⁰ And we probably all fear that inadequately supervised technologies have the potential to trigger “abrupt and disruptive deterioration” in even the most liquid markets.²⁴¹

V. THE SEC AWAKENS

SEC Chairs have regularly affirmed the importance of revisiting bond market structure, but their efforts have generally been incremental and oblique. During the Obama Administration, Chair Mary Jo White pressed FINRA and MSRB to modernize mark-up rules and disseminate more trading data.²⁴² Under the Trump Administration, Chair Jay Clayton chartered a Fixed-Income Market Structure Advisory Committee (FIMSAC) to

234. See, e.g., Bruce, Odinet & Tosato, *supra* note 219, at 1119.

235. See Fin. Indus. Regul. Auth., SEC Interpretative Letter, 2020 WL 5745536 (Sept. 25, 2020) (granting no-action relief from the SEC’s customer protection rule to alternative trading systems introducing transactions in digital asset securities).

236. Custody of Digital Asset Securities by Special Purpose Broker-Dealers, 86 Fed. Reg. 11627, 11631 (proposed Feb. 26, 2021) (to be codified as 17 C.F.R. pt. 240) (providing interim interpretive guidance for broker-dealer custody of cryptoasset securities); see also Jason Foye Chief, *An Inside Look into FINRA’s Crypto Asset Work*, FINRA CRYPTO HUB (Aug. 3, 2023), <https://www.finra.org/media-center/blog/inside-look-finras-crypto-asset-work> [<https://perma.cc/EHA4-5JWB>].

237. O’Hara & Zhou, *supra* note 100, at 369 (observing that bond illiquidity, institutional trading, and market structure operate as natural limitations on disruption of bond dealer dominance). For example, FinTech initiatives often provide back-end services to dealers or institutional investors to manage order generation, routing, and execution without necessarily displacing traditional intermediaries. Brummer & Yadav, *supra* note 189, at 275–78.

238. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 130–49, 152 (describing among issues, risks associated with scaling distributed ledgers; potential flaws in the design or implementation of smart contracts, governance mechanisms, oracles, and decentralized exchanges; and custodial and environmental risks).

239. See Douglas W. Arner, János Barberis & Ross P. Buckley, *The Evolution of Fintech: A New Post-Crisis Paradigm?*, 47 GEO. J. INT’L L. 1271, 1286–95 (2016) (discussing expectations that the latest round of financial technological innovation will succeed in “democratizing digital financial services”).

240. Mary Jo White, Chair, Sec. & Exch. Comm’n, Speech Before the Economic Club of New York: Intermediation in the Modern Securities Markets: Putting Technology and Competition to Work for Investors (June 20, 2014), <http://www.sec.gov/news/speech/2014-spch062014mjw> [<https://perma.cc/DH3W-XG7B>]; see also Judge, *supra* note 198, at 594–614 (describing such “positional and informational advantages”).

241. 2021 TREASURY MARKET REPORT, *supra* note 10, at 1.

242. Speech of Former SEC Chair Mary Jo White, *supra* note 240.

review *inter alia* the “efficiency and resiliency of the corporate bond and municipal securities markets.”²⁴³ The rule package proposed by current-Chair Gary Gensler in many ways builds on Chair Clayton’s concept release on fixed-income markets and proposed expansion of Regulation ATS to government securities.²⁴⁴

The immediate impetus for more vigorous intervention appears to have been the repeated shocks endured by the Treasury markets over the past decade. Some of these incidents—exemplified by the October 2014 flash rally—involved unexplained volatility in Treasury markets: regulators appeared to attribute such events to the market’s reliance on proprietary traders to supply liquidity (however ephemeral) and the inability of dealers to respond resiliently in their absence. Other crises—such as the pressure endured by the Treasury markets during the onset of the COVID-19 epidemic in March 2020—exposed the operational incapacity of certain trading systems to respond to surges in trading volume.

In each case, regulators collectively highlighted recurrent weaknesses in the Treasury markets.²⁴⁵ Unregulated trading systems and services failed during moments of unexpected or unprecedented stress.²⁴⁶ The lack of coordinated oversight over market intermediaries led to gaps in trading data. These gaps made it difficult to reconstruct and analyze trading activity.²⁴⁷ Inconsistent circuit breakers, risk management controls, and the limitations of clearing and financing arrangements exacerbated liquidity pressure.²⁴⁸ In a remarkable show of unity, the policy recommendations generated among financial regulators indicated an enhanced role for the SEC and FINRA in the oversight of Treasury market trading systems and trading data.²⁴⁹

The SEC’s current proposals, however, reflect the broadest effort to date to comprehensively (if not coherently) address fixed-income trading. They would assert jurisdiction over trading systems and trading protocols, liquidity providers, clearing agencies, and data vendors not only in Treasury markets but across bond markets.²⁵⁰ While ambitious in scope, the proposals nevertheless hew closely to the SEC’s approach to equity market regulation.²⁵¹ This Part will briefly summarize these proposals and consider the motivations behind them as well as the signals they send to the bond marketplace.

243. STAFF REPORT ON THE FIRST YEAR OF THE FIXED INCOME MARKET STRUCTURE ADVISORY COMMITTEE, *supra* note 11, at 2; *accord* Fixed Income Market Structure Advisory Committee, Exchange Act Release No. 81958, 82 Fed. Reg. 50460 (Oct. 31, 2017).

244. *See generally* Regulation ATS and Regulation SCI for U.S. Government Securities, Exchange Act Release No. 90019, 85 Fed. Reg. 87106 (Dec. 31, 2020).

245. *See, e.g.*, 2021 TREASURY MARKET REPORT, *supra* note 10, at 17–18.

246. *Id.*

247. *See id.* at 26–29 (discussing the need to improve the quality and availability of data regarding cash, futures, and repo transactions in Treasury securities).

248. *See id.* at 13–14 (describing, among other “notable challenges to the supply of liquidity,” inconsistencies across markets in terms of dealer activity limits and circuit breakers, and the unpredictability of margin calls).

249. *See id.* at 28 (collectively endorsing efforts to improve the coverage, accuracy, and quality of data FINRA collects through TRACE, including by extending trade reporting obligations to entities that are not FINRA members).

250. 2021 TREASURY MARKET REPORT, *supra* note 10, at 28.

251. *Id.*

A. Expanding the SEC's Reach

The SEC's proposed reforms to bond markets span four broad categories of intermediation. In general, the releases aim (i) to expand the definition of "exchange" to encompass a broader range of trading services and technologies, (ii) to expand the definition of "dealer" to encompass a broader range of liquidity providers both in debt and equity markets, (iii) to impose additional conditions on how informational intermediaries create and disseminate information, and (iv) to impose a broader clearing mandate for Treasury securities.²⁵² Individually, these proposals appear to reflect substantive concerns about systemic risk in the marketplace as well as incipient business practices. To the extent that these proposals formalize regulation of existing entities and relationships, however, they collectively threaten to solidify bond trading practices around current bond market structures.

1. Exchanges

The SEC may require registration of any entity that "constitutes, maintains, or provides a market place or facilities for bringing together purchasers and sellers of securities" as an exchange.²⁵³ At the time of enactment, the Exchange Act contemplated floor-based exchanges with specialists or designated market makers facilitating the execution of transactions pursuant to the exchanges' priority, parity and precedence rules.²⁵⁴ From the late sixties through the early nineties, the SEC allowed a variety of trading systems to play in the equity market "sandbox" while monitoring their growth and risks.²⁵⁵ It wasn't until the Nasdaq market maker scandal of the mid-nineties that the SEC felt compelled to integrate these trading systems into the national market system framework for stock trading.²⁵⁶

To do so, the SEC adopted an "interpretation" of the statutory definition of an "exchange" in 1998 that formally brought alternative trading systems within the scope of "exchange" registration; this interpretation swept up any system that "[b]rings together the orders for securities of multiple buyers and sellers" using "established, non-discretionary methods (whether by providing a trading facility or by setting rules) under which such orders interact with each other, and the buyers and sellers entering such orders agree to the

252. *Id.*

253. 15 U.S.C. §§ 78c(a)(1), 78e, 78f.

254. *Id.* § 78k; *see also* SEC. & EXCH. COMM'N, REPORT OF THE SPECIAL STUDY OF SECURITIES MARKETS OF THE SECURITIES AND EXCHANGE COMMISSION, H.R. DOC. NO. 95, pt. 2, at 40–48 (1963).

255. Trading systems began to automate off-exchange trading in equity securities in the late 1960s and 1970s. Institutional trading systems—like Instinet and POSIT—operated limit order books or crossing systems for institutional investors on a purely agency basis. The SEC staff granted such systems no-action relief from regulation as exchanges even as the Commission anticipated "publishing for comment a rule to regulate automated trading systems." *See* Instinet Corp., SEC Staff No-Action Letter, 1986 WL 67657, at *3 (Sept. 8, 1986); Posit, SEC Staff No-Action Letter, 1987 WL 108131, at *2 (July 28, 1987).

256. *See* Regulation of Exchanges and Alternative Trading Systems, Exchange Act Release No. 40760, 63 Fed. Reg. 70844, 70845–46 (Dec. 22, 1998) (citing market-makers' use of alternative trading systems "as a private market," among other reasons, as a justification for regulating such systems); SEC, REPORT PURSUANT TO SECTION 21(A) OF THE SECURITIES EXCHANGE ACT OF 1934 REGARDING THE NASD AND THE NASDAQ STOCK MARKET App. 10–11 (1996) (describing how market makers privately used ATSS to facilitate adherence to the "odd-eighths" pricing convention).

terms of a trade.”²⁵⁷ The SEC simultaneously exempted “alternative trading systems” that enforce rules algorithmically—rather than through traditional disciplinary authority²⁵⁸—provided that they comply with a bespoke regulatory regime (Regulation ATS).²⁵⁹

At the time, the SEC’s interpretation sought only to capture automated stock trading systems that matched “firm indications of buying and selling interest” pursuant to trading algorithms or trading rules.²⁶⁰ The SEC nevertheless carefully sought to distinguish other trading facilities that were in the business of providing communications or information services, keeping in line with earlier SEC no-action relief from broker-dealer registration.²⁶¹ The SEC’s definition also expressly excluded systems that traded government securities on the grounds that the U.S. Treasury Department was the primary regulator for brokers and dealers exclusively dealing in government securities.²⁶²

The SEC’s current proposal would further broaden its interpretation of what constitutes an exchange. On the rulemaking front, its March 2022 proposal would:

- Eliminate the exemption from exchange registration for systems that trade government securities and repurchase agreements,²⁶³
- Expand the scope of interaction triggering regulation as an “exchange” to include bringing together buyers and sellers using any “trading interest”;²⁶⁴
- Expand the universe of technologies triggering regulation as an “exchange” to include “communication protocols” that enable “buyers and sellers [to] interact and agree to the terms of a trade.”²⁶⁵

257. 17 C.F.R. § 240.3b-16 (2024).

258. 17 C.F.R. § 240.3a1-1 (2024).

259. 17 C.F.R. § 242.301 (2024).

260. *See, e.g.*, Regulation of Exchanges and Alternative Trading Systems, Exchange Act Release No. 40760, 63 Fed. Reg. 70844, 70849–52 (Dec. 22, 1988) (elaborating on what it means “to bring together” the “orders” of “multiple buyers and sellers” using “established, non-discretionary methods”).

261. *Id.* at 70854–55 (providing 20 examples of systems); 15 U.S.C. § 78c(a)(4)(A) (defining the term “broker” to mean “any person engaged in the business of effecting transactions in securities for the account of others”). In general, the SEC distinguished informational services from brokers based on whether their business model relied on the “salesman’s stake” in generating trades—for example, collecting transaction-based fees—as opposed to other fee models. The SEC has nevertheless imposed additional fair access obligations on certain information services, such as “securities information processors” acting as “exclusive processors” under NMS Plans and “electronic communication networks” that undertake display obligations on behalf of market makers. *See supra* Part V.A.

262. 17 C.F.R. § 242.301(a)(4) (2024).

263. *See* Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15516–17 (proposed Mar. 18, 2022) (to be codified at 17 C.F.R. pts 232, 240, 242, 249) (explaining the proposal to eliminate the exemption for Government Securities ATSs).

264. *Id.* “Trading interest” would be defined as quantity, direction, or price with respect to an identified security. Current Rule 3b-16 limits the exchange registration requirement to those systems that bring together “orders” (meaning “any firm indication of a willingness to buy or sell a security, as either principal or agent, including any bid or offer quotation, market order, limit order, or other priced order”). 17 C.F.R. § 240.3b-16(a)(1) & (c) (2024).

265. *See* Amendments Regarding the Definition of “Exchange,” 87 Fed. Reg. 15496, 15505–06 (proposing to define the term “established, non-discretionary methods” to include “communication protocols” that a system “makes available” to users). Current Rule 3b-16 limits the exchange registration requirement to those systems

Confirming DeFi proponents' fears,²⁶⁶ the SEC further clarified in Spring 2023 that DeFi platforms would be subject to "exchange" registration under these revised definitions.²⁶⁷ The SEC has brought concomitant enforcement actions to bar cryptoexchanges that facilitate trading in coins, tokens or investment contracts thereon that are deemed "securities."²⁶⁸ The SEC has specifically called out "centralized exchanges" such as Coinbase and Binance for their failure to assure "separation of the[ir] core functions" as contrary to the spirit of the Exchange Act.²⁶⁹

Certainly, the move to include government securities trading systems within the scope of Regulation ATS makes sense. After seven years of public discussion, enhanced oversight of government-securities trading systems seems to enjoy broad endorsement from market participants as well as the acquiescence of the Fed and the Treasury.²⁷⁰ The fact that some, but not all, major government securities trading systems are already subject to Regulation ATS by virtue of their non-government-securities-related activities only underscores the regulatory inequity.²⁷¹ Indeed, the SEC could in theory have adopted Chair Clayton's 2020 Government Securities ATS proposal without further ado.²⁷²

The proposal to simultaneously expand activity-based jurisdiction is more difficult to understand. While the SEC clearly wants to regulate systems beyond deterministic order-matching or quotation systems, the degree of structure required to trigger interest is frustratingly vague. The term "communication protocol" is undefined, and as several commenters note, it is not clear where the facilities of an "exchange" ends and where the workflow technologies of a "buyer" or "seller" begins.²⁷³ The ambiguity of the SEC's anachronistic statutory authority may explain, in large part, its inability to provide more concrete guidance.²⁷⁴

that "use[] established, non-discretionary methods (whether by providing a trading facility or by setting rules) under which such orders interact with each other, and the buyers and sellers entering such orders agree to the terms of a trade." 17 C.F.R. § 240.3b-16(a)(2) (2024).

266. See, e.g., Carol R. Goforth, *Critiquing the SEC's Ongoing Efforts to Regulate Crypto Exchanges*, 14 WM. & MARY BUS. L. REV. 305, 322–28 (2023); HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 147–49.

267. Supplemental Information and Reopening of Comment Period for Amendments Regarding the Definition of "Exchange," Exchange Act Release No. 97309, 88 Fed. Reg. 29448, 29448–49 (proposed May 5, 2023) (to be codified at 17 C.F.R. pts. 232, 240, 242, 249) (explaining that the purpose of the release is to provide "supplemental information and economic analysis regarding trading systems that trade crypto asset securities" under proposed rulemaking); see Goforth, *supra* note 266, at 311–22.

268. Gary Gensler, Chair, Sec. & Exch. Comm'n, Prepared Remarks on Crypto Markets at the Penn Law Capital Markets Association Annual Conference (Apr. 4, 2022), <https://www.sec.gov/news/speech/gensler-remarks-crypto-markets-040422> [<https://perma.cc/3XAS-WQQJ>].

269. Complaint at 18, SEC v. Binance Holdings Ltd., No. 23-cv-01599 (D.D.C. June 5, 2023); Complaint at 11, SEC v. Coinbase, Inc., 23-cv-4738 (S.D.N.Y. June 6, 2023).

270. See, e.g., 2021 TREASURY MARKET REPORT, *supra* note 10, at 33–34.

271. Amendments Regarding the Definition of "Exchange" and Alternative Trading Systems, 87 Fed. Reg. 15496, 15600.

272. See *supra* note 12.

273. Bloomberg L.P. Comment Letter, *supra* note 96; SIFMA Asset Mgmt. Grp. Comment Letter, *supra* note 104, at 2; Inv. Co. Inst. Comment Letter, *supra* note 59, at 2.

274. By way of contrast, the EU's Second Markets in Financial Instruments Directive (MiFID II) separately defined "regulated markets," "multilateral trading facilities" and "organized trading facilities" to better distinguish systems that apply non-discretionary rules from those that do not. See Danny Busch & Han Gulyás,

Nowhere does this vagueness create more anxiety than in the context of decentralized exchanges, which by design use tools such as smart contracts, governance tokens, and decentralized applications—quintessentially structured protocols—to conduct financial activity.²⁷⁵ Several commenters note that the proposed redefinition of exchange could be read to “sweep into the agency’s regulatory ambit even truly decentralized systems, which . . . perform their functions via embedded smart contracts.”²⁷⁶ In this vein, Commissioner Peirce has proposed that the SEC adopt a “time-limited exemption” from regulation under the federal securities laws for digital assets and the systems that trade them.²⁷⁷

2. Dealers

The Exchange Act generally defines the term “dealer” to mean “any person engaged in the business of buying and selling securities . . . for such person’s own account through a broker or otherwise,” while excluding a person that does not do so “as a part of a regular business.”²⁷⁸ Intuitively, what distinguishes dealers from other traders is that they primarily aim to profit from the spread between the price at which they offer to buy and the price at which they offer to sell.²⁷⁹ In equity markets, moreover, designated market makers may commit to abide by additional obligations to provide liquidity (whether under the rules of a stock exchange or Regulation NMS) and continue to receive inducements or incentives for doing so.²⁸⁰

The idea of imposing dealer-like obligations on emerging liquidity providers is not novel. In equity markets, specialists and designated market makers without a public customer business have been regulated as dealers under SEC and SRO rules, and it is historically evident that a lack of financial responsibility or operational capacity of major liquidity providers can have negative externalities for the marketplace.²⁸¹ Nor is the idea of exercising greater oversight over larger market participants novel. The SEC already requires broker-dealers to monitor the activities of “large traders” in NMS securities—

Alternative Trading Venues and Systematic Internalisers in Europe, in FINANCIAL MARKET INFRASTRUCTURES: LAW AND REGULATION 158–95 (Jens-Hinrich Binder & Paolo Saguato eds., 2021).

275. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 18–28.

276. Andreessen Horowitz, Comment Letter on Proposed Rule to Amend the Definition of “Exchange,” at 4–5 (Apr. 18, 2022), https://a16z.com/wp-content/uploads/2022/04/a16z_comment_on_letter_on_file_number_S7-02-22.pdf [<https://perma.cc/6E5U-UX2X>]; Crypto Council for Innovation, Comment Letter on Proposed Rule to Amend the Definition of “Exchange” (Apr. 18, 2022), <https://www.sec.gov/comments/s7-02-22/s70222-20123996-280136.pdf> [<https://perma.cc/P8HL-NHVP>].

277. *See, e.g.*, Hester Peirce, SEC Comm’r, Speech on Running on Empty: A Proposal to Fill the Gap Between Regulation and Decentralization (Feb. 6, 2020) (proposing a new Rule 195 creating a safe harbor for trading in digital assets issued by decentralized ledgers and entities).

278. 15 U.S.C. § 78c(a)(6); *see generally supra* Part II.C.1.

279. For bonds and other relatively illiquid securities, they may incidentally profit from holding positions in inventory. As discussed *infra* notes 67–76, the Volcker Rule attempts to quantify the relative contributions of market-making and risk-taking in classifying dealer activity. *See* 12 C.F.R. pt. 248, app. A, Part IV.b (2024) (describing source-of-revenue measurements).

280. *See, e.g.*, Stanislav Dolgoplov, *Providing Liquidity in a High Frequency World: Trading Obligations and Privileges of Market Makers and a Private Right of Action*, 7 BROOK. J. CORP. FIN. & COM. L. 303, 352–58 (2013).

281. Further Definition of “As a Part of a Regular Business” in the Definition of Dealer and Government Securities Dealer, 87 Fed. Reg. 23054, 23085 (proposed Apr. 18, 2022) (to be codified at 17 C.F.R. pt. 240).

pursuant to authority under the Exchange Act²⁸²—and the Treasury Department’s large position reporting rules require the filing of large position reports in specific Treasury issues on demand.²⁸³

Moreover, for at least a decade, Congress has heard concerns about the activities of proprietary traders that interact with the automated systems of exchanges, alternative systems, and market makers.²⁸⁴ High-frequency trading firms place and cancel orders at a volume far exceeding their trading positions or capital.²⁸⁵ Such trading results in more liquidity and tighter spreads, but the ephemerality of their trading interest may distort the market’s perception of liquidity and may trigger price disruptions.²⁸⁶ More generally, market participants fear the potentially manipulative use of such trading strategies.²⁸⁷ There have accordingly been calls to regulate this kind of trading activity, whether under the rubric of “dealer” registration or additional categories of liquidity provider.²⁸⁸

In reconceptualizing the definition of a “dealer,” the SEC’s recently adopted rule specifically focuses on whether proprietary trading firms “engage[] in a regular pattern of buying and selling securities that has the effect of providing liquidity to other market participants.”²⁸⁹ A “regular pattern” may be found through regular turnover of positions or comparable arbitrage transactions in related instruments, programming trading to capture bid-ask spreads or other liquidity incentives, or communicating trading interest on both sides of the market at or near best available prices.²⁹⁰ Unlike the precise metrics of the Volcker Rule, which are ostensibly calibrated to distinguish “market making” from “dealing,”²⁹¹ the SEC’s empirically less rigorous definition of “dealer” evidently seeks to preserve enforcement flexibility.

The SEC’s decision to act seems to have been motivated by the understandable concern that proprietary trading firms account for a near-majority of ATS trading in on-the-run Treasury securities, without any formal capacity or financial responsibility

282. 17 C.F.R. § 240.13h-1 (2024).

283. 17 C.F.R. pt. 420 (2024).

284. See, e.g., *Equity Market Structure: Hearing Before the House Subcomm. on Cap. Mkts. & Gov’t Sponsored Enters.*, 113th Cong. (2014); *Conflicts of Interest, Investor Loss of Confidence, and High Speed Trading in U.S. Stock Markets: Hearing Before the Senate Permanent Subcomm. on Investigations*, 113th Cong. (2014).

285. Concept Release on Equity Market Structure, Exchange Act Release No. 61358, 75 Fed. Reg. 3594, 3606–12 (Jan. 21, 2010).

286. *Id.* at 3606–08.

287. *Id.* at 3611–12.

288. For a helpful history, see 4 THOMAS LEE HAZEN, TREATISE ON THE LAW OF SECURITIES REGULATION § 14:14, Westlaw (database updated Nov. 2023).

289. Further Definition of “As a Part of a Regular Business” in the Definition of Dealer and Government Securities Dealer, 89 Fed. Reg. 14938, 15009 (Feb. 29, 2024) (to be codified at 17 C.F.R. pt. 240) (adopting new Rules 3a5-4 and 3a44-2). The final rule excludes investment companies and smaller participants (less than \$50 million in assets under management) from the interpretation of the definition of “dealer.” *Id.*

290. *Id.* at 14947–48; see also Further Definition of “As a Part of a Regular Business” in the Definition of Dealer and Government Securities Dealer, 87 Fed. Reg. 23054, 23064–70 (Apr. 18, 2022) (elaborating on the intended scope of the previously proposed phrase “routine pattern”).

291. 12 C.F.R. pt. 248, app A, Part IV (2024) (imposing both “risk-management measurements” and “source-of-revenue measurements”).

requirements—let alone, liquidity obligations.²⁹² What is curious about the SEC’s proposal is that it was unnecessary to extend it beyond equity and Treasury markets, where proprietary trading activity is relatively minimal. In other contexts, for example, policymakers have considered incremental classification of “major participants” in financial markets to assert jurisdiction over their activities without subjecting them to the full suite of dealer regulation.²⁹³

3. Data and Analytics

Two additional SEC releases would regulate how information is generated and used in securities markets. In 2022, the SEC solicited comment as to whether certain pricing services should be subject to regulation as investment advisers.²⁹⁴ The SEC’s release focused on services that provide “prices, valuations, and additional data” about an investment “to assist users with determining an appropriate value of the investment.”²⁹⁵ Such services exercise discretion in the sense that they select valuation methodologies, templates, and inputs and generally review the appropriateness of valuations generated by their models.²⁹⁶ In the absence of more concrete authority,²⁹⁷ one might reasonably conclude that the SEC desires to fold data products and data analytics under the aegis of the Advisers Act when used to make trading or pricing decisions,²⁹⁸ particularly to the extent that registrants outsource their own fiduciary and professional obligations to such entities.

In August 2023, the SEC further proposed to regulate the use of predictive data analytics by broker-dealers and investment advisers,²⁹⁹ building on its concerns regarding

292. The SEC abandoned its proposal to establish special rules for classifying entities trading government securities based on monthly trading volume. Further Definition of “As a Part of a Regular Business,” 87 Fed. Reg. 23054, 23105 (proposed Rule 3a44-2).

293. Congress distinguished “major participants” from “dealers” in swap markets, to acknowledge firms with substantial positions and potential to create substantial counterparty exposure. *Compare* 7 U.S.C. § 6s(43), (49) (defining “security-based swap dealer” and “swap dealer”), *with id.* § 6s(32), (33) (defining “major security-based swap participant” and “major swap participant”).

294. Request for Comment on Certain Information Providers Acting as Investment Advisers, Advisers Act Release No. 6050, 87 Fed. Reg. 37254, 37259 (June 22, 2022) (to be codified at 17 C.F.R. pts. 270, 275). The SEC’s request for comment is part of a larger inquiry into how index and portfolio providers ought to be regulated in connection with the management of investment companies.

295. *Id.* at 37256.

296. *Id.*

297. U.S. financial services law does not yet provide for the regulation of benchmark products separately from their use (e.g., indexes, rates, and representative prices) unlike the EU’s post-crisis revisions to MiFID to regulate commercial benchmark products. Regulation (EU) 2016/1011 of the European Parliament and of the Council of 8 June 2016 on Indices Used as Benchmarks in Financial Instruments and Financial Contracts or to Measure the Performance of Investment Funds and Amending Directives 2008/48/EC and 2014/17/EU and Regulation (EU) No 596/2014, O.J. (L 171) 1; *see also* ONNIG H. DOMBALAGIAN, CHASING THE TAPE 98–100 (2015) (observing that the “SEC and CFTC have not taken direct action to regulate US benchmarks” apart from “regulatory oversight of benchmark products”).

298. *See, e.g.*, Paul G. Mahoney & Adriana Z. Robertson, *Advisers by Another Name*, 11 HARV. BUS. L. REV. 311, 349–56 (2021) (proposing a safe harbor for index providers within the Investment Advisers Act).

299. Conflicts of Interest Associated with the Use of Predictive Data Analytics by Broker-Dealers and Investment Advisers, 88 Fed. Reg. 53960, 53960 (proposed Aug. 9, 2023) (to be codified at 17 C.F.R. pts. 240, 275).

the gamification of trading and other digital engagement practices.³⁰⁰ The proposed rules seek to ensure that firms address, through their internal policies and procedures, the conflicts of interest that may arise in connection with any “covered technology” that “optimizes for, predicts, guides, forecasts, or directs investment-related behaviors or outcomes.”³⁰¹ In particular, the proposed rules impose a duty to “[e]liminate or neutralize the effect of any conflict of interest” that places the interests of the registrant or its associated persons before those of customers.³⁰²

While the SEC’s releases do not expressly implicate debt markets, it is not hard to see their potential relevance to debt trading systems and services. Many debt ATSs already provide pricing services and predictive analytics to their subscribers. These subscribers use those services and analytics when selecting and trading in securities or pricing individual securities for portfolio valuation purposes.³⁰³ The functionality of online research tools to filter, select, and purchase municipal securities would pose particular interpretive challenges for retail broker-dealers.³⁰⁴ In an ideal world, perhaps, such systems would not only evolve to identify securities that fit the subscriber’s investment parameters but also guide price negotiation for both sides in all-in-all trades.

Without a clearer understanding of the SEC’s thinking, its proposals could introduce unnecessary confusion in connection with the development of trade matching and trade execution services in debt markets. Imposing dual-fiduciary responsibilities for pricing bilateral trades—or requiring “neutralization” of dealer conflicts when recommending securities to customers—could discourage the development of trading services that attempt to negotiate customer-to-customer trades.³⁰⁵ Moreover, many trading systems or services are established by dealers or dealer consortia for the purpose of advertising their bond liquidity. To the extent that such systems are populated with limited inventory, it may be difficult to fully neutralize the interests of their owners.³⁰⁶

300. Request for Information and Comments on Broker-Dealer and Investment Adviser Digital Engagement Practices, Related Tools and Methods, Exchange Act Release No. 92766, 86 Fed. Reg. 49067, 49068–70 (Sept. 1, 2021) (describing such “digital engagement practices”)

301. Conflicts of Interest Associated with the Use of Predictive Data, 88 Fed. Reg. 53960, 54021–23 (proposed rules 17 C.F.R. § 240.15l-2 and § 275.211(h)(2)-4). These include any “analytical, technological, or computational function, algorithm, model, correlation matrix, or similar method or process.” *Id.*

302. *Id.*

303. See *supra* text accompanying notes 194–201. As part of its proposed amendments to Form ATS, the SEC has signaled its intention to require more transparency with respect to the types of pricing methodologies, data feeds, and other services such systems provide their members. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15546–49, 15555 (proposed Mar. 18, 2022) (to be codified at 17 C.F.R. pts 232, 240, 242, 249).

304. The proposed rule for broker-dealers covers only transactions with natural persons and not institutional investors. There is no similar limitation in the proposed rule for investment advisers. Conflicts of Interest Associated with the Use of Predictive Data, 88 Fed. Reg. 53960, 54021–23 (proposed rules 17 C.F.R. § 240.15l-2 and § 275.211(h)(2)-4).

305. See, e.g., 17 C.F.R. § 270.17a-7 (2024) (exemption for agency cross transactions).

306. See, e.g., Hardy Callcott, Jay Baris & Laurie Kleiman, *SEC’s New Rules on Use of Data Analytics by Broker-Dealers and Investment Advisers*, HARV. L. SCH. F. ON CORP. GOVERNANCE (Aug. 26, 2023), <https://corpgov.law.harvard.edu/2023/08/26/secs-new-rules-on-use-of-data-analytics-by-broker-dealers-and-investment-advisers> [<https://perma.cc/4ZJZ-SRAX>] (opining that the proposed rules would limit the ability of broker-dealers who offer only a limited product set of investments to communicate with their customers).

Such an interpretation, if ultimately adopted, would thus stand in contrast to the approach taken by the Commission in its proposal to codify the best execution rule.³⁰⁷ Under proposed “Regulation Best Execution,” for example, dealer quotations would be excluded from the SEC’s proposed standard under circumstances where a broker-dealer or institutional customer (exercising independent judgment) seeks execution against the quotation.³⁰⁸ More generally, some commentators lament the Commission’s departure from its approach to codifying the suitability and fiduciary duty standards of broker-dealers and investment advisers, respectively, insofar as a broker-dealer or investment adviser cannot simply disclose a conflict of interest,” but “must ‘eliminate or neutralize’ that conflict.”³⁰⁹

4. Clearing Agencies

Using its authority over central agencies,³¹⁰ the SEC proposed in 2022 to mandate broader centralized clearing of transactions involving U.S. Treasury securities.³¹¹ Under its proposal, adopted in 2023 with modifications,³¹² direct participants in central clearing counterparties for Treasury securities must “submit for clearance and settlement all of the eligible secondary market transactions to which such direct participant is a counterparty.”³¹³ More importantly, clearing agencies acting as central counterparties will have to “establish objective, risk-based, and publicly disclosed criteria for participation, which,” *inter alia*, “permit fair and open access” by non-clearing counterparties of direct participants.³¹⁴

The SEC has evoked a similar concern through its rulemaking and enforcement actions in DeFi markets, where trading, clearing, and custodial functions have clustered in certain “centralized” cryptoexchanges.³¹⁵ The SEC’s enforcement actions against cryptoexchanges, for example, articulate that such systems must respect the “separation of core functions” anticipated by the Exchange Act, and in particular the decoupling of

307. Regulation Best Execution, 88 Fed. Reg. 5440, 5555–56 (proposed Jan. 27, 2023) (to be codified at 17 C.F.R. pts. 240, 242).

308. *Id.* (proposed Rule § 242.1100(a)(1)-(2)).

309. *See, e.g.*, Callcott, Baris & Kleiman, *supra* note 306.

310. 15 U.S.C. § 78q-1.

311. Standards for Covered Clearing Agencies for U.S. Treasury Securities and Application of the Broker-Dealer Customer Protection Rule with Respect to U.S. Treasury Securities, Exchange Act Release No. 95763, 87 Fed. Reg. 64610, 64614 (proposed Oct. 25, 2022) (to be codified at 17 C.F.R. pt. 240) (proposing to require covered clearing agencies “to address their direct participants’ non-centrally cleared transactions, both for repos and certain categories of cash transactions,” in order to “reduce contagion risk to the CCA and bring the benefits of central clearing to more transactions involving U.S. Treasury securities”).

312. Standards for Covered Clearing Agencies for U.S. Treasury Securities and Application of the Broker-Dealer Customer Protection Rule with Respect to U.S. Treasury Securities, Exchange Act Release No. 99149, 89 Fed. Reg. 2714 (Jan. 16, 2024) (to be codified at 17 C.F.R. pt. 240).

313. 17 C.F.R. § 240.17ad-22(e)(18)(iv)(A) (2024) (including repurchase agreements and cash transactions that are interdealer broker transactions or involve counterparties who are dealers). The Commission determined not to include transactions with hedge funds and leveraged accounts in the definition of “eligible secondary market transaction.” Standards for Covered Clearing Agencies, 89 Fed. Reg. at 2723.

314. 17 C.F.R. § 240.17ad-22(e)(18)(i) (2024).

315. Dell’Erba, *supra* note 233; Supplemental Information and Reopening of Comment Period for Amendment Regarding the Definition of “Exchange,” Exchange Act Release No. 97309, 88 Fed. Reg. 29448, 29450 n.29 (proposed May 5, 2023) (to be codified at 17 C.F.R. pts. 232, 240, 242, 249).

custodial and trading services.³¹⁶ As noted above, the SEC’s proposed pathways for the regulation of trading platforms encourage segregation of clearing from trading³¹⁷ and require custodial “special purpose broker-dealers” to use a qualified custodian to maintain possession and control of customer crypto-assets.³¹⁸

B. Understanding the SEC’s Motivations

The SEC’s rulemaking package poses risks. First, for the sake of regulating a handful of major market centers, the SEC is doubling down on equity market structure as the definitive template for regulating debt markets: this could not only lock certain established trading systems into place but also reinforce the power of dealers to maintain their privileged position in debt markets. Perhaps more problematically, some commenters have difficulty understanding what policy problem the SEC is trying to address: for example, traditional securities intermediaries question why the SEC is proposing to extend the equity ATS regime to the fixed-income marketplace,³¹⁹ while DeFi proponents fear that such encroachment may discourage creative disruption.³²⁰

On a fundamental level, the SEC is simply trying to shore up the capacity, security, and integrity of major bond market trading systems while establishing a better picture of how the marketplace works and more oversight over trading information. In this regard, the SEC emphasizes the benefits of extending its confidentiality, fair access, operational transparency, and recordkeeping rules and SRO membership, surveillance, and trade reporting requirements to trading systems.³²¹ The SEC doesn’t fully explain, however, why these concerns justify the breadth of its rule and, specifically, the imposition of registration requirements on new classes of entities.³²²

For example, it may make sense to apply an exchange-like regime to alternative trading systems that function as “market centers”: holding actionable trading interest and matching buyers and sellers and as a byproduct generating reference prices for third parties. Any system to which the handling of actionable trading interest is entrusted ought to be subject either to fiduciary duties (if it is a broker or dealer) or to an obligation to handle such interest in accordance with “non-discretionary” rules that are made known to users. Most of the kinds of communication protocol the SEC discusses, however, hold no “resting

316. See cases cited *supra* note 260.

317. See *supra* note 233.

318. See *supra* note 234.

319. See, e.g., SIFMA Asset Mgmt. Grp. Comment Letter, *supra* note 104, at 3. Other commenters have expressly questioned the wisdom of the proposed rules on both statutory and cost-benefit grounds. See, e.g., Patrick McHenry & Bill Huizenga, Comment Letter on Proposed Rule to Amend the Definition of “Exchange” (Apr. 18, 2022), <https://www.sec.gov/comments/s7-12-22/s71222-20128285-290981.pdf> [<https://perma.cc/7KYH-HAFT>].

320. See, e.g., a16z Crypto, Comment Letter on Proposed Rule to Amend the Definition of “Exchange” (June 13, 2022), <https://www.sec.gov/comments/s7-02-22/s70222-205099-412162.pdf> [<https://perma.cc/9X3M-EUK8>].

321. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15502 (proposed Mar. 18, 2022) (to be codified at 17 C.F.R. pts. 232, 240, 242, 249).

322. Bloomberg notes that the designation of certain communications services as “exchanges” could create extraterritorial problems, insofar as foreign regulators may resist or impose similar classification in their own jurisdictions and thereby trigger unnecessary or inconsistent regulation. Bloomberg L.P. Comment Letter, *supra* note 96, at 19.

liquidity” or act as exclusive information conduits: indeed, as the SEC acknowledges, trading interest in illiquid instruments is simultaneously expressed in a variety of redundant services.³²³

The SEC also appears motivated by concerns of regulatory arbitrage—voiced by registered dealers and trading systems—that their competitors ought to be subject to comparable regulatory obligations.³²⁴ Of course, “communication protocols” offer institutional investors an opportunity to find liquidity when dealer quotations are not readily available for individual issues.³²⁵ But the ability to bypass intermediaries is not, alone, a justification for regulating a trading service or technology as an ATS if participants are otherwise able to execute trades efficiently at the best available prices.³²⁶ Such a rule would stifle new entrants in a segment of the market that could benefit from some disruption.³²⁷

Operational transparency may be another short-term objective.³²⁸ Registration as an exchange gives the SEC the authority to directly impose a number of recordkeeping and

323. *Id.* at 25.

324. FIMSAC, for example, has recommended that the SEC work with FINRA and the MSRB to review the regulatory framework for bond markets—and the application of Regulation ATS to electronic trading systems in particular—with the goal of “promot[ing] the growth of fair and effective fixed-income electronic trading markets.” These recommendations include:

- To ensure that the regulatory framework best promotes the growth of fair and effective fixed-income electronic trading markets;
- To ensure that no regulatory gaps or inconsistencies in the application of such regulation exist that increase the potential for investor harm, systemic risk or unfair competition;
- To consider whether Regulation ATS . . . should be amended to account for differences in protocols and market structures commonly used to trade fixed income as compared to equities;
- To ensure that regulation is not unfairly promoting or impeding specific trading protocols and business models over others; and
- To consider whether any existing regulation impacting the fixed income electronic trading markets is unnecessary from a cost-benefit perspective.

SEC FIXED INCOME MARKET STRUCTURE ADVISORY COMMITTEE, RECOMMENDATION REGARDING DEFINING “ELECTRONIC TRADING” FOR REGULATORY PURPOSES (Oct. 5, 2020).

325. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15606.

326. 15 U.S.C. § 78k-1(a)(C)(v) (“It is in the public interest and appropriate for the protection of investors and the maintenance of fair and orderly markets to assure . . . an opportunity . . . for investors’ orders to be executed without the participation of a dealer”). Such trades may need to be intermediated by a broker in order to execute and report trades or participate in central clearing and settlement. *See, e.g.*, MarketAxess, Comment Letter on Proposed Rule Regulating ATS for ATSS that Trade U.S. Government Securities 6 (Mar. 1, 2021), <https://www.sec.gov/comments/s7-12-20/s71220-8426732-229606.pdf> [<https://perma.cc/G848-GPV8>].

327. Judge, *supra* note 198, at 591 (observing that intermediaries are “relatively better positioned to shape laws and regulate[] and to otherwise act to promote institutional arrangements that serve their collective interests”).

328. Among the obligations that communication protocol systems will become subject to include greater disclosure regarding how they operate and their arrangements with affiliates, liquidity providers, other trading venues, and service providers as well as the eligibility of and differences in treatment among classes of subscribers. The SEC has also requested disclosures regarding ancillary services—such as algorithmic trading products, order management or order execution systems, data feeds, order hedging and aggregation facilities, and so forth. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems, 87 Fed. Reg. 15496, 15546.

reporting requirements, which can then be used by regulators and possibly members of the public. Much of this disclosure, however, could be imposed on “communication protocols” without regulating them as exchanges. Bloomberg, for example, suggests that broker-dealers could maintain operational disclosures for the systems they use.³²⁹ Alternatively, the use of such information conduits by broker-dealers could be conditioned on their compliance with the terms of no-action relief.³³⁰

C. Implications of the SEC’s Proposal

There is one aspect of the SEC’s rulemaking package, however understated, that will have far reaching implications for how market participants think about the role of bond trading systems. “Fair access” requirements have long been part of the self-regulatory framework for registered exchanges.³³¹ Because exchanges concentrate liquidity, exchanges cannot discriminate against order flow.³³² The SEC has hypothetically extended fair access obligations to high-volume ATSs, yet the concept is underdeveloped with respect to alternative trading systems that do not trade in equity securities.³³³ Under Regulation ATS, such systems, at most, would have to “[e]stablish written standards for granting access to trading on its system” and “[n]ot unreasonably prohibit or limit access to those services in an unfair or discriminatory manner.”³³⁴

Eliminating unnecessary operational barriers to trading is perhaps the surest way to promote “all-to-all” trading. There are, however, different ways to think about what fair access should mean in bond markets. *Informational access* could mean that all market participants have an opportunity to subscribe for pricing services and the ability to view information widely disseminated among subscribers. *Trading access* would ensure that all market participants have an opportunity to interact with liquidity advertised through an ATS or market center: this might include not just clearing counterparties but also public investors. *Intermarket access* would require ATSs to provide their subscribers with effective access to opportunities in other trading systems or market centers with which they have a relationship. Each of these options presents practical and legal barriers to implementation.

Access to information. First, the SEC would need to consider what “fair access” to information means. Operationally, fair access to information is straightforward to

329. Bloomberg L.P. Comment Letter, *supra* note 96, at 4.

330. See, e.g., Bloomberg Tradebook LLC, SEC No-Action Letter, 2006 WL 1816814, at *1 (June 28, 2006) (granting no-action relief for “an electronic communications network” that displays market maker orders in at least one SRO trading or display facility).

331. This includes not only ensuring fair access to membership and participation in the exchange by all broker-dealers, 15 U.S.C. § 78s(d)(1), but also ensuring that the rules of the exchange provide for the “equitable allocation of reasonable dues, fees, and other charges among its members and issuers and other persons using its facilities” and are “not designed to permit unfair discrimination between customers, issuers, brokers, or dealers.” *Id.* § 78f(b)(4)-(5).

332. Kevin S. Haeberle, *Discrimination Platforms*, 42 J. CORP. L. 809, 829–30 (2017).

333. Much of the SEC’s initial focus in promulgating Regulation ATS was assuring intermarket access to ATSs’ best priced orders for national market system securities, rather than assuring access to its trading facilities. See, e.g., 17 C.F.R. § 242.301(b)(3) (2024) (order display and execution access requirements with respect to “NMS stocks”).

334. 17 C.F.R. § 242.301(b)(5)(ii) (2024). The exclusions for crossing systems and derivative-pricing systems underscore that the SEC’s focus was on equity markets.

implement because information is a non-rivalrous good.³³⁵ Indeed, the SEC has forgone the registration of information services in the past by imposing fair access requirements on those who use them, often through no-action or other relief.³³⁶ More formally regulated informational services under the Exchange Act also assume fair access obligations.³³⁷ The question is thus less operational and more empirical: how much information can the SEC force trading systems to share without scaring away users concerned about the privacy of their trading interest?

In the context of equity markets, the SEC has taken the view that information is “widely disseminated” when shared with more than one person.³³⁸ In a real-time auction market, like those operated by stock exchanges and certain bond auction systems, a higher volume of orders competes based on price, size and time, and therefore requiring participants to share information is less likely to result in missed trades. Requiring bond traders to share more information might also improve execution quality across trading venues. As O’Hara & Zhou suggest, voice traders might benefit from the ability to negotiate on the basis of “trade interests and actual trades on electronic trading platforms.”³³⁹ It would nevertheless be awkward to treat an RFQ or even a stream as the same as a “firm” order on a stock exchange: Without a guarantee of execution, both dealers and investors may prefer to trade with counterparties with whom they have established trading relationships or prefer not to deal with dealers suspected of abusing information.³⁴⁰

Access to trading opportunities within the system. The SEC must also consider to what extent trading systems require subscribers to trade with other subscribers. Many trading systems may restrict or “tailor” service levels, once access is granted, “to different clients based on size, usage, and preferences.”³⁴¹ There are often plausible reasons: ranging from a lack of clearing arrangements to concern about the sincerity or intentions of an unknown counterparty in a negotiation.³⁴² Mandating clearing of interdealer broker transactions and facilitating all-to-all clearing, as described above, could eliminate operational obstacles.³⁴³

335. Of course, trading interest—as distinct from trading information—can only be exhausted once. Unlike in equity markets, there is little evidence that institutions seek to improve execution quality by “shredding” orders. O’Hara & Zhou, *supra* note 100, at 372; *see also* Angel, Harris & Spatt, *supra* note 112, at 30–31 (discussing related “quote-matching” practices in equity markets).

336. *See* 17 C.F.R. § 242.602(b)(5)(i) (2024) (requiring market makers who enter orders “into an electronic communications network that widely disseminates such order” to publish that order directly or through the ECN).

337. 15 U.S.C. § 78k-1(b)(4)-(5) (establishing fair access requirements for “securities information processors” analogous to those applicable to self-regulatory organizations).

338. Interpretive Guidance on the Order Execution Rules, Fed. Sec. L. Rep. (CCH) ¶ 72261 (Nov. 22, 1996) (“Similarly, the Division believes that an order entered into an ECN would not be ‘widely disseminated’ and thus need not be displayed publicly if it was not shown to more than one other subscriber.”).

339. *See* O’Hara & Zhou, *supra* note 100, at 374–77.

340. *See, e.g.,* Di Maggio, Kermani & Song, *supra* note 167, at 283–84.

341. SIFMA Asset Mgmt. Grp. Comment Letter, *supra* note 104, at 9 (suggesting that “it is not uncommon, based on the client characteristics, for services offered by the ATS to be tailored, including client tiering, order segregation, and user ratings”).

342. *See, e.g.,* Tradeweb Mkts. Comment Letter, *supra* note 193, at 8 (noting that “[m]arket participants view the ability to exercise discretion [over which other participants they want to trade with] as a key benefit of many trading platforms, consistent with maintaining their overall dealer-customer relationships”); *see also* O’Hara & Zhou, *supra* note 100, at 384–85 (suggesting that filtering may account in part for why electronic technology hasn’t fostered new entrants).

343. *See supra* Part V.A.4.

While an alternative trading system registered as a broker-dealer could support anonymous clearing, many of the communications services potentially included in the scope of the proposed definition of “exchange” may not currently have or need to offer such functionality.³⁴⁴

Access to intermarket opportunities. The SEC will also likely eventually consider to what extent access should be available to intermarket opportunities. Sophisticated end-users, of course, subscribe to multiple venues and have EMSs that can route orders or trading interest to the venue of their choice by relying on linkages among venues. Intermarket access is thus largely not an issue from the perspective of interoperability. There is nevertheless an argument to improve intermarket access for the benefit of retail and institutional investors who do not have the ability to wield advanced EMSs: they should arguably have a chance to interact directly with the inventory of other dealers and the trading interest of other investors without dealer intermediation as riskless principal.³⁴⁵

For example, some commentators have called for requiring “brokers to post customer limit orders to an actionable electronically accessible order display facility—and preventing traders from trading through those orders.”³⁴⁶ In a recent study of the corporate bond market, Harris found that “[c]ontinuous two-sided quotations are almost always available for more than 850 of the most actively traded bonds.”³⁴⁷ He argues a public order display facility “would substantially lower transaction costs for public investors,” insofar as it could provide “strong incentives to dealers and other traders to offer good prices,” while allowing “exchanges and ATSS to attract market orders when traders post liquidity in their facilities.”³⁴⁸ The MSRB has recently proposed to create such a “real time central transparency platform” (CTP) for municipal securities.³⁴⁹

The National Association of Securities Dealers (NASD) previously experimented with such a display facility for high yield corporate bonds.³⁵⁰ Its Fixed-Income Pricing System (FIPS) was designed to “collect, process, and disseminate, in real-time, firm

344. See, e.g., Intercont’l Exch., Inc., Comment Letter on Proposed Rule to Amend the Definition of “Exchange” 2 (Apr. 26, 2022), <https://www.sec.gov/comments/s7-02-22/s70222-20126859-287593.pdf> [<https://perma.cc/92R3-X9HV>] (requesting clarification of financial risk management control requirements and confirmation and statement delivery requirements with respect to transactions negotiated on a communication protocol system but executed away); see also Tradeweb Mkts., Inc. Comment Letter, *supra* note 193, at 8–10.

345. According to the Commission, over 90% of marketable retail stock orders are internalized by a wholesale market maker and do not have an opportunity to compete for the best available prices in the marketplace. Order Competition Rule, Exchange Act Release No. 96495, 88 Fed. Reg. 128, 179–86 (Jan. 3, 2023). Retail investors nevertheless benefit from the principle of intermarket access insofar as wholesalers must generally offer price improvement over published orders and quotations when they internalize orders. *Id.* at 129–30, 143; see also 17 C.F.R. § 242.611 (2024) (requiring exchanges and alternative trading systems to establish and enforce policies and procedures reasonably designed to ensure that they do not execute transactions at prices inferior to “protected quotations” in national market system stocks).

346. Larry Harris, Albert S. Kyle & Erik R. Sirri, *Statement of the Financial Economics Roundtable, April 2015: The Structure of Trading in Bond Markets*, 71 FIN. ANALYSTS J., no. 6, 2015, at 5, 8.

347. Harris, *supra* note 72, at 39–40 (adding that many such bonds “trade as actively as do small and some mid-cap stocks, and they would undoubtedly trade much more actively if transaction costs were lower”).

348. *Id.* at 9, 40.

349. MSRB Notice 2012-06, MSRB Publishes Long-Range Market Transparency Plan (Feb. 23, 2012) (describing the proposed functionalities of an enhanced EMMA website platform dubbed “EMMA 2.0”).

350. Order Approving Proposed Rule Change Relating to the Proposed Operation of a Pricing System for Certain High Yield Fixed Income Securities, Exchange Act Release No. 32019, 58 Fed. Reg. 16428 (Mar. 26, 1993).

quotations” in FIPS securities.³⁵¹ The NASD envisioned that an advisory committee would select securities that were “characterized by comparatively high trade volumes, multiple brokers/dealers that are willing to trade the issue in block size, and trading patterns that more closely resemble the issuer’s common stock.”³⁵² Notably, FIPS dealers would be required to post firm quotations for FIPS securities at published prices and sizes.³⁵³ The TRACE facility eventually replaced FIPS and rescinded its quotation dissemination requirements.³⁵⁴

VI. PRINCIPLES FOR REGULATING BOND TRADING TECHNOLOGIES

I have argued that regulators are attempting to address immediate concerns about the resilience of secondary market trading without (openly) brainstorming long-term strategies for promoting direct interaction among investors. There is of course no clear legal or regulatory solution: bond market structure ought to evolve through an iterative process, where policymakers “stage regulation” based on an assessment of costs and benefits and adjust their approach based on unanticipated consequences.³⁵⁵ The SEC must also tread carefully around a federal judiciary increasingly skeptical of the creative exercise of administrative authority.³⁵⁶

Regulators can nevertheless articulate what measures they might be prepared to entertain to encourage both established participants and new entrants to organize their activities in the service of those goals.³⁵⁷ In particular, regulators ought to consider how to foster more centralized, all-to-all trading by improving competition in the provision of price information, encouraging opportunities for interaction among market participants, and encouraging trading systems to refine interactive processes through experimentation. This Article suggests three strategic signals that the SEC could articulate to nudge markets in that direction:

- Information exchange—such as the negotiation and pricing of bond trades—is a non-fiduciary commercial service that can be offered and regulated independently of trade execution and advisory services;

351. *Id.*

352. Fixed Income Pricing System., Fed. Sec. L. Rep. ¶ 76854, 1994 WL 17094744 (Mar. 15, 1994) (order exempting broker-dealers participating in FIPS from Rule 15c2-11); *see also* 58 Fed. Reg. at 16430 (“Initial criteria for designation would include the rating, volume, price, name recognition of the issuer, research following and representation from diverse industry groups,” as well as a minimum public float and at least two market makers).

353. *Id.* at 16430–31.

354. Order Approving Proposed NASD Rule Change Relating to the Creation of a Corporate Bond Trade Reporting and Transaction Dissemination Facility and the Elimination of Nasdaq’s Fixed Income Pricing System, Exchange Act Release No. 43,873, 66 Fed. Reg. 8131, 8133 (Jan. 29, 2001).

355. Whitehead, *supra* note 162, at 1295.

356. For example, the D.C. Circuit vacated an SEC rule mandating a pilot program to test the impact of eliminating or capping “maker-taker” fees for lack of a “regulatory agenda.” *NYSE LLC v. SEC*, 962 F.3d 541, 555 (D.C. Cir. 2020).

357. *See, e.g.*, Robert B. Ahdieh, *Law’s Signal: A Cueing Theory of Law in Market Transition*, 77 S. CAL. L. REV. 215, 279–84 (2004).

- Regulated trading systems can and should be empowered to better enforce and validate the fairness of the terms at which trades executed through their systems take place; and
- Trading systems and services should have an opportunity to experiment with pricing, negotiating, and trading protocols on decentralized platforms and other emergent technologies.

I explain each of these signals further below.

A. *Regulating Information Services as Commercial Services*

One starting principle might be to decouple the regulation of price information creation from the regulation of trading. We rely on intermediaries to process trades, and incidentally to produce and verify information as a by-product; we also rely on intermediaries to use information about other people's trading interest to fairly price transactions with customers. It is thus understandable that the SEC fears that creation of information about trading interest increasingly takes place outside of traditional trading systems. Nevertheless, bonds are by nature derivatively priced based on a variety of inputs that include but also transcend pre- and post-trade information. As such, bond markets might present an ideal opportunity to experiment with alternatively regulated information services.

In seeking to regulate a broader range of trading services, the SEC arguably is concerned about the information it can't see. That includes information about *how* trading interest interacts in those services, *what* real-time information is being exchanged in those services, and *how* nonpublic information is fed into other trading activity. To regulate such services as broker-dealers or investment advisers, however, would effectively impose customer-facing obligations on services that generally do not purport to recommend or otherwise dictate the terms of trades. Instead, the SEC could regulate such services indirectly—in the same manner that it has regulated other information vendors—while simultaneously ensuring fair access to publicly disseminated and privately synthesized information.

Information about *how* trading interest interacts arguably shouldn't require much additional regulation beyond disclosure. On a traditional floor exchange, "order types" and "parity, priority and precedence rules" were instructions published in a rule book that everyone knew and members were expected to honor.³⁵⁸ While the operation of communication protocols is more opaque, the SEC and SROs could easily require dealers that employ such services to interact with customers (or each other) to ensure that such services fully disclose the range and format of instructions they carry, the inputs on which they rely, and which party is responsible for executing those instructions. Some protocols,

358. Of course, some order types can be unnecessarily complicated or obfuscate predatory trading practices, which is why exchange order types are generally subject to Commission oversight. See Jonathan Macey & David Swensen, *Recovering the Promise of the Orderly and Fair Stock Exchange*, 42 J. CORP. L. 777, 789 (2017) (describing exchange order types that facilitated front-running by high-frequency traders).

moreover, are sufficiently intuitive that they could be expressed in a common markup language, whether developed privately or by the SEC.³⁵⁹

A helpful analogy is smart contracting. Imagine a customer wallet that invokes an “RFQ” contract that messages the universe of dealers to submit offers, collects and sorts those offers, and executes the most favorable ones. That message may trigger one or more dealers to submit an offer within the parameters established by the wallet. The RFQ contract could have been written by someone no one has ever met and executed through the operating system of the relevant digital ledger.³⁶⁰ While decentralized trading relies on the interaction of multiple wallets, each executing their own code in response to messages and external events, the transparency of the code is arguably sufficient to both audit and legitimate the trading activity it facilitates.

Capturing *what* real-time information is being exchanged in trading services may require registration and recordkeeping rules, depending on the nature of the service. For example, EMSs could be regulated in a manner similar to non-exclusive “securities information processors” (SIPs) to the extent they merely enable dealers and customers to transmit and receive packets of instructions formatted in accordance with rules established by a third party. The data feed created by an EMS could arguably give regulators the information they need to reconstruct trades, as long as regulators had independent access to (i) the specifications of the instructions, (ii) any external feeds used by those instructions, and (iii) the individual expressions of interest conveyed by the parties. As described above, SRO-based services have already standardized many of the inputs for bond transactions.³⁶¹

Regulating *how* nonpublic trading information feeds other trading activity presents perhaps the greatest challenge. Many of the systems that offer synthetic prices based on proprietary trading data are registered as broker-dealers, and therefore may arguably be expected—even if only as a commercial matter—to facilitate market-wide best execution for their users.³⁶² But even here the ultimate purpose of regulation may well be to provide the market with fair access to—and a fair understanding of—those synthetic prices. Thus, the SEC could require firms of a given size to license synthesized price information on neutral, non-discriminatory terms under the existing statutory framework for “exclusive” SIPs (while reserving the underlying data for surveillance and enforcement purposes).

In each case, the SEC can achieve a basic degree of transparency—whether in negotiation methods, specific communications, or the transmutation of activity into synthetic prices—without imposing fiduciary duties or other customer-facing obligations on the data conduit. At the same time, however, the SEC can require that such services operate independently of the dealers or markets that generate the information they collect, process, and transmit to ensure neutral, unconflicted, and efficient delivery of services.³⁶³

359. See, e.g., Fabozzi, *supra* note 8, at 54 (describing the “adoption of FIX as a protocol for fixed-income transactions [as] one of the primary technological developments in this space”).

360. In this case, the SEC could in theory scan the ledger if it wanted to create an audit trail, assess compliance with marketplace rules, or gather price information.

361. See *supra* notes 357–60 and accompanying text.

362. See, e.g., Nicholson, *supra* note 96, at 61–62 (noting that institutional compliance departments increasingly expect traders to document best execution across all trading systems, and not just within a given trading system).

363. *Nasdaq Stock Mkt. LLC v. SEC*, 38 F.4th 1126, 1143–44 (D.C. Cir. 2022) (finding “no merit to petitioners’ argument that the Commission failed to consider the disadvantages or costs of the independent administrator requirement” for dissemination of data under NMS plans).

If successful, Congress might eventually be moved to expand such authority as needed into an all-purpose regulatory framework for information services.³⁶⁴

All this begs the question: whose responsibility is it to ensure that transactions are executed in the interests of customers? As discussed in the following Part, the role of trade execution systems could be enhanced to that end.

B. Enforcing and Validating Centralized Interaction

The SEC might also promote “all-to-all” trading in interdealer and multi-dealer systems by empowering them to fashion limited discretionary rules for trade execution. In expanding the scope of trading system regulation, the SEC is evidently concerned that too much trading takes place outside of the trading systems it regulates. And yet, the problem is not necessarily that institutions and other investors are avoiding SEC oversight but, rather, that trading systems are not yet sufficiently sophisticated to be able to solicit and satisfy investor interest without exposing investors to a higher risk of adverse selection.

FIMSAC has called out some examples of the kind of conduct that bedevils market participants in bond trading systems. For example, in a central limit order book, the rules of a marketplace arguably ought to discourage jumping ahead of published orders or quotations, such as by offering trivial price improvement (pennying) in order to obtain price-time advantage.³⁶⁵ In an RFQ system, by contrast, the rules of a marketplace arguably ought to discourage dealers from soliciting quotes from other dealers before internalizing their own customer orders at the same price (last look).³⁶⁶ Relatedly, Harris finds that dealers trade through largely actionable prices quoted in interdealer-broker systems for corporate bonds at fairly high rates.³⁶⁷ Similar tactics pervade equity markets, where they also have a significant impact on the willingness of customers to entrust expressions of trading interest to intermediaries.

There is also the problem that bonds are more easily substitutable than equity securities. A selling customer can generally unload only a specific security, but a purchaser may select from among any number of bonds that fit its cash flow needs and risk tolerance.³⁶⁸ More generally, a dealer or trading system can assemble a variety of portfolios that satisfy a customer’s specific needs and objectives from an inventory of securities available for sale. It is thus difficult to impose and enforce a non-discretionary rule that requires comparable securities transactions to be priced fairly and to discourage internalization based on published prices or solicited quotations in comparable securities.³⁶⁹

One approach to address these problems is to create more protection for customer trading interest within existing trade execution systems. Traditionally, exchange trading rules have been designed with the goal of maximizing opportunities for the execution of

364. *See supra* note 297 (discussing U.S. benchmark regulation).

365. FIXED INCOME MKT, STRUCTURE ADVISORY COMM., SEC. & EXCH. COMM’N, RECOMMENDATIONS REGARDING THE PRACTICE OF PENNYING IN THE CORPORATE AND MUNICIPAL BOND MARKETS (2019).

366. *Id.*

367. Harris, *supra* note 72, at 39 (observing a 46.8% “trade through rate for TRACE trades in two-sided markets standing for at least two seconds”).

368. SIFMA, CAPITAL MARKETS REPORT—MODERNIZING AND RATIONALIZING REGULATION OF THE U.S. CAPITAL MARKETS 34 (2017).

369. *Id.* at 54.

customer “orders,” whether by arranging to supply liquidity when needed or limiting unnecessary interpositioning when public counterparties are available.³⁷⁰ Exchanges historically implemented these protocols through mechanical parity, priority, and precedence rules as well as more discretionary standards governing the obligations of their dealer participants. In equity markets, as the manual handling of orders has been replaced by algorithms, these rules are increasingly hardwired into trading and compliance systems.³⁷¹

A related concern is the validity of negotiated prices. Even when customers have the opportunity to interact in a trading system, professional asset managers may be required to document or otherwise seek assurances that negotiated prices reflect the “market” price for the security. ATSS, of course, provide a variety of pricing tools and routinely advise customers about the extent to which their transactions deviate from recent transactions in identical or comparable securities. Much like printing “upstairs” trades on a stock exchange,³⁷² obtaining the imprimatur of a self-regulatory trading system could be a significant benefit for an asset manager when defending execution prices under fiduciary or prudential standards.

It may not make sense to encourage the reinvigoration of bond “exchanges,” particularly as the Exchange Act’s self-regulatory framework itself increasingly invites constitutional scrutiny.³⁷³ Nevertheless, the premise of self-regulation under the Exchange Act is that market professionals can establish standards of conduct that—in other contexts—might be deemed a restraint against trade.³⁷⁴ Thus, the SEC could permit larger trading systems and multi-dealer client systems to adopt a limited rulebook without triggering exchange registration on the one hand or antitrust scrutiny on the other.³⁷⁵ The coverage of the rulebook could be limited to deterring practices considered detrimental to

370. 17 C.F.R. § 242.11b-1(a)(2)(ii) & (iii) (2024).

371. *Id.* § 242.611 (requiring market centers to prevent “trade-throughs” from certain “protected quotations” in “NMS stocks”).

372. *See, e.g.,* Angel, Harris & Spatt, *supra* note 112, at 47 (discussing “flash trades”).

373. “There is a serious argument that FINRA hearing officers exercise significant executive power. And it is undisputed that they do not act under the President. That may be a constitutional problem.” *Alpine Sec. Corp. v. FINRA*, No. 23-cv-01506, 2023 WL 4703307 at *4 (D.C. Cir. July 5, 2023) (Walker, J., concurring) (enjoining expulsion of FINRA member firm pending adjudication of the constitutionality of FINRA disciplinary proceedings); Benjamin P. Edwards, *Supreme Risk*, 74 FLA. L. REV. 543 (2022) (assessing the constitutionality of existing self-regulatory models under recent U.S. Supreme Court jurisprudence).

374. *Credit Suisse Sec. (USA) LLC v. Billing*, 551 U.S. 264, 275–76 (2007) (identifying the potential for “conflicting . . . standards of conduct” among the “critical” factors in “finding sufficient incompatibility” between antitrust law and securities laws to warrant immunity). The degree to which antitrust enforcement agencies or prudential regulators should balance competition and coordination in the shadow of antitrust law remains a topic of fervent debate. *Compare* Rory Van Loo, *Making Innovation More Competitive: The Case of Fintech*, 65 UCLA L. REV. 232, 232 (2018) (arguing “a reallocation of competition authority would better position regulators to navigate the future of innovation”) *with* Samuel N. Weinstein, *Financial Regulation in the (Receding) Shadow of Antitrust*, 91 TEMP. L. REV. 447, 452 (2019) (suggesting that “competition in financial markets may suffer as antitrust is displaced by regulations enforced by agencies poorly suited to the task of preserving and promoting competitive markets”).

375. Under Regulation ATS today, a trading system may elect not to be regulated as an exchange only if it does not “(i) [s]et rules governing the conduct of subscribers other than the conduct of such subscribers’ trading on such organization, association, person, group of persons, or system; or (ii) [d]iscipline subscribers other than by exclusion from trading.” 17 C.F.R. § 242.300(a)(2) (2024).

the expression of trading interest and conferring legitimacy on the negotiation and pricing of trades (i) executed within the parameters of and (ii) printed through their systems.

Such rules can be administered and enforced in a variety of ways, whether by freezes and fines on the one hand³⁷⁶ or through suspensions and comparable sanctions on the other.³⁷⁷ SROs with de jure or de facto market power (such as FINRA and MSRB) may be necessary to enforce self-regulatory principles,³⁷⁸ but individual trading systems are arguably better able to marry standards with the specific functionalities they employ. Operational sanctions imposed by a trading system might be particularly apt for proprietary traders required to register as dealers, insofar as they lack customer relationships and, therefore, any professional or fiduciary obligations to counterparties must be enforced through the trading system's rules.³⁷⁹

I am also mindful of the pragmatic considerations that go into building a rule set sufficiently flexible to anticipate innovative trading protocols. Regulators should not try to do it themselves: the regime governing “swap execution facilities” is a cautionary example.³⁸⁰ It took the Commodity Futures Trading Commission (CFTC) several tries to promulgate trade execution rules for swap execution facilities, which still essentially limit them to “making available” CLOB and RFQ functionality.³⁸¹ The SEC meanwhile only recently finalized rules for the registration and regulation for security-based swap execution facilities—well over a decade after Dodd-Frank.³⁸² More troublingly, those

376. See, e.g., 12 C.F.R. § 220.8(c) (2024) (imposing a 90-day freeze for cash account violations under Regulation T); FINRA, Regulatory Notice 13-32 (Oct. 9, 2013), <https://www.finra.org/rules-guidance/notices/13-32> [<https://perma.cc/HH2F-W66G>] (describing “minor rule violation plan”).

377. Cf. Fair Administration and Governance of Self-Regulatory Organizations, Exchange Act Release No. 50699, 69 Fed. Reg. 71126, 71126–27 (proposed Dec. 8, 2004) (to be codified at 17 C.F.R. pts. 240, 242, 249) (proposing Rule 6a-5(j) and (n) for for-profit exchanges). The concept of self-regulation under the Exchange Act has evolved over time as exchanges have shed traditional floor operations, demutualized, and spun off many of their regulatory responsibilities to FINRA. See William A. Birdthistle & M. Todd Henderson, *Becoming a Fifth Branch*, 99 CORNELL L. REV. 1, 12–24 (2013) (describing how some self-regulatory organizations have evolved into “quasi-governmental organizations”); see generally Roberta S. Karmel, *Turning Seats into Shares: Causes and Implications of Demutualization of Stock and Futures Exchanges*, 53 HASTINGS L.J. 367 (2002) (analyzing the implications of the demutualization of stock exchanges for their continued exercise of self-regulatory authority).

378. See, e.g., Jonathan Macey & Caroline Novogrod, *Enforcing Self-Regulatory Organization's Penalties and the Nature of Self-Regulation*, 40 HOFSTRA L. REV. 963, 967 (2012) (arguing that an SRO's enforcement power is a function of its market power”).

379. Proposed amendments to Exchange Act Rule 15b9-1 (17 C.F.R. § 240.15b9-1) would narrow exemptions for proprietary firms from SRO membership, thereby subjecting over-the-counter proprietary traders to FINRA jurisdiction. To the extent such dealers trade exclusively through trading systems, however, they would not have customers. Exemption for Certain Exchange Members, Exchange Act Release No. 95388, 87 Fed. Reg. 49930 (proposed July 29, 2022) (to be codified at 17 C.F.R. 240).

380. 7 U.S.C. § 7b-3(b)(1); 15 U.S.C. § 78c-4(b); see also 7 U.S.C. § 7b-3(e) (rule of construction that “goal of [registering SEFs] is to promote the trading of swaps on swap execution facilities and to promote pre-trade price transparency in the swaps market”).

381. 17 C.F.R. § 37.9(a)(2)(i)(A)–(B) (2024).

382. Security-Based Swap Execution and Registration and Regulation of Security-Based Swap Execution Facilities, Exchange Act Release No. 98845, 88 Fed. Reg. 87156 (Dec. 15, 2023); see also 17 C.F.R. § 242.815 (2024) (imposing comparable execution methods for “Required Transactions” on security-based swap execution facilities).

efforts do not appear to have generated much enthusiasm for standardized trading in swaps or security-based swaps.³⁸³

More than anything else, I suggest that the SEC express an openness to dialogue about what limited self-regulation could look like for such enhanced multi-dealer systems.³⁸⁴ The SEC already has, to a degree, considerable experience wrestling with the governance issues raised by such systems. Both the SEC and the CFTC have proposed or adopted rules regarding ownership concentration and governance of derivatives clearinghouses,³⁸⁵ as well as rules governing the relations between shareholders and members of for-profit exchanges.³⁸⁶ From the SEC's perspective, regulating the governance of multi-member trading systems might be the most effective approach to ensure they channel innovation for the benefit of the public.

C. Experimentation with Decentralization

A final consideration is the extent to which regulators should foster opportunities for broader interaction with those who cannot afford the cost of access to trading systems, services, and technologies. Retail investors typically access secondary markets through a dealer and largely interact with that dealer as principal. Much like in equity markets, this creates significant obstacles to integrating retail and institutional trading. The SEC's solution in equity markets has been to integrate retail orders into public benchmarks for execution and to assure access to retail orders through exchange or other SRO facilities. As discussed above, there are proposals to develop a universal display book for retail transactions in municipal securities.³⁸⁷

Such a system, if built by SROs, would fuel many of the same debates over market structures that have beleaguered equity markets. For example, regulators would have to decide whether and when customer orders should be subject to a display requirement, whether and how much priority or precedence to give published orders, and whether such a utility should be owned and operated by an SRO or an independent vendor. In equity markets, moreover, where SROs operated national securities exchanges and over-the-counter display systems, the duality of commercial and regulatory operations was tenuous at best.³⁸⁸

383. The SEC has found that "only a small fraction of [security-based swap] trading occurs on platforms." Rules Relating to Security-Based Swap Execution and Registration and Regulation of Security-Based Swap Execution Facilities, Exchange Act Release No. 94615, 87 Fed. Reg. 28872, 28875, 28946 (proposed May 11, 2022) (to be codified at 17 C.F.R. pts. 201, 232, 240, 242, 249) (proposing release).

384. As Weinstein suggests, greater structural regulation of ownership might be necessary to relax this prohibition. Weinstein, *supra* note 374, at 495–505.

385. See Paolo Saguato, *Securities and Derivatives Central Counterparties in the U.S.*, in FINANCIAL MARKET INFRASTRUCTURES 286–91 (Jens Hindrich-Binder and Paolo Saguato eds., 2022) (discussing the SEC and CFTC's mandate to limit the influence of clearing members over the governance of derivatives clearinghouses).

386. See Fair Administration and Governance of Self-Regulatory Organizations, Exchange Act Release No. 50699, 69 Fed. Reg. 71126 (proposed Dec. 8, 2004) (to be codified at 17 C.F.R. pts. 240, 242, 249) (proposing rules pertaining to the governance of for-profit "self-regulatory organizations").

387. See *supra* text accompanying notes 333–40.

388. See, e.g., Karmel, *supra* note 377, at 424 (noting that "a for-profit marketplace might not be interested in devoting its resources to funding a rigorous enforcement program [or alternatively] might decide to make enforcement penalties a source of its funding").

Another approach is to continue the project of encouraging dealer systems to provide greater pre- and post-trade transparency to retail investors while prodding dealers to execute trades at close-to-benchmark prices through compliance and enforcement efforts.³⁸⁹ Independent pricing services could evolve to serve as a public reference price for retail trades as well as all-to-all trades over time if regulators, industry professionals, and technologists could agree on methodological approaches and appropriate safeguards.³⁹⁰ Relying on private ordering—and, in particular, dominant debt trading systems—might nevertheless be suboptimal to the extent that they are largely controlled by established dealer participants. There may also be a limit to the effectiveness of transparency as a strategy.³⁹¹

A compromise approach to “straddling the divide” between order-driven and dealer-driven markets may be to encourage the development of pilot programs that integrate retail trading interest in novel ways. DeFi advocates regularly tout DLT’s advantages as a retail trading and clearing platform:³⁹² DLT could theoretically replace multi-intermediary clearing structures and thereby eliminate the stress on dealers and other intermediaries to clear trades.³⁹³ This could open up clearing and trading mechanisms to a broader range of counterparties and investors, including retail investors. As discussed above, monetary authorities are investigating whether a DLT can sustain the scale, volume, and resilience needed to issue government-issued stablecoins.

Despite the range of operational issues and risks yet to be resolved,³⁹⁴ Congress is actively exploring legislative alternatives to accommodate digital ledger technology and

389. See, e.g., Whitehead, *supra* note 162, at 1302–04 (describing the phase-in of TRACE reporting); see, e.g., Nicholson, *supra* note 96, at 61–62 (describing the evolution of best execution obligations with the increasing aggregation of fixed-income data); see also Regulation Best Execution, 88 Fed. Reg. 5440, 5471 (proposed Jan. 27, 2023) (to be codified at 17 C.F.R. pts. 240, 242) (discussing the application of the SEC’s proposed Regulation Best Execution to conflicted transactions in fixed-income securities).

390. See SIFMA, Comment Letter on Request for Information on the Accessibility, Methodology and Utility of Indices (Nov. 27, 2018), https://www.sifma.org/wp-content/uploads/2018/11/SIFMA_Muni_Benchmark_Letter_final.pdf [https://perma.cc/D7UN-F2S7] (discussing MSRB Notice 2018-20). The dissemination of “representative prices” served as an important, if brief, experiment in the transition from over-the-counter to Nasdaq trading in equity markets, particularly insofar as wholesale benchmark prices eliminated discrepancies in pricing across retail dealers. Michael J. Simon & Robert L.D. Colby, *The National Market System for Over-the-Counter Stocks*, 55 GEO. WASH. L. REV. 17, 31–51 (1986).

391. Paul Asquith, Thom Covert & Parag Pathak, *The Effects of Mandatory Transparency in Financial Market Design: Evidence from the Corporate Bond Market* 29 (Nat’l Bureau of Econ. Rsch., Working Paper No. 19417, 2019) (noting that “transparency effects are not uniform across different segments of the bond market”); Lewis & Schwert, *supra* note 121, at 29 (discussing the benefits and tradeoffs of transparency for customers and dealers).

392. HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208, at 60–61.

393. Some scholars have proposed that a DLT-based holding and settlement system could ameliorate the clearance and settlement of trades. See, e.g., George S. Geis, *Traceable Shares and Corporate Law*, 113 NW. U. L. REV. 227, 254–66 (2018) (describing how a DLT system could be employed to clear and settle securities trades); David C. Donald & Mahdi H. Miraz, *Multilateral Transparency for Securities Markets Through DLT*, 25 FORDHAM J. CORP. & FIN. L. 97, 135–39 (2019) (describing how a DLT system could be employed to trade, clear, and settle securities).

394. See *supra* text accompanying notes 235–39.

associated tokens and DeFi services,³⁹⁵ and crypto-friendly Commissioners have proposed frameworks designed to accommodate crypto-asset trading platforms within the Exchange Act framework.³⁹⁶ Many of these proposals contemplate limiting the SEC's jurisdiction over trading in digital assets issued by decentralized ledgers and entities,³⁹⁷ on the ostensible grounds that they do not neatly fit the Supreme Court's definition of an "investment contract" under the *Howey* test.³⁹⁸

To demonstrate its interest (and political relevance) in this space, the SEC could entertain pilot programs for building municipal bond order display platforms using distributed ledger technology.³⁹⁹ As retail products, municipal securities are relatively illiquid and pose fewer adverse selection problems,⁴⁰⁰ so the latency of DLT-based trading services poses less concern.⁴⁰¹ Municipal disclosures are largely compiled and maintained by third parties under the Exchange Act,⁴⁰² which could allow the SEC to experiment with alternative strategies for certifying admission to trading without ceding authority to mandate disclosures in connection with the offer or sale of securities. Finally, the MSRB, as a dedicated regulator, has demonstrated a strong interest in developing tools for retail investors using MSRB data.⁴⁰³

Municipal securities thus present a suitable laboratory for experimenting with retail-oriented cryptoasset trading platforms. In addition to its no-action relief for alternative trading systems and special purpose broker dealers, the SEC could tweak Rule 15c2-12 to operate as a certification requirement for the admission of municipal securities to quotation and display through a decentralized or DLT platform.⁴⁰⁴ The SEC could also work with

395. See Press Release, U.S. House Fin. Servs. Comm., McHenry, Thompson, Hill, Johnson Release Digital Asset Structure Market Proposal (June 2, 2023), <https://financialservices.house.gov/news/documentsingle.aspx?DocumentID=408838> [<https://perma.cc/46ZP-47VY>] (discussing draft legislation that seeks to provide a legislative framework for digital assets).

396. Hester M. Peirce, Comm'r, Sec. & Exch. Comm'n, Running on Empty: A Proposal to Fill the Gap Between Regulation and Decentralization (Feb. 6, 2020), <https://www.sec.gov/news/speech/peirce-remarks-blockress-2020-02-06> [<https://perma.cc/GX65-GF7E>] (putting forward proposal for rulemaking under the Securities Act).

397. See Financial Innovation and Technology for the 21st Century Act, H.R. 4763, 118th Cong., 1st Sess. §§ 105, 204 (2023) (proposing to classify digital assets to which a "decentralized network" relates as a "digital commodity" subject to the CFTC's oversight and excluded from the definition of a "security" under federal securities law).

398. *United Hous. Found., Inc. v. Forman*, 421 U.S. 837, 852 (1975) (holding that the "touchstone" of the *Howey* test for an "investment contract" is "the presence of an investment in a common venture premised on a reasonable expectation of profits to be derived from the entrepreneurial or managerial efforts of others." (citing *SEC v. W.J. Howey Co.*, 328 U.S. 293, 301 (1946)); see also Yuliya Guseva, *A Conceptual Framework for Digital-Asset Securities: Tokens and Coins as Debt and Equity*, 80 MD. L. REV. 166, 184–88 (2020) (analyzing the difficulty of applying the *Howey* test to a DLT project investment once the "expectation of profits" no longer derives from the efforts of the issuer-developer).

399. Many of the special purpose broker-dealers and trading systems currently in the SEC's registration queue are designed for institutional investors, with the capacity to conduct their own diligence into prices and make their own custodial arrangements. See *supra* note 232.

400. See Bessembinder, Spatt & Venkataraman, *supra* note 19.

401. See HARVEY, RAMACHANDRAN & SANTORO, *supra* note 208.

402. See *supra* note 39 (explaining and citing the relevant law).

403. See *EMMA Labs*, MUN. SEC. RULEMAKING BD., <https://emmalabs.msrb.org> [<https://perma.cc/KC5H-9WSB>] ("EMMA Labs provides a hub for municipal market participants and technology experts to collaborate, innovate and create potential applications for market data.").

404. See *supra* note 39 (explaining and citing the relevant law).

the MSRB to adapt its trade reporting rules to accommodate transactions effected through DLT platforms. These experiments could inform the SEC's perspective on facilitating the entry of DLT platforms into trading in more liquid "digital asset securities," including equity securities more broadly.

VII. CONCLUSION

A confluence of factors—low interest rates, enhanced prudential regulation, technological advances—has created a moment in time where reform of the debt markets enjoys significant industrywide support. That moment may soon pass as the Federal Reserve Board raises interest rates and rolls back "quantitative easing," Congress and federal financial regulators contemplate easing capital and liquidity requirements, and crypto enthusiasts dig themselves out from the recent cryptowinter. Moreover, the nature of corporate and municipal bond trading may require dealer networks to dominate liquidity provision for the foreseeable future. The SEC has nevertheless undertaken significant efforts—across administrations and hand-in-hand with other financial regulators—to reform fixed-income trading. It is worth exploiting that moment in a manner that doesn't just replicate equity market structures but develops norms and structures to foster a better bond market.

Table 1. US Fixed-Income Securities—Issuance (in \$ billions)⁴⁰⁵

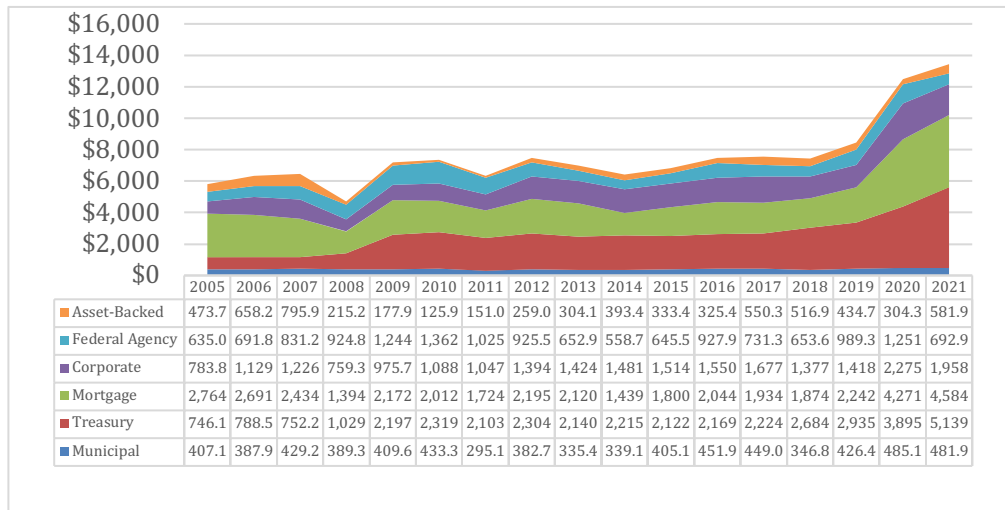
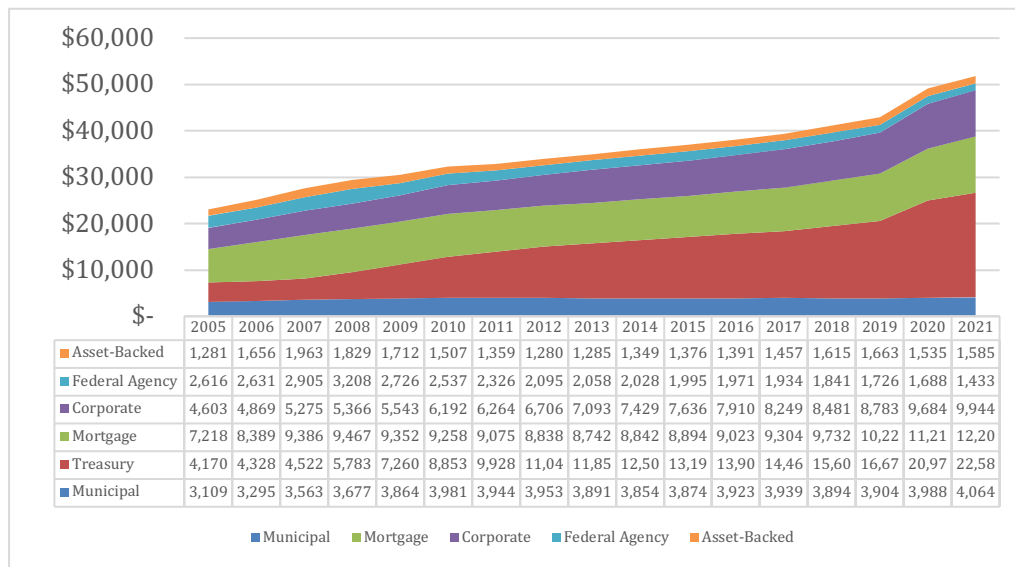


Table 2. US Fixed-Income Securities—Outstanding (in \$ billions)⁴⁰⁶



405. US Fixed Income Securities Statistics, SEC. INDUS. & FIN. MKTS. ASS'N (Aug. 7, 2023), <https://www.sifma.org/resources/research/us-fixed-income-securities-statistics> (on file with the *Journal of Corporation Law*).

406. *Id.*

Table 3. US Fixed-Income Securities—Average Daily Trading Volume (in \$ billions)⁴⁰⁷

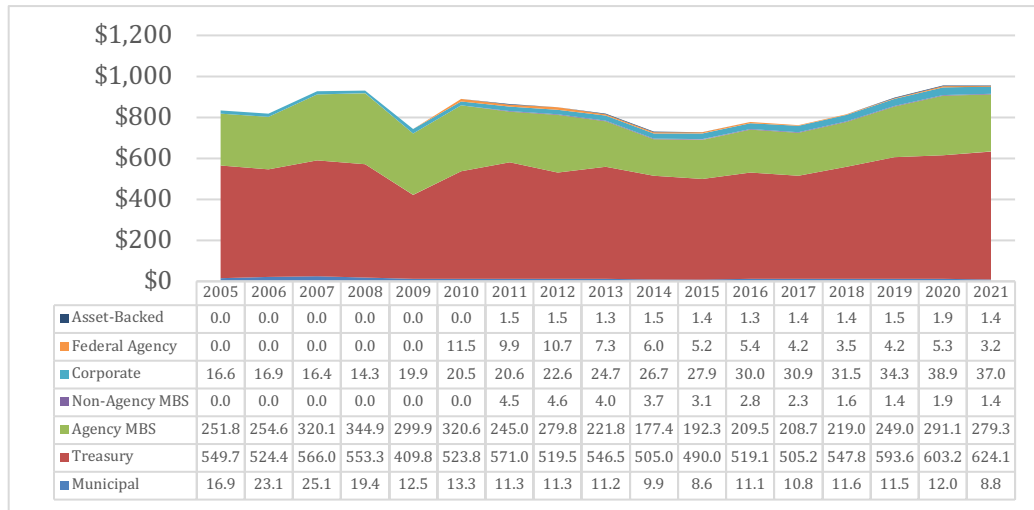
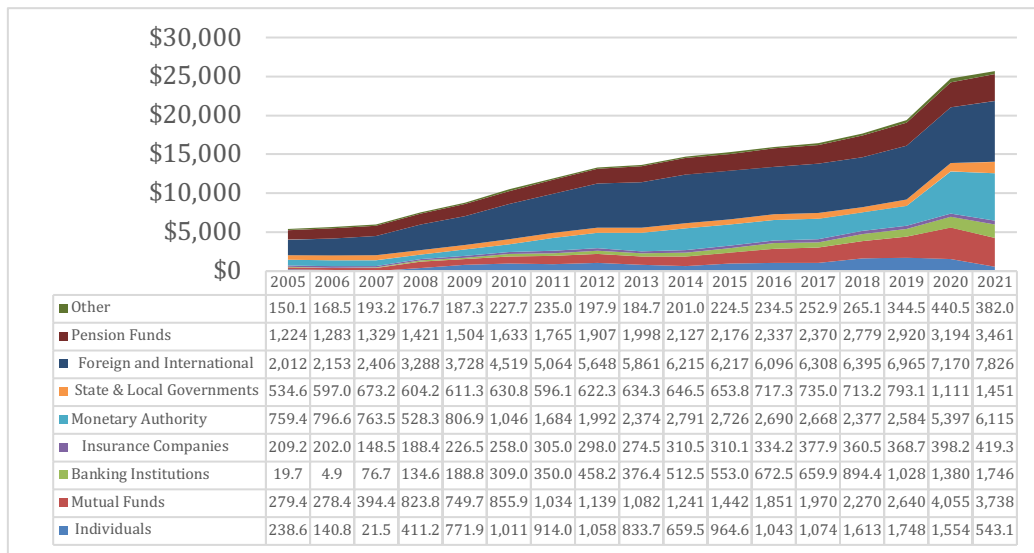


Table 4. US Treasury Securities—Holders (in \$ billions)⁴⁰⁸



407. *Id.*

408. *Id.*

Table 5. US Municipal Securities—Holders (in \$ billions)⁴⁰⁹

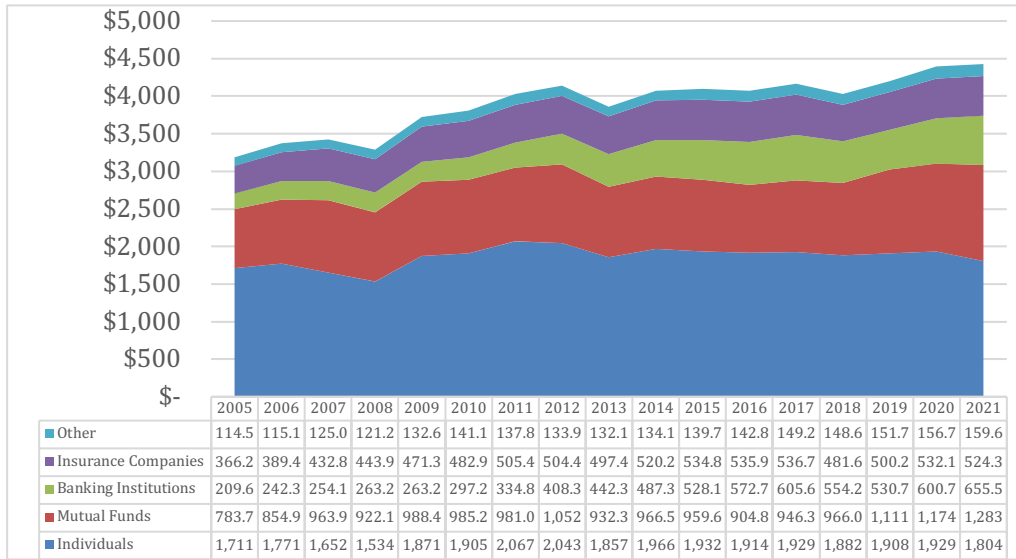
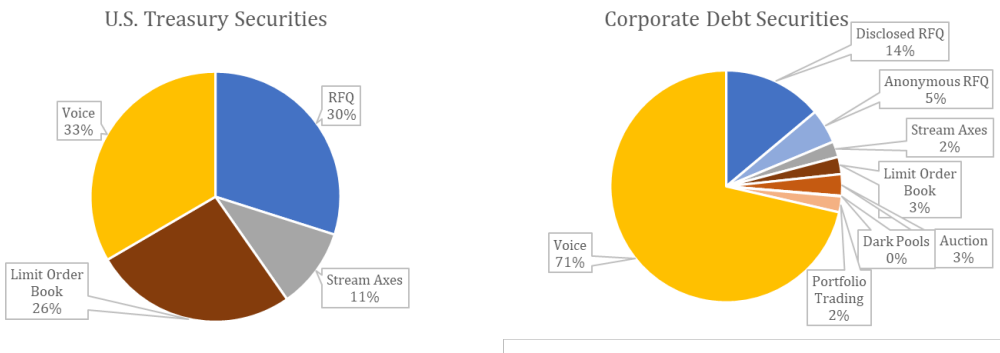


Table 6. Distribution of Trading by Protocol⁴¹⁰



409. *Id.*

410. Amendments Regarding the Definition of “Exchange” and Alternative Trading Systems (ATs), 87 Fed. Reg. 15496 (proposed Mar. 18, 2022) (to be codified at 17 C.F.R. pts. 232, 240, 242, 249).