THE FAILED REGULATION OF U.S. TREASURY MARKETS

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In trading the preeminent risk-free security, the $21 trillion U.S. Treasury market supports the country's borrowing needs, financial stability, and investor appetite for a safe asset. Straddling the nexus between a securities market and a systemically essential institution, the Treasury market must function at all costs, even if other markets fail.

This Article shows that Treasury market structure is fragile, weakened by a regulatory model poorly suited to match its design. First, public oversight of Treasuries is fragmented, divided between five or more agencies. The rulebook for Treasuries is sparse, lacking basic guardrails common to other markets. Without effective rules and institutional cooperation, regulators are ill-equipped to develop a taxonomy of risks and strategies to mitigate them. Second, private self-regulation cannot fill the gap. Comprising a rival mix of heavily regulated banks and lightly regulated algorithmic firms, major Treasuries traders lack incentives to cooperate. Instead, traders are motivated to take risks where the costs of detection and discipline are low. These deficiencies leave the market vulnerable to failure and risk-taking as traders lack sufficient economic interest to maintain market integrity.

This Article concludes with two proposals to introduce stronger public and private oversight: (1) formalized coordination between regulators, led by the Financial Stability Oversight Council; and (2) mandatory clearing for Treasuries trades that forces traders to monitor

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each other. As the country's economic lifeline, regulatory neglect of the Treasury market constitutes an exceptionally reckless administrative gamble with the potential to damage the country's preeminence in global finance.

INTRODUCTION

In March 2020, as the COVID-19 pandemic ripped through the economy, the then-$17 trillion market for U.S. government bonds ("Treasuries") was brought to the brink of failure. Because investors rely on Treasuries to keep them safe during crises, the potential collapse of Treasuries presented an unthinkable doomsday scenario for global markets and the U.S. economy.[1] With the Dow Jones index plummeting by 2,000 and 3,000 points in a single day, the Treasury market was supposed to be the safe haven for investors that needed to sell Treasuries to raise cash or buy them as protection.[2] Instead, as panic took hold and

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1. See Colby Smith & Robin Wigglesworth, US Treasuries: The Lessons from March's Market Meltdown, Fin. Times (July 29, 2020), https://www.ft.com/content/ea6f3104-eeec-466a-a082-76ae78d430fd (on file with the *Columbia Law Review*) (highlighting the significance of the Treasury market to the global economy and providing a detailed account of the system-wide risk posed by the events of March 2020); Jeffrey Cheng, David Wessel & Joshua Younger, How Did COVID-19 Disrupt the Market for U.S. Treasury Debt?, Brookings (May 1, 2020), https://www.brookings.edu/blog/up-front/2020/05/01/how-did-covid-19-disrupt-the-market-for-u-s-treasury-debt [https://perma.cc/38F3-F8CH] ("Treasury securities are at the core of financial markets . . . [a]nd they are rainy day assets: safe and stable investments that banks, companies, and governments accumulate on the assumption that they can be quickly sold at low cost if they need cash fast."); see also Bryan Noeth & Rajdeep Sengupta, Flight to Safety and U.S. Treasury Securities, Fed. Rsrv. Bank of St. Louis: Reg'l Economist, at 18 (2010), https://www.stlouisfed.org/~/media/Files/PDFs/publications/pub_assets/pdf/re/2010/c/treasury_securities.pdf [https://perma.cc/PS9N-7XAL] ("[I]nvestors turn to U.S. Treasuries during times of increased uncertainty as a safe haven for their investments."); Antoine Bouveret, Peter Breuer, Yingyuan Chen, David Jones & Tsuyoshi Sasaki, Fragilities in the U.S. Treasury Market: Lessons from the "Flash Rally" of October 15, 2014, at 5–6 (IMF, Working Paper No. WP/15/222, 2015), https://www.imf.org/external/pubs/ft/wp/2015/wp15222.pdf [https://perma.cc/SWY2-5DG6] ("The U.S. Treasury market is one of the largest and most liquid financial markets in the world, as well as one of the most important. Treasury securities are the bedrock of the financial system . . . .").

2. See David J. Lynch, Thomas Heath, Taylor Telford & Heather Long, U.S. Stock Market Suffers Worst Crash Since 1987, as Americans Wake Up to a New Normal of Life, Wash. Post (Mar. 13, 2020), https://www.washingtonpost.com/us-policy/2020/03/12/markets-stocks-today-coronavirus (on file with the *Columbia Law Review*) ("The roughly $17 trillion Treasury market is the safe haven for investors who want a near-absolute guarantee that they will get their money back."); Adam Samson, Robin Wigglesworth, Colby Smith & Joe Rennison, Strains in the U.S. Government Bond Market Rattle Investors, Fin. Times (Mar. 12, 2020), https://www.ft.com/content/1a305358-6450-11ea-a6cd-df28cc3c6a68 (on file with the *Columbia Law Review*) ("Several fund managers also raised alarm at the worsening health of the US government debt market and warned that, without decisive action, dysfunction could have a widespread impact on fragile financial markets."); Darrell Duffie, Still the World's Safe Haven? Redesigning U.S. Treasury Market After the COVID-19 Crisis 2 (Brookings, Hutchins Ctr. Working Paper No. 62, 2020), https://www.brookings.edu/wp-content/uploads/2020/05/WP62_Duffie_v2.pdf [https://perma.cc/3TD2-S6S8] [hereinafter Duffie, Redesigning After COVID-19] (describing how the pandemic and associated financial disruption "call[ed] into question the longstanding view that Treasuries are a reliable safe haven in a crisis"); Ian Millhiser, The Dow Jones Had Its Biggest Point Drop in History Monday, Vox (Mar. 16, 2020), https://www.vox.com/2020/3/16/21182341/dow-

investors tried to cash out, the market faltered to a crawl. Waves of orders went unfulfilled.[3] Treasuries prices—a benchmark against which virtually all other financial assets are priced—whipsawed wildly.[4] Facing the possibility that this unshakable market could fail, the Federal Reserve (the Fed) stepped in with over one trillion dollars of immediate stabilizing support.[5] Yet despite this intervention and additional aid to help revive capital markets, the quality and reliability of the Treasury market struggled to regain its footing.[6] This decline could not have come at a worse moment for the U.S. economy. Treasury borrowing outpaced records, adding almost $3 trillion to the national debt over spring 2020 alone as Congress

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jones-biggest-point-drop-coronavirus-3000 (on file with the *Columbia Law Review*) (reporting on the 2,997 point drop in the Dow Jones Index).

3. See Smith & Wigglesworth, supra note 1 ("Trading conditions for US Treasuries had been poor for a while. But that Thursday—the day after Covid-19 was declared a pandemic—unnerving glitches escalated into mayhem.").

4. See id. (noting highly disruptive volatility in Treasuries prices that manifested in yields falling to an all-time low before rebounding higher and highlighting the extremely rare nature of such price swings); see also Michael Fleming & Francisco Ruela, Treasury Market Liquidity During the COVID-19 Crisis, Liberty St. Econ. (Apr. 17, 2020), https://libertystreeteconomics.newyorkfed.org/2020/04/treasury-market-liquidity-during-the-covid-19-crisis.html [https://perma.cc/EA79-BM34] ("The COVID-19 pandemic resulted in a sizable increase in uncertainty about economic conditions . . . [causing] market expectations of asset values to shift rapidly, and hence price volatility to increase . . . . [V]olatility caused market makers to widen their bid-ask spreads and post less depth . . . and the price impact of trades to increase.").

5. See Lynch et al., supra note 2 (describing the Fed's attempt "to smooth the operations of the giant U.S. Treasury market" by injecting $1.5 trillion to support short-term funding markets for bonds as well as announcing the purchase of $60 billion in Treasury bonds); see also Michael Fleming, Asani Sarkar & Peter Van Tessel, The COVID-19 Pandemic and the Fed's Response, Liberty St. Econ. (Apr. 15, 2020), https://libertystreeteconomics.newyorkfed.org/2020/04/the-covid-19-pandemic-and-the-feds-response.html [https://perma.cc/UV5Z-72CX] [hereinafter Fleming et al., COVID-19 and the Fed's Response] (describing the various stabilizing measures taken by the Fed in response to COVID-19 and the Treasury markets). One of the extraordinary interventions by the Fed included establishing a "temporary repurchase agreement facility for foreign and international monetary authorities," or "FIMA Repo Facility," to offer swap lines for dollars and Treasuries to foreign central banks in order to ease pressure on the Treasury market. Press Release, Bd. of Governors of the Fed. Rsrv. Sys., Federal Reserve Announces Establishment of a Temporary FIMA Repo Facility to Help Support the Smooth Functioning of Financial Markets (Mar. 31, 2020), https://www.federalreserve.gov/newsevents/pressreleases/monetary20200331a.htm [https://perma.cc/T5JP-VS73].

6. See, e.g., Fin. Stability Bd., Holistic Review of the March Market Turmoil 2 (Nov. 17, 2020), https://www.fsb.org/wp-content/uploads/P171120-2.pdf [https://perma.cc/RAM4-DLER] (concluding that the exceptional interventions of central banks into the markets were crucial to saving the market in the short term, but "[t]he financial system remains vulnerable to another liquidity strain, as the underlying structures and mechanisms that gave rise to the turmoil are still in place"); John Dizard, Opinion, The U.S. Treasury Market Is Facing a Train Wreck (Dec. 11, 2020), Fin. Times, https://www.ft.com/content/ffb2a3b4-1044-4a61-921a-e288ffb82170 (on file with the *Columbia Law Review*) (warning that "[t]here is going to be a train wreck at the front end of the [Treasury] curve next year" because "[t]here is way too much cash chasing too little paper" (quoting Mark Cabana, head of U.S. rates strategy for Bank of America Securities)).

enacted far-reaching stimulus measures in response to the COVID-19 pandemic.[7] Just as the need for Treasuries has grown existentially urgent, the Treasury market has revealed itself to be fragile.

This suddenness notwithstanding, the ill-timed collapse in "risk-free" Treasury markets is unsurprising and overdue. Despite their singular importance, Treasuries have evolved under a regulatory framework that lacks effective supervisory and administrative power. Treasury markets have therefore failed to adapt to emerging risks and technological change while operating under a system of supervision that is far less intense than what exists for equity or corporate bond markets. The result is a market structure in which the regulatory guardrails are minimal and outdated, leaving it pervasively exposed to failure.

This Article makes two descriptive claims. First, public regulation of Treasury markets is characterized by excess fragmentation among supervisors, resulting in a lack of coordination as well as a sparse and bureaucratically costly-to-change rulebook. This institutional framework is fragmented by design. Whereas equities or corporate bonds are overseen by a primary regulator (the SEC), Treasuries are supervised by five or more major agencies, none of which has lead status. The Treasury writes the rules, the Federal Reserve Bank of New York (N.Y. Fed) facilitates debt auctions, the SEC and the Financial Industry Regulatory Authority (FINRA) supervise securities firms that trade Treasuries, the Fed monitors banks, and the Commodity Futures Trading Commission (CFTC) oversees the derivatives markets linked to Treasuries.[8] This shared oversight is not necessarily unusual. As Professors Jody Freeman and Jim Rossi observe, fragmentation is a common feature of the administrative state.[9] This arrangement highlights the market's significance for the financial system and has the advantage of pooling regulatory expertise and experience. But

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7. See Coronavirus Aid, Relief, and Economic Security Act (CARES Act), Pub. L. No. 116-136, 134 Stat. 281 (2020) (establishing various emergency measures to assist businesses and individuals at the onset of the COVID-19 pandemic in the United States); Martin Crutsinger, Treasury Says April–June Borrowing Will Be a Record $2.99T, AP News (May 4, 2020), https://apnews.com/article/35f17494fbdbb0d7ecb10d79a7bacce3 (on file with the *Columbia Law Review*) ("The economic paralysis triggered by the coronavirus pandemic is forcing the U.S. Treasury to borrow far more than it ever has before—$2.99 trillion in the current quarter alone."); see also U.S. Dep't of the Treasury, Monthly Statement of the Public Debt of the United States (June 2020), https://www.treasurydirect.gov/govt/reports/pd/mspd/2020/opds062020.pdf [https://perma.cc/6GTZ-YVA8] (showing a total marketable (tradable) public debt of $19.9 trillion out of a total public debt of $26.5 trillion).

8. See Jerry W. Markham, Regulating the U.S. Treasury Market, 100 Marq. L. Rev. 185, 199–230 (2016) (providing an overview of these regulatory bodies and their respective roles in overseeing Treasuries); see also infra section I.B (describing the current patchwork of agencies and fragmented regulatory structure for Treasury market oversight).

9. See Jody Freeman & Jim Rossi, Agency Coordination in Shared Regulatory Space, 125 Harv. L. Rev. 1131, 1134 (2012) (detailing the fragmentation common to the administrative state and describing measures for coordination between agencies that exercise shared oversight over the same areas).

it also creates high institutional barriers to action[10] through information gaps, turf battles, inconsistent regulatory approaches between agencies, and the need to coordinate to fulfill basic objectives.[11] Perhaps the most problematic downside to this system is that no single agency possesses a full picture of the Treasury market with which to craft an optimal supervisory strategy, should it decide to take the initiative.[12] The widespread view that Treasuries are a risk-free security can also engender a lack of urgency to develop an administrative framework capable of heightened vigilance. Reflecting these hurdles, agencies have faltered in exercising joint oversight in recent years.[13] Information sharing has required regulators to enter into complex agreements with one another just to pool and transfer data.[14] And even straightforward, commonsense rulemaking has required time and mobilization, only to result in reforms that are partial in their coverage.[15]

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10. See Markham, supra note 8, at 199–208 (describing the allocation of oversight responsibilities between agencies and examples of types of misconduct in both the primary and secondary market); see also Luis Aguilar, Comm'r, SEC, Ere Misery Made Me Wise: The Need to Revisit the Regulatory Framework of the U.S. Treasury Market (July 14, 2015), https://www.sec.gov/news/statement/need-to-revisit–regulatory-framework-us-treasury-market.html [https://perma.cc/F4DC-JCS8] (noting the need to update the regulation of Treasury markets and the current absence of responsive oversight).

11. See Freeman & Rossi, supra note 9, at 1138–55 (detailing the rationales governing allocation of shared responsibilities across multiple agencies as well as ways to facilitate coordination despite resistance to change).

12. See id. at 1150–51 (describing weaknesses associated with fragmented regulatory frameworks, including how fragmented regimes create information asymmetries that lead to inaction).

13. See U.S. Dep't of the Treasury, Bd. of Governors of the Fed. Rsrv. Sys., Fed. Rsrv. Bank of N.Y., SEC & U.S. Commodity Futures Trading Comm'n, Joint Staff Report: The U.S. Treasury Market on October 15, 2014, at 15–19 (July 13, 2015), https://www.treasury.gov/press-center/press-releases/Documents/Joint_Staff_Report_Treasury_10-15-2014.pdf [https://perma.cc/T5GG-7R5] [hereinafter U.S. Dep't of the Treasury et al., Joint Staff Report] (analyzing the Flash Rally, an episode of secondary market prices behaving extremely abnormally over a fifteen-minute period on October 15, 2014, and outlining the importance of regulatory reform).

14. See Ryan Tracy & Andrew Ackerman, The New Bond Market, Regulators Scramble to Keep Up, Wall St. J. (Sept. 23, 2015), https://www.wsj.com/articles/the-new-bond-market-the-u-s-treasury-struggles-to-keep-up-1443027850 (on file with the *Columbia Law Review*) (demonstrating how the lack of such agreements created oversight difficulties by limiting important information sharing between regulators).

15. For example, in 2017, regulators created a trade reporting mechanism for Treasuries requiring banks and broker-dealers to provide trade information to regulators through FINRA's Trade Reporting and Compliance Engine (TRACE). See Press Release, Bd. of Governors of the Fed. Rsrv. Sys., Federal Reserve Board Announces Plans to Enter Negotiations with FINRA to Potentially Act as Collection Agent of U.S. Treasury Securities Secondary Market Transactions Data (Oct. 21, 2016), https://www.federalreserve.gov/newsevents/pressreleases/other20161021a.htm [https://perma.cc/76KD-5AXD] [hereinafter The Fed, FINRA Negotiation Press Release]. At the time it was promulgated, a securities firm could avoid reporting rules by not classifying itself as a FINRA-regulated broker-dealer firm, a loophole that was partially remedied in April 2019 by requiring trading platforms to specifically identify trading firms. See Alexandra Scaggs, Opinion, The Dealer–Trader

Perhaps most worryingly, these high administrative costs have produced a rulebook for Treasury markets that is noticeably sparser than that applicable to participants in equities or the corporate bond market, limiting the levers available to regulators to monitor and discipline traders. According to one expert, out of the thousands of rules prescribed for equity brokers and dealers, only about forty-six apply to those in Treasuries.[16] Indeed, there is doubt even among regulators about which rules are in fact applicable to Treasury markets, leaving a question mark over the enforceability of otherwise mainstay prohibitions (such as uncertainty over rules governing brokers trading ahead of client orders).[17] Further highlighting the limited tools available to regulators under this hands-off approach, trading platforms that only host Treasuries trades are exempt from the usual panoply of regulations that apply to securities trading platforms.[18] While major equity trading exchanges like the New

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Distinction and Treasury Market Regulation (Updated), Fin. Times (Oct. 28 2016), https://www.ft.com/content/35eecd10-d387-3a2f-9114-62d9023b8c34 (on file with the *Columbia Law Review*) [hereinafter Scaggs, Dealer–Trader Distinction] (illustrating the FINRA broker-dealer registration-avoidance loophole used by some securities firms to evade the regulatory perimeter for Treasuries trading reporting rules); James Collin Harkrader & Michael Puglia, Principal Trading Firm Activity in Treasury Cash Markets, Bd. of Governors of the Fed. Rsrv. Sys.: FEDS Notes (Aug. 4, 2020), https://www.federalreserve.gov/econres/notes/feds-notes/principal-trading-firm-activity-in-treasury-cash-markets-20200804.htm [https://perma.cc/Y4SW-GVBC] (explaining that trade reporting was imperfect as information gaps remained even after implementation of the 2017 reporting system); see also infra Part III.

16. See Ken Monahan, TRACE "Unlocks" the Treasury Market for the Official Sector. Everyone Else Gets a Peek Through the Keyhole, Greenwich Assocs.: Blog (Oct. 3, 2018), https://www.greenwich.com/blog/frbny-trace-unlocks-treasury-market-everyone-else-gets-peek-through-keyhole [https://perma.cc/89BZ-N7B8] (noting that there used to be only thirty-nine rules pertaining to Treasuries prior to the 2017 Treasury reporting reform).

17. See e.g., Rule 5320. Prohibition Against Trading Ahead of Customer Orders, Fin. Indus. Regul. Auth., https://www.finra.org/rules-guidance/rulebooks/finra-rules/5320 [https://perma.cc/YSY3-MNZW] [hereinafter FINRA, Rule 5320] (last visited Jan. 16, 2021) (applying the broker-trading rule to equity securities but remaining unclear about whether it applies to Treasuries traders that trade ahead of their clients). To clarify the matter, the SEC and FINRA have conducted a review to determine which rules do and ought to apply to Treasuries. See Letter from Stephen Luparello, Dir., Div. Trading & Mkts., to Robert W. Cook, President & CEO, Fin. Indus. Regul. Auth. (Aug. 19, 2016), https://www.sec.gov/divisions/marketreg/letter-to-finra-regulation-of-us-treasury-securities.pdf [https://perma".cc/FA33-SHQT] [hereinafter Luparello, FINRA Request Letter] (requesting a review of which FINRA rules apply to, or ought to apply to, Treasuries broker-dealers).

18. See, e.g., SEC Requirements for Alternative Trading Systems, 17 C.F.R. § 242.301(a) (2020) (exempting platforms that transact only in U.S. government securities from having to register as an alternative trading system (ATS) under the jurisdiction of the SEC). But see Press Release, SEC, SEC Proposes Rules to Extend Regulations ATS and SCI to Treasuries and Other Government Securities Markets (Sept. 28, 2020), https://www.sec.gov/news/press-release/2020-227 [https://perma.cc/4L78-P2UU] [hereinafter SEC, ATS/SCI Release] (proposing to amend this exemption and include Treasuries trading platforms under Regulation ATS). Note, however, that this proposed amendment would not require a Treasuries ATS to register as a full exchange under Section 6 of the Securities Exchange Act of 1934. Id.

York Stock Exchange (NYSE) must provide regular disclosures about their operations and comply with fairness and good governance standards,[19] venues that only trade Treasuries can avoid these regulations altogether.[20]

This Article also argues that, in light of modern technological advances, private self-regulation in Treasury markets lacks structural incentives to fill the gap left by weak and fragmented public oversight. Historically, the purchase and trade of Treasuries have largely been intermediated by a cohort of top-tier banks and investment banks designated as "primary dealers" for the market.[21] Currently numbering twenty-four firms, primary dealers are designated by regulators to oil the machinery of Treasuries trading by providing liquidity to the market.[22] Because of their access to new issues, primary dealers are also the key conduits for investors looking to buy or sell Treasuries.[23] Primary dealers are chosen for their capacity to regularly purchase government debt (and are expected to do so), and they are also usually networked banks and investment firms capable of connecting with investors worldwide in the secondary Treasuries market.[24] Importantly, the secondary market for Treasuries features an

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19. See, e.g., SEC Dissemination of Transaction Reports and Last Sale Data with Respect to Transactions in NMS Stock, 17 C.F.R. § 242.601(a) ("Every national securities exchange shall file a transaction reporting plan regarding transactions in listed equity and Nasdaq securities executed through its facilities . . . ."); SEC Order Protection Rule, id. § 242.611 (requiring exchanges to establish policies to prevent trade-throughs); Spotlight on Regulation SCI, SEC, https://www.sec.gov/spotlight/regulation-sci.shtml [https://perma.cc/9YEE-EMZG] (detailing compliance with rules governing the resilience of technological and infrastructural processes underlying trading platforms) (last visited Jan. 16, 2021); see also SEC Regulation SCI—Systems Compliance and Integrity, id. §§ 242.1000–.1007 (requiring that certain "SCI entit[ies]," including "national securities exchange[s]," establish and maintain policies ensuring system resilience and security).

20. See Mary Jo White, Chair, SEC, Prioritizing Regulatory Enhancements for the U.S. Treasury Market, Keynote Address at the Evolving Structure of the U.S. Treasury Market Second Annual Conference (Oct. 24, 2016), https://www.sec.gov/news/speech/white-keynote-us-treasury-market-conference-102416.html [https://perma.cc/AG5D-8PRF] ("These basic and critical regulatory standards do not apply to platforms that trade U.S. Treasury securities."). In the same address, White suggested eliminating the regulatory exemption for Treasuries trading platforms. See id. ("I have reassessed the decision . . . to exclude from Regulation ATS platforms that trade solely government securities.").

21. See Dominique Dupont & Brian Sack, The Treasury Securities Market: Overview and Recent Developments, 85 Fed. Rsrv. Bull. 785, 786–87 (1999), https://www.federalreserve.gov/pubs/bulletin/1999/1299lead.pdf [https://perma.cc/32P7-9P7C] (providing an overview of the function of primary dealers, as well as defining marketable securities and the types of bonds that generally comprise the U.S. Treasury market).

22. See Primary Dealers: List of Primary Dealers, Fed. Rsrv. Bank of N.Y., https://www.newyorkfed.org/markets/primarydealers [https://perma.cc/DP76-V47V] [hereinafter N.Y. Fed, Primary Dealer List] (last visited Jan. 5, 2021).

23. See Dupont & Sack, supra note 21, at 789 ("[T]he [primary] dealer can facilitate transactions between customers . . . .").

24. See id. at 787–90; N.Y. Fed, Primary Dealer List, supra note 22 (describing how "[i]n order to be eligible as a primary dealer, a firm must . . . [d]emonstrate a substantial presence as a market maker that provides two-way liquidity in U.S. government securities"

additional significant aspect: the interdealer market, in which dealers transact with *one another* to manage their inventories.[25] If one dealer has clients needing Treasuries that it does not have, it can tap into this interdealer space to purchase the securities from another dealer and satisfy investor demand.[26] Traditionally, trading in both markets took place through telephones, faxes, and computer displays of orders, giving the market its reputation as an uncomplicated and ultrasafe corner of the financial system.[27]

Over the last decade, however, the Treasury market has experienced a fundamental shift away from relying on just primary dealers and analog trading mechanics. It is now largely automated, populated to an increasing degree by high-speed algorithmic traders known as "high-frequency traders" (HFTs) that use preset computerized programs to trade in milliseconds and microseconds.[28] At least in the interdealer market, primary dealers have ceded their dominance in competition with expert, automated firms that are more agile because they are smaller—and generally much less regulated.[29] High-speed automated trading now drives as much as 50% to 70% of Treasuries trading volume between dealers.[30]

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and is expected to "bid on a pro-rata basis in all Treasury auctions at reasonably competitive prices").

25. Dupont & Sack, supra note 21, at 789.

26. Id.; see also infra section II.B.

27. Compare Dupont & Sack, supra note 21, at 806 (describing the Treasury trading landscape in 1999, when most trades were executed via telephone), with Markham, supra note 8, at 198–99 (noting that Treasuries are traded virtually around the clock and underscoring the use of electronic trading for most Treasuries, including by high-frequency traders). With computer technology, dealer-to-customer markets have utilized "request for quote" (RFQs) through portals and specialist electronic platforms. See Kevin McPartland, Greenwich Assocs., U.S. Treasury Trading: The Intersection of Liquidity Makers and Takers 3 (2015) [hereinafter McPartland, Intersection] (asserting that RFQ remains the dominant method for trading despite changes in technology).

28. John Bates, Algorithmic Trading and High Frequency Trading: Experiences from the Market and Thoughts on Regulatory Requirements (unpublished manuscript), *in* Tech. Advisory Comm., U.S. Commodity Futures Trading Comm'n, Technological Trading in the Markets 27 (July 14, 2010), http://www.cftc.gov/ucm/groups/public/@newsroom/documents/file/tac_071410_binder.pdf [https://perma.cc/CVA7-8EGZ] ("An algorithm is 'a sequence of steps to achieve a goal'—and the general case of algorithmic trading is 'using a computer to automate a trading strategy.'").

29. See infra section II.C.1. (describing the transfer of dominance from traditional primary dealers to high-frequency trading (HFT) firms).

30. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 21, 36–39 (showing that on October 15, 2014, principal trading firms (PTFs)—a term commonly used to reference HFTs in Treasury markets—accounted for "more than 50 percent" of trading, and detailing the key features of PTFs and their Treasuries trading strategies); Smith & Wigglesworth, supra note 1 ("Electronic-style trading activity now accounts for more than 75 per cent of liquidity provision in the Treasury market . . . ."); Portia Crowe, High Frequency Traders Are Now Dominating Another Huge Market, Bus. Insider (Sept. 23, 2015), https://www.businessinsider.com/high-frequency-traders-dominate-the-treasuries-market-2015-9 (on file with the *Columbia Law Review*) (noting that BrokerTec, one of the major platforms for dealers trading Treasuries with one another, was reported to

Such trading is familiar in equities markets, and regulators have adopted a bevy of rules to mitigate negative externalities there.[31] But the advent of HFTs in Treasuries poses challenges within a lax regulatory environment characterized by patchy reporting, fragmented oversight, and weak levers to collect information on traders and platforms.[32] Without informational insight into the real-world effects of new traders and their strategies, regulators lack the knowledge and authority to effectively tackle the resulting risks.[33]

This lenient regulatory regime contributes to the limited private incentives for market actors to self-regulate. Professors Georgy Egorov and Bard Harstad observe that firms can either come together to self-regulate in the absence of an active regulator or they can do so in order to preempt oversight by a strict one.[34] But because the regulatory landscape is so fragmented, the impending prospect of strict government monitoring is an unlikely motivating factor for Treasuries traders.

Even if market participants wish to police themselves, private incentives fostered by modern Treasury trading relationships undermine effective self-policing. The self-interest that might once have pushed primary dealers toward promoting protective market behavior has diminished with the ascendancy of rival, less-regulated automated securities firms. Primary dealers traditionally had much to lose if the Treasury market performed poorly, but the economic bonds that used to keep them in line are fraying as they compete with new automated traders for market share.[35]

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intermediate around 65% to 70% of interdealer trading volume); Robert Mackenzie Smith, Client List Reveals HFT Dominance on BrokerTec, Risk.net (Sept. 23, 2015), https://www.risk.net/derivatives/interest-rate-derivatives/2426923/client-list-reveals-hft-dominance-brokertec (on file with the *Columbia Law Review*) [hereinafter Smith, HFT Dominance] (noting that eight of ten traders on the top interdealer Treasuries trading platform were high-speed traders).

31. See, e.g., SEC Regulation SCI—Systems Compliance and Integrity, 17 C.F.R. §§ 242.1000–.1007 (2020) (establishing rules governing electronic trading systems infrastructure in order to promote market resilience).

32. See Aguilar, supra note 10 ("The transformative changes that swept through the equities and options markets in the past decade have vastly reshaped the landscape of the Treasury market . . . . As a result, the structure, participants, and technological underpinnings of today's Treasury market are far different than they were just a few years ago."); see also infra Part III.

33. See Tracy & Ackerman, supra note 14 (describing gaps in the current regulatory framework for governing Treasuries trading and the risks and consequences such gaps pose with regard to HFTs).

34. See Georgy Egorov & Bard Harstad, Private Politics & Public Regulation, 84 Rev. Econ. Stud. 1652, 1652–57 (2017) (developing a model illustrating firms' incentives for self-regulation in both the presence and absence of an active regulator).

35. As a small group of repeat players, primary dealers had once held significant economic skin-in-the-game and reputational investment in the franchise, offering a means to reduce information deficits and promote cooperation in detecting and managing risk. See infra section III.B (explaining the misalignment of regulatory incentives created by the coexistence of primary dealers and HFTs).

Thus, an overall picture emerges: The asymmetric distribution of regulatory burdens between primary dealers on the one hand and high-speed securities firms on the other limits opportunities for private cooperation and mutually reinforces risk-taking behavior by both sets of players. Unwieldy public monitoring, combined with a light-touch rulebook, allows all firms to take risks or trade opportunistically with little chance of detection and discipline. Traders can also cheaply exit the market if something goes wrong, limiting how fully they must internalize the costs of their risky behavior. For the less-regulated, nonprimary dealer firms, the regulatory constraints are even weaker, further increasing their financial incentive to seek risk in Treasury markets. Faced with diminishing profits and a less lucrative franchise, primary dealers are also incentivized to take risks and shirk self-discipline. So, not only is the task of private oversight logistically harder as the number of traders proliferates and diversifies, but it is also problematic when self-policing would result in primary dealers imposing added costs on themselves in a period of fierce competition and lower profits.

The consequences of this regulatory neglect in Treasury markets were apparent even prior to the March 2020 COVID-19 crisis, as a number of disruptions over the years pointed to unaddressed fragilities at the heart of this supposedly failure-proof market. Famously, on October 15, 2014, the price of Treasuries surged well in excess of what would have been normal for the time.[36] Just after 9:30 AM, the market was roiled by some of the highest trading volumes in its history, and prices seemed to fluctuate at random.[37] Despite the absence of any significant news, this abnormally rapid rise—and subsequent correction—caused Treasuries to suffer some of their largest price moves since 1998.[38] The only three other occasions with greater price shifts have been in response to news of major policy changes,[39] but this "Flash Rally" came out of nowhere, and attempts to

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36. See Matt Levine, Opinion, Algorithms Had Themselves a Treasury Flash Crash, Bloomberg (July 13, 2015), https://www.bloomberg.com/opinion/articles/2015-07-13/algorithms-had-themselves-a-treasury-flash-crash (on file with the *Columbia Law Review*) (describing the October 15, 2014 Flash Rally and discussing regulatory findings highlighting the behavior of "dumb" automated trading algorithms simply responding to price signals rather than fundamental information as contributing factors).

37. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 15 (describing how yields dropped sixteen points and then subsequently rebounded, all within fifteen minutes).

38. Id. at 17.

39. Id. (observing that the other three instances of large intraday moves since 1998 "followed significant new fundamental information being received by markets"). The absence of a news trigger is significant, as it would not be unusual for the price of U.S. Treasuries to rise—in essence, for the returns (yields) from the Treasury bond to fall—after bad economic news. This is because investors generally seek a "flight to safety" by buying Treasury bonds (essentially lending money to the U.S. government), although this a simplification of complicated trends that are also affected by inflation, interest rates, and competing investment opportunities. See SEC, Interest Rate Risk—When Interest Rates Go Up, Prices of Fixed-Rate Bonds Fall 1–5 (2013), https://www.sec.gov/files/ib_interest

explain it delivered little by way of firm conclusions.[40] Jamie Dimon, the Chairman and CEO of J.P. Morgan, hyperbolically remarked that such price movements were so rare as to happen only once every three billion years.[41] Despite Dimon's optimism, however, a similar incident occurred only a few years later in June 2018, sending Treasury prices into a short and inexplicable tailspin.[42] Even outside of these flash events, other disruptions also revealed the less-than-perfect operation of Treasury market infrastructure: The major trading platform for interdealer trading saw an hour-long shutdown in June 2019, slowing activity across the market.[43] To be sure, flash crashes, slowdowns, and platform malfunctions occur in other markets as well (like equities).[44] Nonetheless, scant regulatory attention and limited levers for intervention leave Treasuries exposed to the possibility that traders come to see the market as a space where risk-taking is much less costly and detectable than elsewhere in capital markets.

This Article concludes by outlining two proposals to begin remedying the deficiencies underlying Treasury market regulation. First, it suggests mechanisms to foster stronger interagency cooperation and help fill the gaps in public regulation. As an initial step, Treasury regulators can benefit by developing a more systematic memorandum of understanding (MOU) to formalize cooperation, information sharing, and enforcement.[45] To institutionalize pathways for interagency cooperation, this Article also proposes that regulators harness the coordination mechanism offered by

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raterisk.pdf [https://perma.cc/J2QK-YXNP] (illustrating the inverse relationship between Treasury prices and yields); Daniel Kruger, U.S. Government Bonds Fall as 10-Year Yield Climbs Above 3%, Wall St. J. (Apr. 13, 2018), https://www.wsj.com/articles/u-s-government-bonds-gain-as-10-year-yield-hovers-near-3-1537200839 (on file with the *Columbia Law Review*) (last updated Sept. 17, 2018) (same).

40. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 4 (finding "no single cause" for the price volatility); Levine, supra note 36 ("The regulators don't know what caused the [volatility].").

41. Levine, supra note 36, at n.7 ("Treasury securities moved . . . statistically 7 to 8 standard deviations[,] . . . an event that is supposed to happen only once in every 3 billion years or so . . . ." (quoting Jamie Dimon, Chairman and CEO of J.P. Morgan)).

42. See Brian Chappatta, Treasury Rally Was a Flash, Not a Crash, Bloomberg (June 7, 2018), https://www.bloomberg.com/opinion/articles/2018-06-07/treasury-rally-was-a-flash-not-a-crash (on file with the *Columbia Law Review*) (positing that the second flash event may have been triggered by turmoil in emerging markets and Brazil, resulting in a flight to U.S. Treasuries).

43. Elizabeth Stanton, Nick Baker & Matthew Leising, Treasuries Hit by One-Hour Outage on Biggest Electronic Platform, Bloomberg (Jan. 11, 2019), https://www.bloomberg.com/news/articles/2019-01-11/brokertec-inter-dealer-treasury-broker-suffers-outage (on file with the *Columbia Law Review*) (describing the outage and highlighting the lack of a serious impact on the day owing to "fortuitous" market conditions).

44. See, e.g., Steven Goldberg, Could Computerized Trading Cause Another Market Crash?, Kiplinger, (Apr. 3, 2018), https://www.kiplinger.com/article/investing/t041-c007-s001-could-computerized-trading-cause-another-market-cr.html [https://perma.cc/4AT9-KPCG] (highlighting the dangers of "Wall Street's robot traders" accidentally causing flash crashes, similar to the one which occurred on May 6, 2010).

45. See infra section IV.A.

the Financial Stability Oversight Council (FSOC), a post-2008 reform body that offers preexisting organizational expertise to map the connections between Treasury markets and the larger financial system.[46]

Second, to mitigate currently misaligned incentives for private self-regulation in the high-frequency trading (HFT) era, this Article suggests creating a Treasuries clearinghouse—an industry mechanism that forces major participants to be more responsible for risk-sharing and mitigation, requiring each to have skin in the game in order to maintain the resiliency of the market.[47] Common to nearly all major markets, clearinghouses are a private solution to the risk that traders can renege on their bargains with counterparties. By supplying the clearinghouse with sufficient funds to make good on promised transactions, participants subscribe to a mechanism wherein their pocketbooks are at risk in case of another firm's failure.[48] As Professor Darrell Duffie also argues, a clearinghouse for the Treasury market could introduce a stronger focus on risk management and bring a more organized approach to protecting its safety and soundness.[49] To be sure, clearinghouses are not a comprehensive solution; as in March 2020, market participants may still flee when it no longer suits them to trade, and algorithms could always go haywire. But a clearinghouse would provide a recognized bulwark that would anchor Treasuries trading to systematized risk sharing and management, motivating even rival traders to cooperate more fully in self-monitoring and discipline.

This Article proceeds as follows. Part I establishes the importance of the Treasury market to the national economy, especially in the wake of COVID-19, and demonstrates that much of the vulnerability is a function of the uniquely fragmented and light-touch regulatory structure overseeing Treasuries. Part II outlines the market structure of Treasury markets and traces their evolution from a relatively simple structure dominated by primary dealers to one populated by high-speed automated traders. This Part also observes how the changing composition of Treasuries traders undermines effective private self-regulation. Part III analyzes the risks of weak public and private regulation in Treasury markets. Part IV suggests pathways for reform.

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46. See infra notes 366–370 and accompanying text.

47. See infra section IV.B; see also Duffie, Redesigning After COVID-19, supra note 2, at 20 (proposing central clearing for Treasuries as a possible solution to market fragility).

48. See Yesha Yadav, The Problematic Case of Clearinghouses in Complex Markets, 101 Geo. L.J. 387, 392–93 (2013) [hereinafter Yadav, Problematic Clearinghouses] (describing the core economic benefits of clearinghouses, notably to reduce counterparty risk, ensure risk-sharing, and increase information about exposures for the market, as well as downsides, including "misaligned incentives" that result from forcing participants to share in the loss should a member's risky actions cause insolvency).

49. See Duffie, Redesigning After COVID-19, supra note 2, at 15 ("Central clearing increases the transparency of settlement risk to regulators and market participants, and in particular allows [central counterparties] to identify concentrated positions and crowded trades, adjusting margin requirements accordingly. Central clearing also improves market safety by lowering exposure to settlement failures . . . .").

I. WHY REGULATE A RISK-FREE MARKET?

The U.S. Treasury market is a key mechanism by which the government funds itself. When tax receipts cannot raise sufficient funds, Treasuries provide the channel for covering the shortfall.[50] Treasuries also anchor global financial markets.[51] As they are backed by the full faith and credit of the United States, its political institutions, consumer and capital markets, and taxing power, Treasuries are generally viewed as default-proof.[52] Investors worldwide rely on them as a fail-safe store of value to protect against risk, volatility, and investment losses.[53] The rate at which the U.S. government borrows is also essential for capital markets: The "risk-free" rate of Treasury borrowing benchmarks the risk-pricing of virtually all other financial assets.[54]

Likely owing to this longstanding perception, public regulation of Treasuries is more hands-off and institutionally fragmented compared to equities or corporate bonds.[55] Treasuries are supervised within a system of shared interagency authority where no single regulator holds primary status.[56] This arrangement offers the advantage of experience and

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50. See Dupont & Sack, supra note 21, at 785 ("The [U.S. government] finances its expenditures in excess of tax receipts through the sale of debt obligations.").

51. See, e.g., Bouveret et al., supra note 1, at 5 ("The continuous functioning and smooth adjustment of the Treasury market is important to global asset markets and financial stability."); Thomas Heath, What the 10-Year Treasury Yield Means to You? Real Money., Wash. Post (Apr. 24, 2018), https://www.washingtonpost.com/news/get-there/wp/2018/04/23/what-does-the-yield-on-the-10-year-treasury-mean-to-you (on file with the *Columbia Law Review*) (describing how investors choose between investing in Treasuries versus equities); Aswath Damodaran, Into the Abyss: What if Nothing Is Risk Free? 4–5 (July 2010), https://ssrn.com/abstract=1648164 (on file with the *Columbia Law Review*) [hereinafter Damodaran, Into the Abyss] (unpublished manuscript) (explaining why Treasuries are still subject to certain classes of risks).

52. Promontory Fin. Grp., Emerging Issues in the Functioning of the U.S. Treasury Market 10–11 (2016) (on file with the *Columbia Law Review*) ("Treasury securities are backed by the full faith and credit of the U.S. government . . . and the historical record of no defaults on the federal debt.").

53. See Bouveret et al., supra note 1, at 5 ("Treasury securities are widely used as a risk-free investment instrument and to satisfy hedging, margining, and collateral needs of market participants.").

54. See Damodaran, Into the Abyss, supra note 51, at 54 (stating that the risk-free rate "provides the basis for computing expected returns on risky assets[,]" like stocks and bonds).

55. See Government Securities Act of 1986, 15 U.S.C. § 78o-5 (2018) (designing the current regulatory framework for Treasury markets and setting out the spheres of responsibility for various existing federal regulators in rulemaking and supervision authority over Treasuries).

56. See U.S. Dep't of the Treasury, SEC & Bd. of Governors of the Fed. Rsrv. Sys., Joint Study of the Regulatory System for Government Securities 2 (1998) https://www.treasurydirect.gov/instit/statreg/gsareg/gsareg_gsr98rpt.pdf [https://perma.cc/7PYB-2F4X] [hereinafter U.S. Dep't of the Treasury et al., Government Securities Regulation Joint Study] ("The [Government Securities Act], rather than creating a separate agency to enforce the regulations, relied, for the most part, on the existing federal regulatory structure when assigning oversight and enforcement responsibilities.").

expertise, but it also creates high coordination costs, information gaps, and the risk of lax enforcement, raising the prospect of bureaucratic inertia in rousing regulators to respond effectively to new challenges.[57]

A. *The Treasury Market as Economic Foundation for the Nation*

U.S. government bonds have long nurtured the country's economic, social, and geopolitical development. Ever since it borrowed to pay for the Revolutionary War of 1776 (then through the Continental Congress), the United States has relied on debt to support public policy.[58] Treasuries have enabled the government to raise capital cheaply and to reliably develop public institutions and social safety nets alongside ambitious policy initiatives.[59] Historically, levels of national public debt surged around critical periods like the Civil War, World War I, the Great Depression, World War II, the 1980s recession, post-9/11, the 2008 Great Recession, and most recently, the COVID-19 pandemic.[60] Due to their risk-free status, Treasuries have been viewed as an essential protective asset for investors and financial markets worldwide.[61] As this section underscores, disruptions to risk-free Treasury markets can directly impair global financial stability and threaten the United States' capacity to borrow reliably to both fund large-scale policies and respond to crises.

1. *The National Significance of Risk-Free Status.* — Treasury bonds are designed to encourage investment from the broadest swath of investors.[62]

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57. See Freeman & Rossi, supra note 9, at 1150–51 (cataloguing the weaknesses of a split enforcement regime "in terms of efficiency, effectiveness, and accountability").

58. See Peter M. Garber, Alexander Hamilton's Market-Based Debt Reduction Plan, 35 Carnegie-Rochester Conf. Series on Pub. Pol'y 79, 80–81 (1991) (detailing the foundations of public debt by describing Alexander Hamilton's strategy to pay off the Continental Congress's Revolutionary War debt).

59. See, e.g., Dupont & Sack, supra note 21, at 785–86 (explaining varied government uses of Treasuries funding); Justin Lahart, The Treasury Market Is Having a Senior Moment, Wall St. J. (June 6, 2018), https://www.wsj.com/articles/the-treasury-market-is-having-a-senior-moment-1528307631 (on file with the *Columbia Law Review*) (emphasizing the role of Treasuries in funding Social Security).

60. See Matt Phillips, The Long Story of U.S. Debt, from 1790 to 2011, in 1 Little Chart, Atlantic (Nov. 13, 2012), https://www.theatlantic.com/business/archive/2012/11/the-long-story-of-us-debt-from-1790-to-2011-in-1-little-chart/265185 (on file with the *Columbia Law Review*) (illustrating debt surges throughout U.S. history graphically, with the spikes coinciding with major events); see also Dupont & Sack, supra note 21, at 785–86 (illustrating how U.S. government debt expanded to fund the Civil War, World War I, and World War II).

61. See, e.g., Claire Jones, More 'Money' Treasuries Would Calm Repo Markets, Fin. Times (Feb. 11, 2020), https://www.ft.com/content/a710474b-3ff5-42fc-b9ab-83325e878716 (on file with the *Columbia Law Review*); U.S. Treasury Securities, Fin. Indus. Regul. Auth., https://www.finra.org/investors/learn-to-invest/types-investments/bonds/types-of-bonds/us-treasury-securities [https://perma.cc/FPF3-8QMK] [hereinafter FINRA, Treasuries Securities] (last visited Jan. 16, 2021).

62. See FINRA, Treasuries Securities, supra note 61.

First, they allow mom-and-pop investors to lend to the U.S. Treasury.[63] Second, different types of bonds allow the debt to be repaid over varying periods, from maturities that come due within a year (Treasury Bills, or T-Bills), to longer-term instruments that are paid back over two, five, seven, and ten years (Treasury Notes), or even over twenty and thirty years (Treasury Bonds).[64] The general belief that Treasury debt will always be repaid, giving those that lend to the United States total certainty about receiving future streams of cash on time, is crucial to its broad accessibility and appeal.[65]

For institutional investors, Treasuries are an essential part of any portfolio. Instead of putting money in stock or corporate bonds whose issuers might fail to pay, Treasuries offer a source of reliable returns.[66] Holders of Treasuries purchase a hedge against downturns, expecting the U.S. government to always repay even if nothing else does.[67] The resilience of this expectation was evident during the worst days of the 2008 Financial Crisis and subsequent Great Recession: Despite concerns about the integrity of the U.S. financial system, the Treasury attracted a lasting surge of cash as investors liquidated their holdings in other securities and sought

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63. See id. ("Treasuries . . . are appealing to the individual investor. They can be bought in denominations of $100, making them affordable, and the buying process is quite convenient."). Efforts have also been made to foster Main Street investment in public debt. See, e.g., The Payroll Savings Options in TreasuryDirect, TreasuryDirect, https://www.treasurydirect.gov/indiv/products/prod_tdpayrollinfo.htm [https://perma.cc/JL9X-FRJA] (last visited Jan. 16, 2021) (allowing for direct investments to be made through payroll).

64. See Treasury Bills, TreasuryDirect, https://www.treasurydirect.gov/indiv/products/prod_tbills_glance.htm [https://perma.cc/3NA7-D5WT] (last visited Jan. 16, 2021); Treasury Bonds, TreasuryDirect, https://www.treasurydirect.gov/indiv/products/prod_tbonds_glance.htm [https://perma.cc/AY5G-5UFQ] (last visited Jan. 16, 2021); Treasury Notes, TreasuryDirect, https://www.treasurydirect.gov/indiv/products/prod_tnotes_glance.htm [https://perma.cc/Z4FF-89G3] (last visited Jan. 16, 2021). In addition, investors can also purchase different types of Treasury securities beyond these common varieties, like those linked to inflation (known as TIPS). See Treasury Inflation-Protected Securities (TIPS), TreasuryDirect, https://www.treasurydirect.gov/indiv/products/prod_tips_glance.htm [https://perma.cc/AFL2-MBTN] (last visited Jan. 16, 2021).

65. See FINRA, Treasuries Securities, supra note 61. Standard & Poor's, however, downgraded the U.S. credit rating from AAA to AA+ in 2011 in response to political gridlock in Congress. Zachary A. Goldfarb, S&P Downgrades U.S. Credit Rating for First Time, Wash. Post (Aug. 6, 2011), https://www.washingtonpost.com/business/economy/sandp-considering-first-downgrade-of-us-credit-rating/2011/08/05/gIQAqKeIxI_story.html (on file with the *Columbia Law Review*) ("S&P's downgrade served as an indictment of the gridlock that sent the nation to the edge of defaulting on its debt obligations.").

66. See Why It Makes Sense to Invest in Treasury Bonds, Economist (May 26, 2018), https://www.economist.com/finance-and-economics/2018/05/26/why-it-makes-sense-to-invest-in-treasury-bonds (on file with the *Columbia Law Review*) (describing hedging using Treasuries as an "insurance policy" providing guaranteed returns).

67. See id.; see also Noeth & Sengupta, supra note 1, at 18 (describing Treasuries as a "safe haven" in times of financial uncertainty); Jeff Sommer, This Flight to Safety Wasn't Supposed to Happen, N.Y. Times (June 5, 2010), https://www.nytimes.com/2010/06/06/business/06stra.html (on file with the *Columbia Law Review*) ("When Treasury bonds are hotter than stocks, it's a sign that something is very wrong with the stock market.").

the comfort of Treasury bonds.[68] As the Recession worsened, the U.S. government was able to borrow at rates that edged ever closer toward 0%, highlighting enormous demand for Treasuries in the depths of economic turmoil.[69] Even with COVID-19 cratering the economy in early 2020—and disrupting the Treasury market itself—the U.S. Treasury continued to borrow at record-low rates.[70]

The risk-free status of Treasuries thus greatly advantages the United States by permitting the government to borrow expansively to accommodate its need for capital, a power exemplified by the increase in tradable debt taken on by the Treasury in the decade since the Great Recession. The approximately $5 trillion of marketable U.S. public debt outstanding in 2008 quadrupled to around $21 trillion by December 2020.[71] This reflects, in part, an expansion of the Treasury's balance sheet to contain the COVID-19 crisis and recession—as well as strong appetite by investors to place their capital in a safe haven.[72] Even prior to COVID-19, commentators predicted that the United States would need to rely heavily on the Treasury market to help pay for rising deficits and major public programs.[73] Following the onset of the pandemic, this dependence has

68. See Noeth & Sengupta, supra note 1, at 18 ("[T]he collapse of Lehman Brothers on Sept. 15, 2008, signaled the beginning of a financial panic . . . . [I]nvestors increased their demand for safer assets, namely U.S. Treasuries . . . .").

69. See id. (explaining how increased demand "led to a further decline in the yields on U.S. Treasuries," with "[y]ields on short-term U.S. securities decreas[ing] sharply to near zero in November" of 2008).

70. See Alexandra Scaggs, The Treasury Market Is Telling a Different Story About Growth than the Stock Market Is, Barron's (Aug. 4, 2020), https://www.barrons.com/articles/the-10-year-treasury-yield-just-closed-at-a-new-low-51596578263 [https://perma.cc/JMH4-3HN9] (describing extremely low rates for U.S. Treasury bonds despite the improving performance of the stock market in the wake of COVID-19).

71. Compare U.S. Dep't of the Treasury, Monthly Statement of the Public Debt of the United States (Dec. 31, 2020), https://www.treasurydirect.gov/govt/reports/pd/mspd/2020/opds122020.pdf [https://perma.cc/BE6A-UP29] [hereinafter U.S. Dep't of the Treasury, December 2020 Statement] (showing roughly $21 trillion in marketable public debt in December 2020), with U.S. Dep't of the Treasury, Monthly Statement of the Public Debt of the United States (June 30, 2008), https://www.treasurydirect.gov/govt/reports/pd/mspd/2008/opds062008.pdf [https://perma.cc/JF63-ZGJH] (showing roughly $5 trillion in marketable public debt in June 2008).

72. Noeth & Sengupta, supra note 1, at 18 ("[T]here has been a large expansion in the amount of Treasury security offerings while yields on Treasuries have actually declined . . . . This anomalous behavior can be explained by a significant increase in the demand for Treasuries—'the flight to safety' in the event of a financial crisis.").

73. See, e.g., Thomas Kaplan, Federal Budget Deficit Projected to Soar to over $1 Trillion in 2020, N.Y. Times (Apr. 9, 2018), https://www.nytimes.com/2018/04/09/us/politics/federal-deficit-tax-cuts-spending-trump.html (on file with the *Columbia Law Review*) (discussing the growing budget deficit); Joy Wiltermuth, Treasury Is About to Flood the Market with Debt to Fund U.S.'s $1 Trillion Deficit—And That Is a Concern, MarketWatch (Aug. 17, 2019), https://www.marketwatch.com/story/the-us-treasury-is-about-to-flood-the-market-with-debt-to-fund-a-1-trillion-deficit-heres-why-that-is-a-worry-2019-08-15 [https://perma.cc/7BRS-W6QQ] ("Treasury is expected to ramp up its issuance of bills, notes and bonds to fund a soaring $1 trillion budget deficit.").

become acute, unavoidable, and extraordinary. As the economy shrank by over 30% on an annualized basis by July 2020[74] and various large-scale stimulus measures became necessary to manage the economic fallout, Treasury borrowing soared to record levels: Overall marketable debt of the United States reached $20.96 trillion in December 2020, an increase of over $3 trillion from $17.14 trillion in March 2020.[75]

2. *Financial Stability and the Protective Power of Treasuries.* — Treasuries also play an essential role in protecting financial markets as the preeminent "safe asset," acting as an approximate substitute for liquid cash and an ideal safeguard against financial distress.[76] Regulations and private industry norms have historically ensured that market participants rely upon Treasuries to facilitate an array of financial functions and transactions.[77]

Treasuries are the highest quality form of collateral for firms looking to access credit or enter into securities transactions.[78] Unlike stocks, which heavily fluctuate in value, or corporate bonds, which carry default risks, the returns from Treasuries held to maturity can be clearly, precisely, and reliably calculated.[79] Because they pay out in U.S. dollars—a safe and stable currency—their returns also come without real currency risks.[80] Because

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74. Martin Crutsinger, U.S. Is Expected to Report a Record-Breaking Economic Plunge, AP News (July 29, 2020), https://apnews.com/article/ap-top-news-technology-gross-domestic-product-business-u-s-news-a96cc78b135712828fdd29dc71fa2869 (on file with the *Columbia Law Review*).

75. U.S. Dep't of the Treasury, December 2020 Statement, supra note 71; U.S. Dep't of the Treasury, Monthly Statement of the Public Debt of the United States (Mar. 31, 2020), https://www.treasurydirect.gov/govt/reports/pd/mspd/2020/opds032020.pdf [https://perma.cc/YK4Y-6PBN].

76. See Promontory Fin. Grp., supra note 52, at 10–14 (explaining how "Treasury securities comprise the largest global asset pool that can be considered to carry virtually no credit risk," as "[m]ost market participants consider Treasury securities to be near cash equivalents, with an ability to be converted into cash virtually immediately when needed"). But see Gary Gorton & Ping He, Optimal Monetary Policy in a Collateralized Economy 3–4 (Nat'l Bureau Econ. Rsch., Working Paper No. 22599, 2016), https://ssrn.com/abstract=2835857 (on file with the *Columbia Law Review*) (challenging the conventional wisdom by arguing that Treasuries and cash are not directly substitutable).

77. See generally Anna Gelpern & Erik F. Gerding, Inside Safe Assets, 33 Yale J. on Regul. 363 (2016) (detailing the regime of assets presumed to be risk-free and their importance in the wake of the 2008 Financial Crisis, but also critically analyzing the system of constructing "safe assets").

78. See Marcin Kacperczyk, Christophe Pérignon & Guillaume Vuillemey, The Private Production of Safe Assets 15 (Aug. 10, 2020), https://ssrn.com/abstract=2984146 (on file with the *Columbia Law Review*) (unpublished manuscript) (noting the important role of very short-term claims for the private sector as a source of safe assets).

79. See Gorton & He, supra note 76, at 2 (highlighting the "convenience yield" of Treasuries).

80. See Ben S. Bernanke, The Dollar's International Role: An "Exorbitant Privilege"?, Brookings (Jan. 7, 2016), https://www.brookings.edu/blog/ben-bernanke/2016/01/07/the-dollars-international-role-an-exorbitant-privilege-2 (on file with the *Columbia Law Review*) (noting the dollar's preeminence in global economic governance and arguing it is

of these qualities, Treasuries can also release credit for the holder with little discounting. All things being equal, a borrower should be able to access much more money by securing debt using Treasuries than by using an equivalent dollar value of stocks or corporate bonds.[81] The ability to easily exchange Treasuries for cash has nourished a "repurchase," or "repo," market in which institutions with cash lend them out on a short-term basis in return for collateral over a variety of assets, including Treasuries.[82] Unsurprisingly, Treasuries have proven to be the most popular form of risk-proofing, representing collateral used for almost 68% of transactions in the $2.5 trillion bilateral repo lending market in 2019.[83]

Treasuries are also indispensable to financial dealmaking. Financial contracts often require that counterparties provide collateral to one another in order to lock in the bargain, a practice that supports the operation of critical market infrastructure, like securities exchanges and their risk management systems.[84] Exchanges, which host hundreds of billions of dollars' worth of daily trades, must also ensure that parties who agree to buy and sell securities do not leave exchanges exposed.[85] So, they

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due, in part, to the currency's historical stability and the stability of American institutions more broadly); Katherine Greifeld, Investors Are Dumping Treasuries and Dollar to Take on More Risk, Bloomberg (Sept. 20, 2018), https://www.bloomberg.com/news/articles/2018-09-20/treasury-yields-and-dollar-part-ways-as-risk-appetite-rebounds (on file with the *Columbia Law Review*) (detailing how a "combination of robust U.S. economic growth and haven flows have buoyed the dollar").

81. See, e.g., Acceptable Collateral for Treasuries, TIPS & Strips, CME Grp., https://www.cmegroup.com/clearing/financial-and-collateral-management/acceptable-collateral-for-treasuries-tips-and-strips.html [https://perma.cc/8GJK-8SMQ] [hereinafter CME, TIPS/STRIPS] (last visited Jan. 16, 2021) (showing lenders and counterparties are likely to apply a larger "haircut" or "discount" when receiving collateral in the form of stocks or corporate bonds relative to Treasuries).

82. See Viktoria Balkanova, Adam Copeland & Rebecca McCaughrin, Fed. Rsrv. Bank of N.Y., Reference Guide to U.S. Repo and Securities Lending Markets 2–4 (2015), https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr740.pdf [https://perma.cc/2H88-JWUW]; see also Manmohan Singh, Collateral Flows and Balance Sheet(s) Space, 5 J. Fin. Mkt. Infrastructures 65, 80 (2016) (elaborating on the utility of repo markets for credit expansion and analyzing how collateral is handled by those using it).

83. Sec. Indus. & Fin. Mkts. Ass'n., U.S. Repo Market Fact Sheet 6 (2020), https://www.sifma.org/wp-content/uploads/2020/04/2020-Repo-Factsheet_final2.pdf [https://perma.cc/G6YA-NPZ3]. These figures refer to bilateral repo market lending, not including reverse repo. Id.

84. See, e.g., Edmund Parker, ISDA Variation Margin Protocol—What Is It About? 1 (2016), https://www.mayerbrown.com/-/media/files/news/2016/08/isda-variation-margin-protocolwhat-is-it-about/files/art_parker_aug2516_isda-variation-margin-protocol/fileattachment/art_parker_aug2516_isda-variation-margin-protocol.pdf [https://perma.cc/BZ5F-S2CH] (illustrating the pervasiveness of collateral agreements).

85. See Daily Market Summary, Nasdaq, http://www.nasdaqtrader.com/Trader.aspx?id=DailyMarketSummary [https://perma.cc/657M-S8NF] (last visited Jan. 16, 2021) (showing that the Nasdaq stock exchange hosts billions of dollars in transactions a day); see also Yadav, Problematic Clearinghouses, supra note 48, at 391 (explaining how clearinghouses in equities markets require members to maintain reserves of collateral to reduce the risk of a member failing without sufficient funds to make good on its exposures).

require that traders post collateral to reflect the risks they create.[86] Treasuries are the preferred type of collateral in these transactions, and exchanges generally apply the lowest discount to collateral offered in the form of Treasuries and tend not to limit how much of it traders are allowed to provide.[87]

The protective power of Treasuries also makes them well-suited regulatory levers to constrain systemic risk. When firms do not have access to liquid assets, troubles from one institution can pass quickly to another as short-term debts go unpaid and distressed firms try to sell whatever they can to generate cash.[88] To mitigate this domino effect, a slew of post–2008 Financial Crisis rulemaking requires firms to maintain a prescribed amount of high-quality, dependably liquid assets—such as Treasuries—for rainy day protection.[89] Treasuries have therefore assumed an even more unique significance since 2008 as bulwarks against financial crises.[90] Firms maintaining protective holdings of Treasuries also extend beyond banks to other kinds of institutions.[91]

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86. See, e.g., Financial and Collateral Management: Standard Acceptable Collateral and Resources, CME Grp., https://www.cmegroup.com/clearing/financial-and-collateral-management.html [https://perma.cc/8X3F-L6E5] (last visited Jan. 16, 2021).

87. See CME, TIPS/STRIPS, supra note 81.

88. See Morgan Ricks, The Money Problem: Rethinking Financial Regulation 110–11 (2016) (arguing that financial panics—"widespread redemption of short-term debt"—are a key catalyst for macroeconomic disasters and that a "shadow banking" panic in 2007 and 2008 was a probable cause of the 2008 Great Recession); see also Morgan Ricks, A Regulatory Design for Monetary Instability, 65 Vand. L. Rev. 1289, 1290–92 (2012) (arguing that current regulatory design fails to contain the potential for runs on short-term money markets and offering an alternative regulatory framework).

89. See, e.g., Fed. Deposit Ins. Corp. Liquidity Risk Management Standards, 12 C.F.R. §§ 329.1–.10, 329.20(a)(3) (2020) (establishing minimum liquidity standards and the required daily liquidity coverage ratio for certain institutions, and identifying Treasuries as a Level 1 liquid asset); see also Hal S. Scott, Connectedness and Contagion: Protecting the Financial System from Panics 183–89 (2016) (detailing the enhanced liquidity requirements applicable to financial institutions following the 2008 Financial Crisis and the emphasis on holding cash and cash-like assets within this framework).

90. See Jane Ihrig, Edward Kim, Cindy Vojtech & Gretchen C. Weinbach, How Have Banks Been Managing the Composition of High-Quality Liquid Assets?, 101 Fed. Rsrv. Bank St. Louis Rev. 177, 181 (2019) (detailing the impact of regulations requiring banks to maintain highly liquid asset reserves on monetary policy and macroeconomic outcomes).

91. See, e.g., Commodity Futures Trading Comm'n Derivatives Clearing Organizations, 17 C.F.R. § 39.11(e)(1)(ii) (requiring derivatives clearinghouses to maintain "cash, U.S. Treasury obligations, or high quality, liquid, general obligations of a sovereign nation" as part of the financial resources necessary to discharge its responsibilities); Nellie Liang & Pat Parkinson, Enhancing Liquidity of the U.S. Treasury Market Under Stress 6 (Brookings Inst., Hutchins Ctr. Working Paper No. 72, 2020) ("In 2019, open-end mutual funds held 12 percent of Treasury securities outstanding, and hedge funds held 9 percent . . . ."); see also Jochen R. Andritzky, Government Bonds and Their Investors: What Are the Facts and Do They Matter? 8–10 (IMF, Working Paper No. WP/12/158, 2012) (detailing the diverse ownership base for Treasuries and guiding rationales for investing in them).

B. *The Fragmented Framework for Public Oversight of Treasuries*

The distinctive importance of Treasuries gives several regulators a stake in these markets, a shared interest that is reflected in a division of oversight where—surprisingly—no single agency takes the lead.[92] The Government Securities Act of 1986 (GSA) taps several existing agencies to work together to regulate and oversee the Treasury market.[93] The regulatory bodies vary in their spheres of authority and expertise, with some traditionally responsible for banking regulation and others for capital markets supervision: The GSA assigns Treasuries-related oversight responsibilities to the Fed, N.Y. Fed, Office of the Comptroller of the Currency (OCC), and Federal Deposit Insurance Corporation (FDIC), which are all traditionally responsible for banking regulation.[94] The Fed is responsible for oversight of qualifying depository institutions, and the Fed's Board of Governors sets guidelines for participating institutions through regulations and other avenues.[95] The OCC, an independent bureau of the U.S. Treasury, also bears responsibility for bank regulation, overseeing national banks chartered under the National Bank Act.[96] Finally, the FDIC serves as the primary regulator over state-insured banks that are not part of the Federal Reserve System and provides secondary supervision over other insured banks and savings associations that are otherwise primarily regulated by the OCC, the Fed, or state banking

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92. See Markham, supra note 8, at 199–204 ("Regulatory jurisdiction over the Treasury market has been allocated among several regulators, including the Treasury, the Fed, the New York Fed, and other 'appropriate' banking regulators, and the SEC.").

93. 15 U.S.C. § 78o-5 (2018). The major public regulators over Treasuries include: (1) independent agencies (the SEC, CFTC, and Federal Deposit Insurance Corporation (FDIC)); (2) executive agencies (the Treasury Department and Office of the Comptroller of the Currency (OCC)); (3) the independent central bank system (the Fed and N.Y. Fed); and (4) a government-authorized, private self-regulatory organization (FINRA). See 15 U.S.C. §§ 78c(a)(34)(G)–(H), 78o-5(d)(3)(A) (defining the term "appropriate regulatory agency" when used in relation to broker-dealers of government securities).

94. See 15 U.S.C. §§ 78c(a)(34)(G)–(H), 78o-5(d)(3)(A).

95. See Supervision & Regulation, Bd. of Governors of the Fed. Rsrv. Sys., https://www.federalreserve.gov/supervisionreg.htm [https://perma.cc/WJ7F-JEKW] (last visited Jan. 28, 2021). Each of the Fed's twelve district banks oversee depository institutions within their geographic footprint, sharpening the Fed's control over its member institutions. See Structure of the Federal Reserve System, Bd. of Governors of the Fed. Rsrv. Sys., https://www.federalreserve.gov/aboutthefed/structure-federal-reserve-system.htm [https://perma.cc/2PEQ-3BMK] (last visited Jan. 28, 2021). Importantly, the N.Y. Fed has several special responsibilities distinguishing it from other regional banks: It bears sole responsibility for conducting open market operations, under which primary dealers purchase (or sell) Treasury securities in exchange for reserves held on account at the Fed. See What We Do, Fed. Rsrv. Bank of N.Y., https://www.newyorkfed.org/aboutthefed/whatwedo [https://perma.cc/2PEQ-3BMK] (last visited Jan. 28, 2021).

96. What We Do, Off. of the Comptroller of the Currency, https://www.occ.treas.gov/about/what-we-do/index-what-we-do.html [https://perma.cc/7JRZ-WB3M] (last visited Jan. 28, 2021).

regulators.[97] Perhaps most famously, the FDIC provides deposit insurance for nearly all U.S. banks and aids their wind-down and resolution if they fail.[98]

The 1986 GSA expanded the role of these banking regulators, making each of them responsible for Treasuries trading conducted by the institutions they traditionally oversee.[99] Specifically, the GSA requires financial institutions dealing in Treasuries to register with or notify their associated regulatory body of such dealings.[100] Thus, state-chartered Federal Reserve member banks must notify the Fed of Treasuries dealings, national banks dealing in Treasuries must notify the OCC, and any institution insured by the FDIC and dealing in Treasuries must notify the FDIC.

In addition to banking regulators, the GSA places oversight of nonbank broker-dealers transacting in Treasuries under the authority of the SEC.[101] FINRA, a self-regulated private authority, assists the SEC in supervising these registered broker-dealers.[102] The CFTC, the primary regulator of derivatives securities in U.S. markets, is charged with protecting derivatives connected to Treasuries (notably, Treasury futures).[103]

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97. What We Do, Fed. Deposit Ins. Corp., https://www.fdic.gov/about/what-we-do/index.html [https://perma.cc/LZ5B-EP3K] (last visited Jan. 28, 2021).

98. Id.

99. 15 U.S.C. § 78c(a)(34)(G); see also Joseph G. Fallon, The Government Securities Act of 1986: Balancing Investor Protection with Market Liquidity, 36 Catholic U.L. Rev. 999, 1011 n.115 (1987) (explaining how the GSA delineated regulatory authority among several preexisting bodies traditionally responsible for banking and capital markets regulation).

100. 15 U.S.C. § 78o(a).

101. Id. § 78c(a)(34)(G)(v); Markham, supra note 8, at 217 ("[The GSA] required nonbanks acting as broker-dealers in government securities to register with the SEC, while banks were subjected to regulation by the 'appropriate regulatory agency.'").

102. See, e.g., Federal Regulation of Government Securities Brokers and Dealers Under the Government Securities Act of 1986, Notice to Members 87-19, Fin. Indus. Regul. Auth., https://www.finra.org/rules-guidance/notices/87-19 [https://perma.cc/7KR8-S5N3] (last visited Jan. 16, 2021) (providing regulatory guidance on certain registration and compliance requirements for Treasuries brokers and dealers relating to the GSA).

103. See Markham, supra note 8, at 201–02 ("The Commodity Exchange Act of 1936 . . . granted the CFTC exclusive jurisdiction over futures contracts on U.S. government securities . . . ."); Mission Statement, Commodity Futures Trading Comm'n, https://www.cftc.gov/About/AboutTheCommission [https://perma.cc/B2FF-5FUA] (last visited Jan. 16, 2021); see also U.S. Dep't of the Treasury, SEC & Bd. of Governors of the Fed. Rsrv. Sys., Joint Report on the Government Securities Market, app. at A-9 (1992), https://www.treasury.gov/resource-center/fin-mkts/Documents/gsr92rpt.pdf [https://perma.cc/7Q57-GPCS] [hereinafter U.S. Dep't of the Treasury et al., 1992 Securities Market Joint Report] ("Futures contracts are available for Treasury bills, notes, and bonds and are authorized by, and traded on, exchanges that are regulated by the [CFTC]."); Jay Clayton, Chair, SEC, Remarks at the Third Annual Conference on the Evolving Structure of the U.S. Treasury Market (Nov. 28, 2017), https://www.sec.gov/news/speech/clayton-2017-11-28 [https://perma.cc/JQU7-AMY9] (describing how the CFTC regulates many of the individuals and firms that participate in the Treasuries futures market).

These shared spheres of authority also divide up enforcement responsibilities. The U.S. Treasury safeguards debt auctions.[104] The SEC, the Fed, CFTC, or FINRA can oversee and take action against the firms they specifically supervise.[105] The N.Y. Fed, working with the Fed, OCC, FDIC, and SEC, sets out the key responsibilities of primary dealer firms, including minimum requirements for capital reserves, internal compliance and risk management controls, reporting standards, and governance.[106] When a firm falls short of compliance, the N.Y. Fed can work with a firm's main regulator to suspend or terminate its primary dealer status.[107]

Treasuries generally enjoy "exempt" status in securities regulation, meaning that issues of government debt do not need to be registered and are not subject to the SEC's mandatory disclosure reporting regime.[108] They do, however, come within the purview of general antifraud and antimanipulation provisions, ensuring that regulators can punish creative schemes to rig Treasury auctions, bid up prices, or trade on insider information.[109] Other kinds of regulation common to trading in equities or bonds apply with caveats or do not apply at all to Treasuries trading.[110]

The overall framework is therefore structured as follows. The U.S. Treasury writes the rules for the market and sets the conditions under which auctions are conducted.[111] It also establishes the key terms by which

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104. See U.S. Dep't of the Treasury et al., 1992 Securities Market Joint Report, supra note 103, at xi–xv, 3 ("The Treasury rules are enforced by the appropriate regulatory agency. The federal banking regulators fill that role for financial institutions that are government securities brokers or dealers, and the SEC does so for all other government securities firms.").

105. For example, although Treasuries are "exempt" securities under the Securities Act of 1933, they are still subject to antifraud and antimanipulation protections enforced by the SEC under Rule 10b-5. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 9; Markham, supra note 8, at 200.

106. Civil regulators like FINRA and the SEC can impose fines, suspensions, and may even ban broker-dealers for rules violations, and DOJ can pursue criminal enforcement for breach of Treasury rules, most notably for bid-rigging at auctions. See, e.g., Kevin Dugan, Goldman Sachs Probed in Alleged Rigging of Treasury Market, MarketWatch (Mar. 21, 2016), https://www.marketwatch.com/story/goldman-sachs-probed-in-alleged-rigging-of-treasury-market-2016-03-21 [https://perma.cc/3AH5-CRRQ] (outlining DOJ's probe into the possible criminality of bid-rigging by financial firms).

107. See Federal Reserve Bank of New York Policy on Counterparties for Market Operations, Fed. Rsrv. Bank of N.Y. (Nov. 9, 2016) [hereinafter N.Y. Fed, Counterparty Policy], https://www.newyorkfed.org/markets/counterparties/policy-on-counterparties-for-market-operations [https://perma.cc/5B9T-72PP] (last visited Jan. 16, 2021).

108. 15 U.S.C. § 77c(a)(2) (2018); see also Markham, supra note 8, at 200.

109. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 9.

110. See, e.g., SEC Requirements for Alternative Trading Systems, 17 C.F.R. § 242.301(a)(4)(ii) (2020) (exempting ATS from SEC reporting requirements if firms only trade government securities); Luparello, FINRA Request Letter, supra note 17, at 2 (listing multiple FINRA rules that are not applicable to government securities).

111. See 31 U.S.C. § 3121 (2018) (granting the Secretary of the Treasury the authority to prescribe rules relating to the issuance and regulation of Treasuries); see also U.S. Dep't

the secondary market operates.[112] The N.Y. Fed acts as an agent for the U.S. Treasury to ensure the smooth operation of its auctions.[113] Meanwhile, a network of specialist regulators separately monitors Treasuries trading firms. The Fed and N.Y. Fed, as well as the OCC and FDIC, supervise the banks that act as dealers; the SEC and FINRA regulate and monitor nonbank securities firms; and the CFTC oversees derivatives that are linked to Treasuries (such as Treasury futures). These complex, shared jurisdictional boundaries reflect a simple design philosophy to harness the existing network of agencies to oversee the Treasury market rather than creating a specific, new regime for this purpose.[114]

Importantly, Treasuries trading has long lacked a systematic reporting regime under any of these regulators for secondary market trades.[115] Rather than requiring firms to submit standardized reports—as is commonplace in equities and corporate bonds—the modern-day web of hands-off Treasuries regulations largely left the matter for market participants to organize among themselves.[116] While firms and trading platforms have long kept private records or provided private feeds of information, government regulators have avoided imposing systematic affirmative reporting requirements.[117] The consequences of this permissive

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of the Treasury et al., 1992 Securities Market Joint Report, supra note 103, app. at A-12 to A-14 (outlining protocols for issuing Treasuries and enforcing auction rules).

112. See, e.g., U.S. Dep't of the Treasury et al., 1992 Securities Market Joint Report, supra note 103, app. at A-14–A-15 nn.19–21.

113. See Treasury Debt Auctions and Buybacks as Fiscal Agent, Fed. Rsrv. Bank of N.Y., https://www.newyorkfed.org/markets/treasury-debt-auctions-and-buybacks-as-fiscal-agent [https://perma.cc/4LPK-QLB9] (last visited Jan. 16, 2021) ("In its capacity as fiscal agent of the United States, the [N.Y. Fed] supports [the] Treasury's marketable securities auctions . . . [and] also executes buybacks of Treasury debt as directed by [the] Treasury.").

114. See U.S. Dep't of the Treasury et al., 1992 Securities Market Joint Report, supra note 103, app. at A-15 ("The GSA, rather than creating a separate agency to enforce the new regulations, relied, for the most part, on the existing regulatory structure when assigning oversight responsibility."). The agencies collaborate through the Inter-Agency Working Group for Treasury Market Surveillance (IAWG), formed in 1992 in response to bid-rigging scandals. U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 48–49.

115. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 9 (explaining fragmented secondary market regulation); Aguilar, supra note 10 (outlining the secondary market's regulatory framework and noting the absence of a workable regime for monitoring and data collection); see also infra note 253 and accompanying text (stating that primary dealers must submit weekly reports to the N.Y. Fed about their positions).

116. See Aguilar, supra note 10 (recommending a number of areas for reform, including enhancements to the ability of regulatory bodies to monitor and gather data); see also SEC Large Trader Reporting, 17 C.F.R. § 240.13h-1 (2020) (requiring mandatory reporting of equities trades by large traders).

117. See, e.g., BrokerTec Market Data and Analytics, CME Grp., https://www.cmegroup.com/trading/market-tech-and-data-services/brokertec/data-analytics.html [https://perma.cc/5TQ4-V7XC] (last visited Jan. 16, 2021) (providing an example of private recordkeeping by firms); see also U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 47–48 (describing the absence of reporting mechanisms and the unavailability of systematic transaction and participant data).

approach came into focus during the 2014 Flash Rally, when authorities struggled to retrieve the data needed to piece together an account of what happened when Treasury prices suddenly went haywire.[118] In 2017 (later supplemented in 2019), regulators finally responded with the expansion of the Trade Reporting and Compliance Engine (TRACE)—a reporting framework for secondary market trades in bonds—by requiring FINRA members to provide data to the agency and for the Fed to receive reporting on behalf of the banks.[119]

Beyond historically spotty reporting requirements, a host of other securities rules applies to Treasuries only with qualifications or exemptions; out of the thousands of FINRA rules applicable to equity broker-dealers, just forty-six apply to those active in Treasury markets.[120] Indeed, regulators themselves are uncertain about which rules do in fact apply, as evidenced by the SEC tasking FINRA to conduct a review on which FINRA rules apply or should apply to securities firms trading Treasuries.[121] Given the absence of common understanding even among regulators, it follows that rules that might be applicable to Treasury market actors lack an effective enforcement backstop. Moreover, with fragmented regulatory supervision and the historical dearth of mandatory trade

118. See U.S. Dep't of the Treasury, et al., Joint Staff Report, supra note 13, at 47–48 (assessing the landscape of available data after the Flash Rally and finding that "transaction data is available only for a subset of trades and only to those trading on a specific platform or venue"); Aguilar, supra note 10 (describing how, after the Flash Rally, regulators had to "harvest [needed trade data] from individual market participants").

119. See The Fed, FINRA Negotiation Press Release, supra note 15 (detailing the then-proposed agreement under which the Fed would collect secondary market data on Treasuries in partnership with FINRA); Harkrader & Puglia, supra note 15 (detailing the new FINRA rule increasing data transparency in secondary Treasury markets); Trade Reporting and Compliance Engine (TRACE), Fin. Indus. Regul. Auth., https://www.finra.org/filing-reporting/trace [https://perma.cc/EYU4-W3HN] (last visited Jan. 16, 2021) (summarizing certain mandatory reporting requirements for fixed income securities); see also Doug Brain, Michiel De Pooter, Dobrislav Dobrev, Michael J. Fleming, Peter Johansson, Collin Jones, Frank M. Keane, Michael Puglia, Liza Reiderman, Anthony P. Rodrigues & Or Shachar, Unlocking the Treasury Market Through TRACE, Liberty St. Econ. (Sept. 28, 2018), https://libertystreeteconomics.newyorkfed.org/2018/09/unlocking-the-treasury-market-through-trace.html [https://perma.cc/L7C7-8CLS] (noting the impact of data reporting on more fully calibrating the composition of the Treasury market and trading volumes).

120. Monahan, supra note 16.

121. See Luparello, FINRA Request Letter, supra note 17, at 2. For example, it is not clear whether FINRA regulations like those prohibiting dealers from using client information to trade ahead of them ("front running") have any bite in Treasury markets. See McPartland, Intersection, supra note 27, at 9 ("There is no required trade reporting, no required participant registrations, an exemption from the Volcker Rule, and no single body that is responsible for ensuring the [Treasury] market remains controlled and orderly."); FINRA, Rule 5320, supra note 17 (applying to equity securities).

reporting, reliably detecting and punishing misbehavior has been costly at best and practically unworkable at worst.[122]

Finally, private Treasuries trading platforms face few legal fetters and, unlike national exchanges, are not subject to a mandate to oversee and regulate their respective markets.[123] Treasuries do not trade on national stock exchanges like the NYSE; they trade on less formal platforms generally categorized as alternative trading systems (ATS).[124] ATS are largely subject to a fairly light-touch regulatory regime under the SEC, which only requires them to provide disclosures about their governance and to comply with standards attesting to operational resilience in their trading infrastructure.[125] Crucially, however, ATS that deal only in Treasuries are exempt from even these rules.[126] This absence of meaningful regulation for Treasuries trading platforms is striking given that trading activity is mostly concentrated on just two dominant platforms. Equity ATS—which are subject to reporting rules—intermediate only a fraction of overall equity trading volume in publicly listed stocks.[127] By contrast, the Treasuries

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122. See Monahan, supra note 16 (noting that certain kinds of offenses require regulators to obtain trading data in order for their misconduct to be noticed and punished). Modern-day bid-rigging in Treasury auctions continues to be a problem, for example. See Keri Geiger & Alexandra Scaggs, U.S. Probes Treasuries Niche that Investors Claim Is Rigged by Big Banks, Bloomberg (Nov. 9, 2015), https://www.bloomberg.com/news/articles/2015-11-09/u-s-probes-treasuries-niche-that-some-investors-claim-is-rigged (on file with the *Columbia Law Review*) (reporting on a DOJ suit against primary dealers alleging a "two-pronged scheme" to maximize the spread between their cost of selling and buying Treasury securities at auction).

123. See SEC, ATS/SCI Release, supra note 18 (proposing to amend various sections of the SEC's Regulation ATS to remove the exemption for platforms that trade government securities); see also Securities Exchange Act of 1934, 15 U.S.C. § 78f(b)(1) (2018) (stipulating the responsibility of national securities exchanges to enforce all applicable rules and standards against exchange users); Yesha Yadav, Oversight Failure in Securities Markets, 104 Cornell L. Rev. 1799, 1831–36 (2019) [hereinafter Yadav, Oversight Failure] (reviewing Regulation ATS and its characteristics to highlight the regulatory responsibilities of national equity exchanges relative to the less formal ATS and stressing the importance of private oversight by exchanges).

124. See SEC, ATS/SCI Release, supra note 18.

125. Regulation of Exchanges and Alternative Trading Systems, 63 Fed. Reg. 70,844, 70,847 (Dec. 22, 1998) (codified at 17 C.F.R. pts. 202, 240, 242 & 249) ("This regulatory framework should encourage market innovation while ensuring basic investor protections . . . . In general, this approach gives securities markets a choice to register as exchanges, or to register as broker-dealers and comply with Regulation ATS.").

126. SEC Requirements for Alternative Trading Systems, 17 C.F.R. § 242.301(a) (2020).

127. Equity trading volume in public stocks is fragmented across fourteen national exchanges and around thirty to forty ATS. See, e.g., Alternative Trading System ("ATS") List, SEC, https://www.sec.gov/foia/docs/atslist.htm [https://perma.cc/G8CE-34W3] (last modified Jan. 29, 2021); National Securities Exchanges, SEC, https://www.sec.gov/fast-answers/divisionsmarketregmrexchangesshtml.html [https://perma.cc/TKS3-KHQ9] (last modified Feb. 26, 2021); see also ATS Transparency Data Quarterly Statistics: 2020 3nd Quarter Tier 1 NMS Stocks, Fin. Indus. Regul. Auth., https://www.finra.org/filing-reporting/otc-transparency/ats-quarterly-statistics (on file with the *Columbia Law Review*) (last

trading platform BrokerTec intermediates between 60% to 80% of all interdealer Treasuries trading volume, with around 10% to 20% hosted by the other venue, eSpeed.[128] This leaves the Treasury market heavily dependent on BrokerTec's functions in particular. In September 2020, the SEC proposed bringing Treasury ATS into the formal regulatory regime for ATS.[129] While representing a step toward greater oversight, this move would only ensure that Treasury platforms are required to comply with the relatively light regulatory regime for ATS rather than the full rulebook applicable to national exchanges, which mandates robust internal monitoring.[130]

II. STRUCTURAL SHIFTS IN TREASURY MARKET DESIGN

Part I emphasizes the significance of Treasuries as a protective safe asset for investors and institutions around the world and the fragmented regulatory structure tasked with overseeing Treasury markets. This Part elaborates on emerging risks in the Treasuries secondary markets following dramatic technological transformations over the last decade. Traditionally, Treasuries relied on primary dealers to maintain the functioning of both the primary and secondary markets.[131] These firms used telephones, faxes, and computer displays to intermediate trades.[132] Since 2008, however, there has been a profound structural shift in how Treasuries are bought and sold. Treasuries now trade using high-speed algorithms deployed by expert securities firms that are smaller and much less regulated than primary dealers.[133] These new dynamics have introduced important gains in market quality, but primary dealers now find themselves competing with asymmetrically advantaged high-speed

visited Jan. 16, 2021) (compiling figures on the secondary trading volume on individual equity ATS).

128. See Katie Kolchin, Sec. Indus. & Fin. Mkts. Ass'n, Electronic Trading Market Structure Primer 36–39 (2019), https://www.sifma.org/wp-content/uploads/2019/10/SIFMA-Insights-Electronic-Trading-Market-Structure-Primer.pdf [https://perma.cc/B2CT-ULE6].

129. SEC, ATS/SCI Release, supra note 18.

130. See Securities Exchange Act of 1934, 15 U.S.C. § 78f (2018) (setting out the requirements for firms that become an exchange). Equities exchanges are governed by a thick rulebook to ensure they maintain operational standards, impose entry restrictions for traders, and allocate monitoring responsibilities over those that use the platform. See Yadav, Oversight Failure, supra note 123, at 1818–27 (highlighting the importance of exchanges as providers of private oversight and enforcers of securities regulation over traders and issuer firms).

131. See Dupont & Sack, supra note 21, at 787.

132. See Michael J. Fleming, Bruce Mizrach & Giang Nguyen, Fed. Rsrv. Bank of N.Y., The Microstructure of a U.S. Treasury ECN: The BrokerTec Platform 5 (2017), https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr381.pdf [https://perma.cc/XAE8-6JRV] [hereinafter Fleming et al., BrokerTec Report] ("Until 1999, nearly all trading in the [interdealer broker] market occurred over the phone via voice-assisted brokers.").

133. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 35–44 (reviewing high-speed electronic trading and the changes associated with its rise).

traders.[134] As the balance of market power shifts from primary dealers to specialized securities firms in the interdealer secondary market, these changes call into question deeply embedded assumptions about the incentives that historically encouraged traders to privately safeguard the integrity of the Treasury market.

A. *Primary Dealers and Public–Private Cooperation*

Primary dealers have long played a critical role in maintaining the operations of the Treasury market, as the Treasury relies on them to facilitate successful offerings and keep the market working fluidly.[135] As a select group of banks and investment firms, primary dealers are in an elevated position to surveil and safeguard Treasury market operations that stand apart from other securities markets in its unusual structural design.

1. *Issuing Treasuries.* — Even though Treasury issues are open to a broad swath of securities dealers, the twenty-four preselected primary dealers are the main purchasers of Treasury debt.[136] According to one 2007 study, primary dealers funded around 71% of all new issues using their own money and for their own accounts.[137] Primary dealers are made up of major international banks and investment firms that possess large balance sheets and act as safe and reliable counterparties to the United States.[138] In exchange for designation, they agree to "participate consistently" in Treasury auctions by bidding for a pro rata share of new issues at "reasonably competitive" prices.[139] Importantly, they must purchase Treasuries even if market environments appear unfavorable.[140] Because of these demands, only large and well-capitalized firms have historically possessed the resources and experience to take on the commitment.[141]

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134. See id. at 38–39 (describing this competition and noting that higher-speed traders can "manage their price risk more dynamically").

135. See Dupont & Sack, supra note 21, at 787. See generally Kenneth D. Garbade, Fed. Rsrv. Bank of N.Y., The Early Years of the Primary Dealer System (2016), https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr777.pdf [https://perma.cc/F2LM-3JYH] (providing an exhaustive history of the primary dealer system from the Great Depression to the modern-day free market system of Treasuries trading).

136. N.Y. Fed, Primary Dealer List, supra note 22.

137. See Michael J. Fleming, Who Buys Treasury Securities at Auction?, 13 Current Issues Econ. & Fin. 1, 3 (2007) (finding that primary dealers make up 70.9% of the bidder category for Treasury securities sold to the public).

138. See N.Y. Fed, Counterparty Policy, supra note 107 (providing an overview of N.Y. Fed requirements for counterparties); N.Y. Fed, Primary Dealer List, supra note 22.

139. N.Y. Fed, Primary Dealer List, supra note 22.

140. See id. ("Primary dealers are expected to participate in open market operations consistently and competitively, in a variety of market environments, to support the implementation of monetary policy.").

141. See id. (requiring non-state-chartered primary dealers to have "net regulatory capital of at least $50 million"). In 2016, the N.Y. Fed made changes to the eligibility criteria for primary dealers, cutting capital requirements for nonbank broker-dealers but raising qualifying capital requirements for bank dealers in order to diversify the kinds of firms that

Becoming a primary dealer has multiple advantages. Commentators have stressed the positive impact of primary dealer designation on a firm's reputation: As an institution chosen by the government owing to its reliability and financial strength, firms that join the club can expect improvements to their public perception.[142] One study observed that new primary dealers enjoyed a noticeable boost to their stock price in the weeks following designation.[143]

2. *Secondary Trading*. — Primary dealers are also key participants in the secondary market for Treasuries, which is divided into two main parts: A market for customers buying or selling Treasuries (like a mutual fund) from dealers, and an interdealer market where dealers transact with one another to modulate their supplies of securities.[144] Both markets operate outside of traditional exchanges like the NYSE or Nasdaq.[145] Instead, interactions between a dealer and a customer, or between dealers, have historically been "over-the-counter" (OTC) trades utilizing telephones or electronic screens where dealers quoted prices to interested counterparties.[146] While the customer–dealer market continues to be OTC, automation in the interdealer market has more recently shifted most OTC trading activity to largely unregulated electronic platforms.[147]

The dominance of primary dealers in the auction process has traditionally given them a prime position within the secondary market as transmission channels for securities between the U.S. government and investors.[148] As counterparties to the Treasury obligated to regularly

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can become dealers. FAQs About the New York Fed's Counterparty Framework for Market Operations, Fed. Rsrv. Bank of N.Y. (Nov. 9, 2016), https://www.newyorkfed.org/markets/counterparties/faq-counterparty-framework-for-market-operations [https://perma.cc/85K3-V5S2]. Primary dealer applicants must now show that they actively participated in Treasury trading for at least a year before applying. See Alexandra Scaggs, What is a Primary Dealer? Updated, Fin. Times (Nov. 22, 2016), https://www.ft.com/content/6b464965-ed75-3850-b68b-1601f13f6a79 (on file with the *Columbia Law Review*).

142. See, e.g., Min Zeng, Three Foreign Banks Interested in Becoming Primary Dealers, Wall St. J. (Jan. 12, 2010), https://www.wsj.com/articles/SB10001424052748704586504574654443053128538 (on file with the *Columbia Law Review*) (describing reputational rewards and other intangible benefits enjoyed by primary dealers).

143. See M. Carpinetti, The Impact of Becoming a Primary Dealer: A Cross-Country Analysis 17 (Aug. 24, 2017), https://thesis.eur.nl/pub/38981 (M.Sc. thesis, Erasmus University Rotterdam) (on file with the *Columbia Law Review*).

144. Dupont & Sack, supra note 21, at 789–90.

145. Id. As a technical matter, Treasuries can be registered with the NYSE, although secondary trading on the NYSE is limited. Id. at 789.

146. Fleming et al., BrokerTec Report, supra note 132, at 4.

147. See id. at 5–7 (describing the high-speed, electronic nature of the interdealer market); McPartland, Intersection, supra note 27, at 3 (describing the RFQ system as dominant in intermediating dealer–client Treasuries trades).

148. See McPartland, Intersection, supra note 27, at 6 (describing how primary dealers represent a large part of the secondary market); Bruce Mizrach & Christopher J. Neely, The Microstructure of the U.S. Treasury Market 6 (Fed. Rsrv. Bank of St. Louis, Working Paper No. 2007-052B, 2007), https://ssrn.com/abstract=1070226 (on file with the *Columbia Law*

acquire ample reserves of securities, they are best placed to serve networks of repeat customers around the world. Moreover, primary dealers must actively participate in the interdealer space, mediating ebbs and flows of inventory to meet investors' changing needs.[149] This centrality has also made primary dealers well placed—and motivated—to exercise private oversight, monitoring the market in order to surveil and discipline themselves and others.[150] Although the U.S. Treasury has expressly disavowed any mandate on primary dealers to function as overseers,[151] it does rely on primary dealers to assist in basic market surveillance. For example, the N.Y. Fed tasks primary dealers with providing regular reports on trading activity and trends, gaining industry-sourced intelligence from those ideally situated to provide it.[152] Because primary dealers are dominant players in both the primary and secondary markets, they have access to a global base of clients as well as important information on government auctions and debt management plans.[153] Thus, as a small group of repeat players incentivized to preserve the value of their privileged franchise, primary dealers should be in a prime position to exercise informal peer discipline on market participants, thus reducing the costs of self-regulation. Advantaged by experience and expertise, primary dealers are also optimally positioned to recognize unusual or troubling behaviors like predatory sales practices, the dumping of batches of Treasuries (which could potentially presage a crisis), and manipulation.

In theory, then, as a small group of firms with economic and reputational skin in the game, primary dealers also have much to lose if the Treasury market functions unreliably and should therefore be monitoring

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Review) (showing, at least in 2005, an average daily trading volume for primary dealers of $550 billion).

149. See Fleming et al., BrokerTec Report, supra note 132, at 5 ("The core of the [primary dealer] market is the interdealer broker (IDB) market, which accounts for nearly all interdealer trading."); Mizrach & Neely, supra note 148, at 6 (explaining that the N.Y. Fed requires primary dealers to "participate meaningfully in both the Fed's open market operations and Treasury auctions").

150. Cf. Yadav, Oversight Failure, supra note 123, at 1818 ("Given their role in bringing traders together and with proximity to the information they generate, exchanges are ideally placed to regulate, monitor, and discipline markets.").

151. U.S. Dep't of the Treasury et al., 1992 Securities Market Joint Report, supra note 103, at 17–19 (describing the various ways in which primary dealers support the functioning and monitoring of the Treasury market, but noting that the relationship between "the Federal Reserve and the primary dealers is purely a business relationship and not a regulatory one").

152. Id.

153. See Administration of Relationships with Primary Dealers, Fed. Rsrv. Bank of N.Y. (Jan. 22, 1992), https://www.newyorkfed.org/markets/pridealers_policies_920122.html [https://perma.cc/9NXU-2A9K] (noting the franchise value and prestige carried by the primary dealer designation); Zeng, supra note 142 (outlining benefits conferred to firms with primary dealer status).

the market out of rational self-interest.[154] To be sure, tight-knit, cohesive, and similarly situated control by privileged dealers invites the risk of collusion, price-rigging, or a tolerance for risk-taking within the "in-group."[155] And primary dealers have, on a number of occasions, incurred sanctions for attempting to manipulate the market in their favor.[156] The downside risk of suboptimal behavior notwithstanding, primary dealers have a lot to lose if Treasury operations go awry—which ought to compel them to practice self-discipline and voluntarily keep an eye on the market for disruptive behaviors that raise the cost of doing business.

B. *The Special Role of the Secondary Market*

Despite the unique position of primary dealers, Treasuries are no different from any other kind of security in terms of market participants' need for liquidity.[157] It is almost a mantra in finance theory that liquid securities markets generate economic gains.[158] If investors can transact

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154. See Fleming et al., BrokerTec Report, supra note 132, at 4–7 (detailing the market-making system for Treasuries); Yakov Amihud & Haim Mendelson, Dealership Market: Market-Making with Inventory, 8 J. Fin. Econ. 31, 50–51 (1980) [hereinafter Amihud & Mendelson, Inventory Market-Making] (describing, in a seminal article, the key mechanisms of market-making and the tools used by dealers to manage inventory risk); Lawrence R. Glosten & Paul R. Milgrom, Bid, Ask and Transaction Prices in a Specialist Market with Heterogeneously Informed Traders, 14 J. Fin. Econ. 71, 72 (1985) (detailing the adverse selection problem of monopolist specialists and the risk of losses they face); Lawrence R. Glosten, Insider Trading, Liquidity, and the Role of the Monopolist Specialist, 62 J. Bus. 211, 211–12 (1989) (explaining further the risk of adverse selection by monopolistic market-makers like primary dealers). Primary dealers are expected to make markets, serving the function of being readily available to trade with counterparties and supply market liquidity. Glosten, supra, at 211–12; N.Y. Fed, Primary Dealer List, supra note 22. Market-makers are ready to use their own money to buy and sell securities, charging a "bid-ask" spread between what they charge sellers relative to how much they quote for the sale to buyers. Amihud & Mendelson, Inventory Market-Making, supra, at 31–32.

155. See, e.g., Geiger & Scaggs, supra note 122 (reporting on a DOJ inquiry and several lawsuits filed in July of 2015 that alleged collusion by primary dealers to inflate prices, which occurred until the "'conspiracy ultimately collapsed' around December 2012").

156. See Markham, supra note 8, at 192–96 (providing examples of instances in which primary dealers were sanctioned, including the Mozer scheme, the Salomon Brothers scandal, and the Steinhardt and Caxton Corp. settlements).

157. See Markus K. Brunnermeier & Lasse Heje Pedersen, Market Liquidity and Funding Liquidity, 22 Rev. Fin. Stud. 2201, 2228–29 (2009) (discussing the significance of Treasury market liquidity for the repo market); Jerome H. Powell, Governor, Bd. of Governors of the Fed. Rsrv. Sys., Speech at the Brookings Institution: Structure and Liquidity in Treasury Markets (Aug. 3, 2015), https://www.federalreserve.gov/newsevents/speech/powell20150803a.htm [https://perma.cc/F86P-6FRJ].

158. See Yakov Amihud & Haim Mendelson, Asset Pricing and the Bid-Ask Spread, 17 J. Fin. Econ. 223, 246 (1986) (showing that policies that increase liquidity also increase firm value). It is also worth noting that "market liquidity" is a complex concept that may be measured by multiple metrics such as bid-ask spread, depth of the market, or overall trading volume. See David Goldreich, Bernd Hanke & Purnendu Nath, The Price of Future Liquidity: Time-Varying Liquidity in the U.S. Treasury Market, 9 Rev. Fin. 1, 1 (2005) (defining liquidity as "the ability to quickly and cheaply trade an asset at a fair price"); see

easily to assume or offload risk, they not only gain privately but also create positive aggregate effects through frequent and seamless interactions.[159]

Government debtholders especially benefit from being able to quickly trade their claims, particularly when facing a cash crunch and corresponding need to sell Treasuries.[160] Economic crises have historically driven high demand for liquidity: Buyers seek to shore up reserves while sellers attempt to meet urgent cash needs.[161] If Treasury markets do not permit easy trading, investors can be expected to discount the capital they put into the market ex ante, or refrain from entering it altogether.[162] A deficiency in Treasury market liquidity, and thus of the protective function of Treasuries, ultimately hurts American taxpayers; the United States would eventually have to raise more tax revenue to cover a higher interest debt bill or reevaluate a more limited menu of policy options to reflect a sclerotic and more expensive government bond market.

Fortunately, Treasuries have historically traded in a deeply liquid secondary market because investors are confident that they can enter and exit both comfortably and predictably.[163] Scholars note that certain kinds of Treasuries have greater appeal to investors—and better liquidity—than others.[164] These more attractive securities have commanded a price

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also Darrell Duffie, Special Repo Rates, 51 J. Fin. 493, 493, 517–18 (1996) (illustrating how higher liquidity correlates with lower Treasury repo rates).

159. See Aswath Damodaran, Equity Risk Premiums (ERP): Determinants, Estimation and Implications—The 2020 Edition, at 15–16 (Mar. 5, 2020), https://ssrn.com/abstract=3550293 (on file with the *Columbia Law Review*) (unpublished manuscript) (noting the importance of liquidity in determining risk premia in equities).

160. See Smith & Wigglesworth, supra note 1 (describing how, in the initial panic caused by the COVID-19 pandemic, "companies, foreign central banks and investment funds . . . [sold] what is typically easiest to sell: Treasuries"). Investors also may not wish to be locked into a multiyear commitment to hold Treasuries; some seek to change their investment preference from a low-risk Treasury to a higher-risk corporate bond. Others will want to buy Treasury debt. They may need to bolster their liquid capital reserves, rebalance their portfolios into low-risk securities, or put their wealth into investments with regular cash flows (such as in retirement planning).

161. See id. (describing liquidity flight during the onset of the COVID-19 pandemic); see also Noeth & Sengupta, supra note 1, at 1 (describing a similar flight during the 2008 Financial Crisis).

162. See Goldreich et al., supra note 158, at 28–30 (describing a market discount for illiquidity).

163. See James Clark & Gabriel Mann, A Deeper Look at Liquidity Conditions in the Treasury Market, U.S. Dep't of the Treasury: Treasury Notes (May 6, 2016), https://www.treasury.gov/connect/blog/Pages/A-Deeper-Look-at-Liquidity-Conditions-in-the-Treasury-Market.aspx [https://perma.cc/SZ5W-3MK3] ("The U.S. Treasury market is the deepest and most liquid government securities market in the world."); see also Kevin McPartland, Sizing and Segmenting Trading in the U.S. Treasury Market, Greenwich Assocs. (Dec. 12, 2017), https://www.greenwich.com/fixed-income-fx-cmds/sizing-and-segmenting-trading-us-treasury-market-0 [https://perma.cc/E94Z-2NQ7] [hereinafter McPartland, Sizing and Segmenting] ("Close to a half trillion dollars in U.S. Treasury bonds trade every day . . . .").

164. Treasuries are classified as either "on-the-run" or "off-the-run." On-the-run Treasuries are brand-new issues of a Treasury bond (for example, a two-year bond). Goldreich et al., supra note 158, at 3. Off-the-run Treasuries are bonds that remain

premium, trading at higher prices[165] relative to those that investors regard as lacking full tradability.[166]

Still, secondary liquidity poses distinct challenges for Treasuries compared to other types of securities. Firms use them—or must use them—as protection against risk, and the Treasury market functions as a safe haven in crisis.[167] These distinctive features make it more complicated for the market to maintain its liquidity and resilience for two main reasons: (1) heavy one-sided demand following government news releases, and (2) regulations requiring that certain firms hold Treasuries rather than sell them when demand spikes, restricting supply.

To this first reason, Treasury markets can face heavy one-sided demand following macroeconomic news releases because demand for Treasuries may spike precisely when other markets are in crisis, thus requiring liquidity in secondary markets to stay resilient under heavy stress. Secondary market Treasury prices thus depend on regular public news releases by the government.[168] Nearly all types of Treasuries tend to respond to these macroeconomic news releases, albeit at varying intensities.[169] While the share prices of public companies depend on economic events as well as firm-specific news, Treasuries react to episodic

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outstanding but with a newer issue of Treasury bonds that carries the same maturity. Id. To illustrate, if the U.S. Treasury issues two-year bonds on a monthly basis, then there will be twenty-four outstanding issues of two-year bonds that are "off-the-run." Id. The newest issue is called "on-the-run" and attracts the greatest investor interest and liquidity. Id. Off-the-run issues become gradually less liquid the closer they get to being fully paid out. See id. at 9 ("Bid-ask spreads continue to widen as the remaining life of the security shortens."). In addition, Treasury Inflation Protected Securities (TIPS)—Treasury bonds that are indexed to inflation—are relatively illiquid and trade at a discount relative to conventional Treasury bonds. See Stefania D'Amico, Don H. Kim & Min Wei, Tips from TIPS: The Informational Content of Treasury Inflation-Protected Security Prices, 53 J. Fin. & Quant. Analysis 395, 400 (2018).

165. Bond interest rates have an inverse relationship with prices in trading. Bonds with higher interest rates (from relatively high-risk issuers) trade at lower prices; by contrast, bonds with lower interest rates (from relatively low-risk issuers) trade at higher prices. Understanding Bond Risk, Fin. Indus. Reg. Auth., https://www.finra.org/investors/learn-to-invest/types-investments/bonds/understanding-bond-risk [https://perma.cc/AJD7-ZT6V] (last visited Feb. 3, 2021).

166. See Goldreich et al., supra note 158, at 3 (showing lower valuations for illiquid bonds); see also Jean-Sébastien Fontaine & René Garcia, Bond Liquidity Premia, 25 Rev. Fin. Stud. 1207, 1211 (2012) (showing that recent bond issues trade at a premium on account of their heightened liquidity relative to older issues).

167. See The Specter of Default: How Safe Are U.S. Treasuries?, Knowledge@Wharton (June 6, 2012), https://knowledge.wharton.upenn.edu/article/the-specter-of-default-how-safe-are-u-s-treasuries [https://perma.cc/AT5A-Y8T7] (explaining that Treasuries are the "main tool banks use to manage liquidity").

168. See Pierluigi Balduzzi, Edwin J. Elton & T. Clifton Green, Economic News and Bond Prices: Evidence from the U.S. Treasury Market, 36 J. Fin. & Quant. Analysis 523, 523–25 (2001) ("[P]ublic news explains a substantial fraction of price volatility in the aftermath of announcements . . . .").

169. See id. at 531 (finding that economic announcements generally had an increased effect on prices for longer-term Treasuries compared to shorter-term Treasuries).

releases of government data (for example, unemployment numbers).[170] Even prior to the advent of high-frequency trading markets, scholars have shown that Treasury prices react most forcefully within one minute of a scheduled news release.[171] It is therefore no surprise that algorithmic Treasury markets react with much greater speed; according to one study, traders are able to respond to new disclosures within 300 milliseconds.[172] Empirical studies prior to and following the arrival of HFT also confirm the intuition that liquidity in Treasury markets comes under stress following major macroeconomic data releases; trading volumes surge, prices rise, and volatility increases as investors clamor to enter the market all at once.[173] Treasury markets thus bear enormous pressure to supply liquidity in the period immediately following government disclosures.

To the second reason, the fact that Treasuries are relied on as regulatory levers means that at least some supply is withheld from the market because firms must hold them as part of their capital buffers instead of trading.[174] This reduces the number of trading counterparties and potentially raises transaction costs if securities and cash become

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170. See id. at 529–31.

171. See id. at 532–34.

172. See Martin Scholtus, Dick van Dijk & Bart Frijns, Speed, Algorithmic Trading, and Market Quality Around Macroeconomic News Announcements, 38 J. Banking & Fin. 89, 89–90 (2004) (showing that a delay of 300 milliseconds reduces returns by up to 1.95% per year because fast traders are able to react to news within 5–150 milliseconds). See generally Thierry Foucault, Johan Hombert & Ioanid Roşu, News Trading and Speed, 71 J. Fin. 335 (2016) (exploring the speed advantage of HFT markets).

173. See Michael J. Fleming & Eli M. Remolona, Price Formation and Liquidity in the U.S. Treasury Market: The Response to Public Information, 54 J. Fin. 1901, 1905–08 (1999) [hereinafter Fleming & Remolona, Response to Public Information] (describing a two-stage trading process following the release of announcements, culminating in a "surge" of trading volume and price volatility); George J. Jiang, Ingrid Lo & Giorgio Valente, High-Frequency Trading Around Macroeconomic News Announcements: Evidence from the U.S. Treasury Market 2–4 (Bank Can., Working Paper No. 2014-56, 2014), https://www.econstor.eu/bitstream/10419/123745/1/812711653.pdf [https://perma.cc/264D-G5U4] (noting that high-frequency traders cause a surge of activity in Treasuries trading in the wake of macroeconomic news announcements); Albert J. Menkveld, Asani Sarkar & Michel van der Wel, The Informativeness of Customer Order Flow Following Macroeconomic Announcements: Evidence from Treasury Futures Markets 4–6 (Nov. 2006), https://www.bankofcanada.ca/wp-content/uploads/2010/09/menveld3.pdf [https://perma.cc/XW94-DXDH] (unpublished manuscript) (observing correlated trading in Treasury futures).

174. See Fed. Deposit Ins. Corp. Liquidity Risk Management Standards, 12 C.F.R. §§ 329.1–.50 (2020) (establishing minimum liquidity ratios); see also Ihrig et al., supra note 90, at 194 (explaining the ways that the liquidity coverage ratio affects banks' liquidity management practices); Mark House, Tim Sablik & John R. Walter, Fed. Rsrv. Bank of Richmond, Understanding the New Liquidity Coverage Ratio Requirements 4 (2016), https://www.richmondfed.org/-/media/richmondfedorg/publications/research/economic_brief/2016/pdf/eb_16-01.pdf (on file with the *Columbia Law Review*) (flagging that a concern stemming from the liquidity coverage ratios is that "banks may not actually use any of their mandated stock of liquidity during a crisis"). Private entities also require firms to support their risk-taking by supplying Treasuries as collateral for their transactions. See CME, TIPS/STRIPS, supra note 81; see also supra notes 85–87 and accompanying text.

scarcer.[175] Conversely, when financial firms face a systemic crisis and must sell Treasuries, their actions can pressurize markets as these important investors liquidate their holdings. Quite apart from crises, the significance of Treasuries for day-to-day regulatory risk management implies that the market must be prepared to absorb orders of all sizes in ways that still leave trading opportunities for other market participants.

C. *Automation, Competition, and Speed in Secondary Markets*

The regulatory framework for Treasuries is premised on a market structure that has remained fairly static since the 1980s.[176] Yet over the last decade, securities markets—including Treasuries—have transformed as automation and algorithmic traders flourished, endowing markets with speed, data intensity, and interconnectivity.[177] While policymakers overseeing other securities markets like equities have introduced rules to

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175. See Ihrig et al., supra note 90, at 180–82 (describing the different tiers of securities acceptable as collateral and the "haircut" applied to each based on perceived tradability). For example, in September 2019, the rate of borrowing jumped suddenly from around 2% to almost 10% in the short-term repo market, where financial firms lend each other cash in return for Treasuries taken as collateral. See Liz McCormick & Alex Harris, The Repo Market's a Mess. (What's the Repo Market?), Bloomberg (Sept. 19, 2019), https://www.bloomberg.com/news/articles/2019-09-19/the-repo-market-s-a-mess-what-s-the-repo-market-quicktake?sref=2qugYeNO (on file with the *Columbia Law Review*); Repo Rate Spike and Federal Reserve Intervention, ESCP Fin. Soc'y (Feb. 21, 2020), https://financescp.net/2020/02/21/repo-rate-spike-and-federal-reserve-intervention [https://perma.cc/2TNA-2AU6].

While commentators offered multiple explanations for the sudden lending halt, one rationale suggested that large banks were holding onto their cash and Treasuries reserves in an effort to maintain the strictest level of compliance with capital and liquidity reserve requirements. See Daniel K. Tarullo, The September Repo Price Spike: Immediate and Longer-Term Issues, Brookings (Dec. 5, 2019), https://www.brookings.edu/research/the-september-repo-price-spike-immediate-and-longer-term-issues [https://perma.cc/8KS7-RF45].

Although the comparison from the repo market to secondary market trades in Treasuries is not exact, this event highlights the potential for reserve requirements to impact the availability of Treasuries and cash. See Joshua Younger, Ryan J. Lessing, Munier Salem & Henry St John, J.P. Morgan, What Is Preventing the Banks from Policing the Repo Market? 2 (2019) (on file with the *Columbia Law Review*) (reporting on the ample cash held by banks prior to the September 2019 repo crisis). See generally Pradeep Yadav & Yesha Yadav, The Stability Illusion in Financial Regulation (Vand. Univ. L. Sch., Working Paper No. 20-46, 2021), https://ssrn.com/abstract=3685404 (on file with the *Columbia Law Review*) (detailing interactions between the Treasuries-backed repo market and the secondary market for trading Treasuries).

176. See Dupont & Sack, supra note 21, at 785–91; see also Kenneth D. Garbade, The Emergence of "Regular and Predictable" as a Treasury Debt Management Strategy, 13 Econ. Pol'y Rev. 53, 56, 69 (2007) ("The emergence of regular and predictable sales of Treasury notes and bonds reduced the element of surprise in Treasury offerings and allowed investors to plan future commitments of funds with greater confidence.").

177. See Austin Gerig, High-Frequency Trading Synchronizes Prices in Financial Markets 7 (Nov. 2015), https://www.sec.gov/files/dera-wp-hft-synchronizes.pdf [https://perma.cc/NUT3-L3HG] (unpublished manuscript) (discussing the interconnection built by HFT markets in modern markets).

address some of the risks caused by this shift to HFT, Treasuries have remained largely overlooked.[178] The investigation into the 2014 Flash Rally, prepared by the Treasury, the Fed, N.Y. Fed, SEC, and CFTC revealed that regulators were caught off-guard by the scale of high-speed automation in Treasuries.[179] The findings pointed to unexpected sources of fragility created by this shift, such as abnormal automated trades as well as rapid deterioration in the liquidity of a market that is supposed to maintain its resiliency to such loss at all times.[180] A full discussion of the implications of algorithmic trading writ large is outside the scope of this Article,[181] but the brief observations that follow underscore the dramatic nature of ongoing structural transformation in Treasuries trading and the challenges posed for the traditional assumptions currently anchoring its regulation.

1. *Automation and Speed in Treasuries Trading.* — While trading algorithms have been used in securities markets for decades, advances in communications technology, programming, artificial intelligence, and data processing have enabled them to drive markets toward ever fuller degrees of automation.[182] Trading algorithms are generally highly sophisticated

178. See, e.g., SEC Regulation SCI—Systems Compliance and Integrity, 17 C.F.R. §§ 242.1000–.1007 (2020) (regulating the resiliency of equity trading platforms markets to accommodate an automated market). Following the Flash Rally inquest in 2017, regulators introduced fuller reporting of secondary market Treasury trades. See Aguilar, supra note 10 (outlining the need for regulatory reform to respond to the fragilities introduced by automated, high-speed trading); see also supra note 15 and accompanying text.

179. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 4–7, 15–19, 32–33 (detailing strained liquidity conditions during the Flash Rally that were due in part to the "growth of high-speed electronic trading," which contributed to a larger presence of PTFs in Treasury markets); see also Aguilar, supra note 10 (explaining how regulators could not access vital Treasury market information in the effort to understand what happened during the Flash Rally).

180. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, app. C at 54–55.

181. See, e.g., Merritt B. Fox, Lawrence R. Glosten & Gabriel V. Rauterberg, The New Stock Market: Sense and Nonsense, 65 Duke L.J. 191, 201–07 (2015) (categorizing the eight most controversial HFT practices in the "new stock market," including HFT activities that lead to "increased volatility and crashes"); Yesha Yadav, How Algorithmic Trading Undermines Efficiency in Capital Markets, 68 Vand. L. Rev. 1607, 1622–25 (2015) [hereinafter Yadav, Algorithmic Trading] (reviewing the costs and benefits of implementing HFT and relevant strategies); SEC, Equity Market Structure Literature Review, Part II: High Frequency Trading 5–7 (2014), https://www.sec.gov/marketstructure/research/hft_lit_review_march_2014.pdf [https://perma.cc/2Q9G-XK67] [hereinafter SEC, Literature Survey] (surveying literature that collectively illustrates the difficulty of precisely defining "HFT"); SEC, Staff Report on Algorithmic Trading in U.S. Capital Markets 30–51 (2020), https://www.sec.gov/files/Algo_Trading_Report_2020.pdf [https://perma.cc/2Z2E-X5W4] [hereinafter SEC, Algorithmic Study] ("Generally, studies on this type of algorithmic trading indicate that some dimensions and activities can have positive effects on market quality and efficiency, while others may impose costs on other market participants or pose risks during periods of unusual market stress.").

182. See U.K. Gov't Off. for Sci., Foresight: The Future of Computer Trading in Financial Markets: An International Perspective 30–50 (2012) https://www.cftc.gov/sites/

and effective. They are trained to evaluate incoming news, price-related information, data on economic trends, prevailing market sentiment (for example, by scraping Twitter feeds), or behavioral cues (by observing how others are trading) in order to respond nearly instantaneously by submitting a series of orders for securities at a particular price.[183] Over time, programming advances, wide-ranging and novel data sources, and increasingly complex artificial intelligence have produced modern-day trading algorithms capable of transacting almost entirely independently in real time.[184] Based on their presequenced programming, algorithms send out orders, receive confirmation about their success or failure, and react automatically by learning from their real-world performance.[185] These algorithms have become ubiquitous in securities markets, displacing human traders in trade-by-trade decisionmaking.[186] Using HFT, securities trades now turn over at speeds measured in milliseconds and microseconds, harness large quantities of data, and utilize complex financial modeling.[187] By some estimates, HFT is responsible for around 50% to 70% of U.S. equity trading by volume, and as much as 80% in certain futures markets.[188]

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default/files/idc/groups/public/@aboutcftc/documents/file/tacfuturecomputertrading 1012.pdf [https://perma.cc/B3TX-Q5GW].

183. Id. at 32; see also Elaine Wah, Computational Models of Algorithmic Trading in Financial Markets 15–25, 50–60 (2016) (on file with the *Columbia Law Review*) (Ph.D. dissertation, University of Michigan) (providing an insightful discussion of computational modeling and analytical techniques underpinning algorithmic trading programming).

184. See Michael Kearns & Yuriy Nevmyvaka, Machine Learning for Market Microstructure and High Frequency Trading, *in* High-Frequency Trading: New Realities for Traders, Markets and Regulators 91, 96–104 (David Easley, Marcos López de Prado & Maureen O'Hara eds., 2013); Wah, supra note 183, at 52 (explaining the details of HFT trading); see also Michael P. Wellman & Uday Rajan, Ethical Issues for Autonomous Trading Agents, 27 Minds & Machs. 609, 611–12 (2017) (noting the significance of high-speed, nonhuman decisionmaking in stock markets, but emphasizing that algorithms are programmed by humans with flaws).

185. See Kearns & Nevmyvaka, supra note 184, at 94–99 ("Typically [HFT activity is driven by] . . . microstructure data that details every order placed, every execution and every cancellation, directly from the exchanges, and . . . thus permits the faithful reconstruction (at least for equities) of the full limit order book, both historically and in real time.").

186. See Wellman & Rajan, supra note 184, at 609–10 (outlining the likely entrenchment of algorithms in financial markets).

187. There is no established definition of HFT in regulation. Rather, the SEC looks to certain identifying features that are generally characteristic of and necessary for HFT: securities turnover in milliseconds (or less), traders that locate their servers close to those of exchanges, reliance on large volumes of data, and use of automated decisionmaking. See SEC, Literature Survey, supra note 181, at 4–7.

188. Rena S. Miller & Gary Shorter, Cong. Rsch. Serv., R44443, High Frequency Trading: Overview of Recent Developments 1–2 (2016) (observing that HFT-related trading drives around 55% of volume in equities, 80% of volume in foreign-exchange-related futures, and around 66% in interest rate and ten-year Treasury futures); see also Michael Mackenzie, High Frequency Trading Dominates the Debate, Fin. Times (Oct. 20, 2009), https://www.ft.com/content/fa347c26-bc41-11de-9426-00144feab49a (on file with the *Columbia Law Review*) (noting that HFT equity volume had reached more than 70%).

Automated traders do more than increase the pace of the market, however. They help markets become more liquid because investors enjoy ample trading opportunities and the ability to make trades without causing abrupt price swings.[189] Given this heightened liquidity, HFT offers investors a continuous supply of willing counterparties that can trade with them at low cost, keeping markets well-oiled and attractive.[190] Finance scholars have underscored the positive impact of high-speed algorithms on both liquidity and cost (by reducing the "spread" that investors must pay, in some cases by as much as 50%).[191]

Additionally, algorithmic markets are much more informationally efficient, at least in the short term. It is a basic tenet of the efficient capital markets theory that markets work better when securities prices quickly incorporate the measure of available public information.[192] In theory and

189. See, e.g., Jonathan Brogaard, Allen Carrion, Thibaut Moyaert, Andriy Shkilko & Konstantin Sokolov, High Frequency Trading and Extreme Price Movements, 128 J. Fin. Econ. 253, 254 (2018) (arguing that HFT does not cause extreme price movements, but can help in absorbing the impact of extreme price movements by supplying liquidity when extreme events occur with reference to single stock); Jonathan Brogaard, Björn Hagströmer, Lars Nordén & Ryan Riordan, Trading Fast and Slow: Colocation and Liquidity, 28 Rev. Fin. Stud. 3407, 3410–15 (2015) (noting that increased speeds for market-makers improves liquidity provision, applying to HFT as well as slower traders); Bruno Biais, Fany Declerck & Sophie Moinas, Who Supplies Liquidity, How and When? 3–4 (Bank for Int'l Settlements, Working Paper No. 563, 2016), https://www.bis.org/publ/work563.pdf [https://perma.cc/P53S-8S6K] (noting that proprietary traders, including HFT, supply liquidity to the market); Jonathan Brogaard, Konstantin Sokolov & Jiang Zhang, How Do Extreme Price Movements End? 3–6 (Sept. 26, 2020), https://ssrn.com/abstract=3700218 (on file with the *Columbia Law Review*) (unpublished manuscript) (observing that liquidity provision increases toward the end of an extreme price movement); see also SEC, Algorithmic Study, supra note 181, at 44–47. But see Albert J. Menkveld & Marius A. Zoican, Need for Speed? Exchange Latency and Liquidity, 30 Rev. Fin. Stud. 1188, 1193 (2017) (arguing that HFT does not enhance liquidity).

190. See, e.g., Biais et al., supra note 189, at 12.

191. See, e.g., Jonathan Brogaard, Terrence Hendershott & Ryan Riordan, High-Frequency Trading and Price Discovery, 27 Rev. Fin. Stud. 2267, 2268–70 (2014) [hereinafter Brogaard et al., Price Discovery]; Albert J. Menkveld, High Frequency Trading and the New Market Makers, 16 J. Fin. Mkts. 712, 714–16 (2013). But see X. Frank Zhang, High-Frequency Trading, Stock Volatility, and Price Discovery 2–3 (Dec. 2010), https://ssrn.com/abstract=1691679 (on file with the *Columbia Law Review*) (unpublished manuscript) (arguing that HFT can increase volatility). On HFT market-making, see discussion of the activity by one major HFT firm, Virtu Financial, which operates as a market-maker across multiple asset classes. Gregory Laughlin, Insights into High Frequency Trading from the Virtu Initial Public Offering 2–4 (Univ. of Cal. Santa Cruz, Ctr. for Analytical Fin., Working Paper No. 11, 2014), https://cafin.ucsc.edu/research/work_papers/CAFIN_WP11.pdf (on file with the *Columbia Law Review*).

192. See Eugene F. Fama, Efficient Capital Markets: A Review of Theory and Empirical Work, 25 J. Fin. 383, 383 (1970) ("A market in which prices always 'fully reflect' available information is called 'efficient.'"); Ronald J. Gilson & Reinier H. Kraakman, The Mechanisms of Market Efficiency, 70 Va. L. Rev. 549, 549–60 (1984) (describing the process by which the interaction of informed and other types of traders helps build efficient markets). For a critical view, see Yadav, Algorithmic Trading, supra note 181, at 1611, 1633–

in practice, then, it follows that HFT—capable of responding in milliseconds to large pools of data—should generate powerful informational efficiencies as prices adjust to emerging insights. Moreover, as high-speed traders transact across multiple markets (for shares, derivatives, or Treasuries), prices across all these different asset classes can synchronize.[193] Finance studies have empirically observed that these intuitions play out in real-world trading: (1) Prices respond rapidly to vast quantities of data; (2) these efficiencies extend across markets to minimize price differences; and (3) securities prices across the board showcase short-term informational efficiencies in response to these dynamics.[194]

But HFT also carries risks. Algorithms inevitably misfire. "Fat-finger" trades can cause automated programs to send out orders in error; algorithms may trade on "fake news" or inaccurate information; they may all respond in tandem to similar kinds of data, artificially amplifying price swings; the programming may be ill-designed to handle overly complex market environments; and algorithms can be biased, manipulative, and predatory.[195] Importantly, the incremental costs of these errors can rapidly compound as prices across the system incorporate these problems too quickly for human traders to contain the damage.[196] Commentators have pointed to more frequent instances of extreme price movements, sudden flash events, and resulting volatility as becoming a characteristic trait of

37 (arguing that algorithms may simultaneously increase informational efficiency while also creating greater costs in allocating capital productively).

193. Gerig, supra note 177, at 7.

194. See, e.g., Brogaard et al., Price Discovery, supra note 191, at 2269 (noting that HFT traders tend to make markets very efficient in the short-term as HFT trades transact in the direction of near-term price changes); Gerig, supra note 177, at 7 (highlighting the interconnection between markets and the ability of HFT traders to foster this synchronicity); see also SEC, Literature Survey, supra note 181, at 4–7 (compiling the considerable literature on this subject); Alain Chaboud, Benjamin Chiquoine, Erik Hjalmarsson & Clara Vega, Rise of the Machines: Algorithmic Trading in the Foreign Exchange Market, 69 J. Fin. 2045, 2075 (2014) (noting high efficiencies in foreign exchange markets).

195. See, e.g., Alina Selyukh, Hackers Send Fake Market-Moving AP Tweet on White House Explosions, Reuters (Apr. 23, 2013), https://www.reuters.com/article/net-us-usa-whitehouse-ap/hackers-send-fake-market-moving-ap-tweet-on-white-house-explosions-idUSBRE93M12Y20130423 (on file with the *Columbia Law Review*) (reporting on how a "fake news" tweet caused a rapid fall in the Dow Jones index and other indices); Alexandra Stevenson, Knight Capital to Pay $12 Million Fine on Trading Violations, N.Y. Times: Dealbook (Oct. 16, 2013), https://dealbook.nytimes.com/2013/10/16/knight-capital-to-pay-12-million-fine-on-trading-violations (on file with the *Columbia Law Review*) (reporting the Knight Capital debacle, when a misfiring router caused the firm to lose around $450 million in forty-five minutes); see also Bruno Biais, Johan Hombert & Pierre-Olivier Weill, Equilibrium Pricing and Trading Volume Under Preference Uncertainty, 81 Rev. Econ. Stud. 1401, 1402–03 (2014) (noting the difficulties of algorithms to choose between different possible trading pathways during complex trading conditions); Robert A. Jarrow & Phillip Protter, A Dysfunctional Role of High Frequency Trading in Electronic Markets, 15 Int'l J. Theoretical & Applied Fin. 1, 3–6 (2012) (arguing that high-frequency traders can create a mispricing that they unknowingly exploit to the disadvantage of ordinary investors).

196. See Gerig, supra note 177, at 7.

modern markets, necessitating regulatory and industry intervention to manage these negative HFT externalities.[197]

In a short period of time, high-speed algorithms migrated from other securities markets to become a mainstay in Treasuries.[198] A market that was, until recently, dependent on telephonic trades has transformed into a near-fully automated marketplace.[199] Interdealer Treasuries trading occurs largely on two electronic platforms, BrokerTec and eSpeed, with BrokerTec enjoying as much as 80% of trading volume in certain Treasuries.[200] The interdealer market sees around $269 billion worth of trading volume daily.[201]

As in equity markets, there are obvious efficiency advantages to this development. One study found that HFT resulted in Treasury markets becoming more efficient when responding to new government disclosures.[202] Measuring reactions to macroeconomic reports, the study confirmed that HFT traders are first to transact on the incoming data.[203] As a result, Treasury prices have also come to exhibit high efficiencies by rapidly reflecting new information in just fractions of a second.[204]

But as illustrated by the 2014 Flash Rally and other disruptions, there are also dangers to HFT, the underlying dynamics of which are poorly understood. For a start, the reporting regime for Treasuries trades is relatively new, coming into force only in 2017.[205] The lack of systematic reporting over the years means that both regulators and the marketplace

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197. See Bd. of the Int'l Org. of Sec. Comm'ns, Mechanisms Used by Trading Venues to Manage Extreme Volatility and Preserve Orderly Trading 8 (2018), https://www.iosco.org/library/pubdocs/pdf/IOSCOPD607.pdf [https://perma.cc/SVW6-YJXB]; see also SEC, Algorithmic Study, supra note 181, at 60–68.

198. McPartland, Sizing and Segmenting, supra note 163, at 7; Joe Rennison, High-Frequency Traders: Bond Market Scourge or Saviour?, Fin. Times (Sept. 1, 2015), https://www.ft.com/content/ab70bdf2-4507-11e5-b3b2-1672f710807b [hereinafter Rennison, High-Frequency Traders] (on file with the *Columbia Law Review*); Smith & Wigglesworth, supra note 1; see also supra note 30 and accompanying text.

199. See Fleming et al., BrokerTec Report, supra note 132, at 5–6 (noting that nearly all interdealer trading took place using telephones until 1999); Harkrader & Puglia, supra note 15 (noting that 61% of trading volume in the interdealer market was driven by HFT).

200. See McPartland, Sizing and Segmenting, supra note 163, at 6–7.

201. Brain et al., supra note 119.

202. See Jiang et al., supra note 173, at 4–5 (noting, however, some negative effects on liquidity as high-speed traders transact aggressively on new disclosures); see also supra notes 169–172 and accompanying text.

203. See Jiang et al., supra note 173, at 4–5.

204. Id. There is even some evidence that prices can drift in Treasury-related assets even before a macroeconomic news release, suggesting that some traders may be privately informed of the news ahead of the release. See Alexander Kurov, Alessio Sancetta, Georg Strasser & Marketa Halova Wolfe, Price Drift Before U.S. Macroeconomic News: Private Information About Public Announcements?, 54 J. Fin. & Quant. Analysis 449, 455–56 (2018) ("[W]e replace every price at the release time of an announcement with the price that was prevailing 5 seconds before the announcement release.").

205. Harkrader & Puglia, supra note 15.

lack a full accounting of the varied disruptions such as fat-finger trades, mini-flash events, predatory behaviors, or misfiring algorithms that may have impacted Treasuries trading. Further, the disruptions thus far observed point to deep uncertainties about the risks posed by automated, high-speed trading of Treasuries.

In the case of the Flash Rally, regulators' investigation revealed no definitive causal trigger to explain why prices experienced a short, sharp, and sudden upward flux, though the Joint Staff Report observed that general market conditions had been strained and that global market risks may have played a role.[206] Several large transactions had taken place following a release of retail sales data, reducing available liquidity. In the event window, HFT and primary dealers markedly limited how fully they were willing to continue trading and supplying trading opportunities to the marketplace.[207] Abnormal "wash" trades appeared to arise where traders, especially HFTs, were simply transacting with themselves.[208] Yet despite these factors, the report could not point to a single cause explaining the rapid deterioration in the market's functions.[209]

A similar, albeit smaller-scale, episode occurred on June 7, 2018, when Treasuries prices appeared to surge abnormally for a few minutes before returning to normal.[210] Commentators suggested possible turmoil in Brazil as a triggering factor but again drew no definitive conclusions.[211] And the leading interdealer Treasuries trading platform, BrokerTec, experienced a one-hour outage in 2019 for reasons that remain unclear.[212] In this instance, the damage to the market was limited, but regulators admitted that it could have been far worse under different circumstances (for example, if the surge had occurred during a different time in the trading day).[213]

Perhaps more fundamentally, some commentators question how valuable the theoretical gains in informational efficiency are in the broader context of algorithmic markets. In high-speed trading, price efficiency measures tend to be very short term in nature.[214] And whether algorithms designed to transact in milliseconds can be expected to deeply reflect the

206. U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 4–6, 15–19.

207. Id. at 4–6.

208. Id.

209. Id.

210. Chappatta, supra note 42.

211. Id.

212. See Treasury Market Practices Group, N.Y. Fed, TMPG Meeting Minutes 1 (Jan. 15, 2019), https://www.newyorkfed.org/medialibrary/Microsites/tmpg/files/Jan-2019-TMPG-Meeting-Minutes.pdf [https://perma.cc/5ECU-USNU] [hereinafter TMPG, Jan. 2019 Meeting Minutes].

213. See id.; see also Yesha Yadav, Blueprint for Reforming Treasury Markets 4–5 (Vanderbilt L. Rsch., Working Paper No. 20-58, 2020), https://ssrn.com/abstract=3739971 (on file with the *Columbia Law Review*) [hereinafter Yadav, Blueprint].

214. See Brogaard et al., Price Discovery, supra note 191, at 2270 (measuring short-term efficiency gains over increments of just a few seconds).

meaning of macroeconomic disclosures is an open question.[215] Research suggests that high-speed algorithms have greater facility in interpreting hard data like numbers and statistics.[216] But interpreting qualitative information can be fraught with difficulty, even for programs that exhibit advanced machine learning and natural language processing abilities.[217] For example, such systems showed discrepancies in classifying qualitative financial information, with most accuracy rates under 60%.[218]

This more fundamental limitation on algorithmic efficiency is especially relevant in the context of Treasuries. Macroeconomic reports revealing news about the health of the United States' economy tend to mark moments of significant trading activity and are usually the major driver of Treasuries price changes.[219] Where these market-moving disclosures take the form of complex macroeconomic reports on matters like unemployment, inflation, retail reports, or the health of the country's agricultural sector, it is to be expected that their qualitative content can hinder algorithms designed to quickly process the simpler and "hardest" data contained in the texts.[220] Macroeconomic disclosures can be lengthy and complicated; their drafting often entails use of footnotes, statistical

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215. See Yadav, Algorithmic Trading, supra note 181, at 1644–55 (detailing the challenges of achieving more fundamental allocative efficiency in automated markets).

216. See, e.g., Bastian von Beschwitz, Donald B. Keim & Massimo Massa, First to "Read" the News: News Analytics and Algorithmic Trading, 10 Rev. Asset Pricing Stud. 122, 123 (2020) (describing the reliance placed on sentiment coding by news analytics companies that supply packages of coded news to HFT firms); Sean Cao, Wei Jiang, Baozhong Yang & Alan L. Zhang, How to Talk When a Machine Is Listening: Corporate Disclosure in the Age of AI 2–5 (Nat'l Bureau of Econ. Rsch., Working Paper No. 27950, 2021), https://ssrn.com/abstract=3683802 (on file with the *Columbia Law Review*) (observing that trading algorithms that use machine learning rely on rules-of-the-road in relation to how they code and process words and phrases, leading corporate executives to adjust their disclosures to cater to these algorithms); S. Sarah Zhang, Need for Speed: Hard Information Processing in a High-Frequency World 19 (Aug. 16, 2017), https://ssrn.com/abstract=1985951 (on file with the *Columbia Law Review*) (unpublished manuscript) (finding empirically that "[i]nformation processing speed matters especially for 'hard' quantitative information shocks and arbitrage trading"); see also Robin Wigglesworth, Robo-Surveillance Shifts Tone of CEO Earnings Calls, Fin. Times (Dec. 5, 2020), https://www.ft.com/content/ca086139-8a0f-4d36-a39d-409339227832 (on file with the *Columbia Law Review*).

217. Further, it is worth noting that the coding used by news analytics companies that package news releases for algorithmic traders has a meaningful impact on prices, for example, in relation to errors becoming incorporated into prices in the short-term even though errors were corrected by the market. See Beschwitz et al., supra note 216, at 124–28.

218. Boming Huang, Yuxiang Huan, Li Da Xu, Lirong Zheng & Zhuo Zou, Automated Trading Systems Statistical and Machine Learning Methods and Hardware Implementation: A Survey, 13 Ent. Info. Sys. 132, 137 (2019).

219. Jiang et al., supra note 173, at 3–4; see also supra notes 169–173 and accompanying text.

220. Jiang et al., supra note 173, at 3–4.

assumptions, soft qualifiers, and explanatory text.[221] Limitations in processing such data can therefore lead to volatility. Moreover, unlike other markets, inaccuracies or incompleteness in data processing can impact trading and prices across the entire asset class of Treasuries rather than just those of a single security (such as the price of Company X's shares).[222]

To be clear, these risks are only hypothetical. The current literature has focused largely on measuring the rapid, millisecond efficiencies to macroeconomic news releases rather than parsing how fully algorithmic actors can incorporate relevant insights into prices for the purpose of Treasuries trading.[223] But they raise the question of just how beneficial algorithmic trading has been for fundamental efficiency in Treasury markets, where—given its unique position—maintaining smooth operation and resiliency around key announcements is critical to the overall health of the financial system and the integrity of prices for financial assets around the globe.[224]

2. *Competition and a Changing Cast of Traders in the Interdealer Market.* — A related critical transformation in the Treasury market also lies in the changing cast of market actors and the introduction of a new kind of trader: smaller, less regulated, nondealer securities firms that compete with primary dealers in the interdealer market.[225] According to one leaked BrokerTec report in 2015, primary dealers appear at the bottom of the rankings of the most active participants, while HFTs comprised eight out of the ten most active firms.[226] The top three—Jump Trading, Citadel Securities, and Teza Technologies—intermediated around $4.2 trillion dollars in Treasuries over two months.[227]

These new entrants fit a different regulatory profile than traditional ones in the interdealer market. Unlike primary dealers, HFT firms tend to trade using their own capital.[228] In equity markets, HFT strategies hinge

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221. See, e.g., U.S. Dep't. of Lab., Bureau of Lab. Stat., News Release: The Employment Situation—October 2018, at 1–3 (Nov. 2, 2018), https://www.bls.gov/news.release/archives/empsit_11022018.pdf [https://perma.cc/DN7D-QLGR].

222. Fleming & Remolona, Response to Public Information, supra note 173, at 1902.

223. See, e.g., Jiang et al., supra note 173, at 19–20.

224. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 1, 8–9 (identifying the Treasury market as critical in the global economy).

225. The issue of balancing competition against stability in Treasury market structure is a critical issue for future exploration. Cf. D. Daniel Sokol, Limiting Anticompetitive Government Interventions that Benefit Special Interests, 17 Geo. Mason L. Rev. 119, 120 (2009) (describing the globalization of antitrust law, the process of creating public restraints, and the negative impact of those restraints).

226. Smith, HFT Dominance, supra note 30 (reporting on a confidential list of the top ten firms trading by volume on BrokerTec).

227. Id. (noting that the top three nonbank firms made up 51% of market share, but also reporting that the interdealer broker ICAP, which then owned BrokerTec, disputed the data as inflated).

228. See Eamon Javers, Why PTF Matters to HFT (No, Really!), CNBC (July 16, 2015), https://www.cnbc.com/2015/07/16/why-ptf-matters-to-hft-no-really.html [https://perma

on using small amounts of capital to buy and sell through the day.[229] By using their own funds rather than intermediating for clients, and not seeking out the formal designation of primary dealers, HFT traders in the Treasury market are generally subject to far lower regulatory burdens.[230] Most have avoided registration with FINRA altogether by structuring their businesses to fall outside of the regulatory definition of a Treasuries broker-dealer.[231] This means that HFT firms that avoid holding themselves out as FINRA-registered brokers or dealers are not subject to the 2017 TRACE mandatory reporting requirement.[232] Avoiding registration further exempts them from complying with other provisions commonly applying to broker-dealers (such as capital requirements or anti-

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.cc/C2XV-NE2F] (reporting on how regulators picked up the term Principal Trading Firms (PTFs) to designate certain HFTs from the HFT industry itself because "the firms . . . tend to invest their own principal and not have clients as do traditional banks and hedge funds").

229. See Miller & Shorter, supra note 188, at 2 ("In general, the traders that employ HFT strategies are attempting to earn small amounts of profit per trade."); see also U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 37–39.

230. To be clear, HFT firms in equity or derivative markets do not fall outside of the regulatory perimeter. See, e.g., SEC Risk Management Controls for Brokers or Dealers with Market Access, 17 C.F.R. § 240.15c3-5 (2020). However, there is a disparity in regulatory attention on HFT trading firms in those markets compared to Treasury markets, where HFTs operate under a lighter regulatory regime than primary dealer firms because they can avoid registration under FINRA rules. See Steven T. Mnuchin & Craig S. Phillips, U.S. Dep't of the Treasury, A Financial System that Creates Economic Opportunities: Capital Markets 79–80 (2017), https://www.treasury.gov/press-center/press-releases/documents/a-financial-system-capital-markets-final-final.pdf [https://perma.cc/WT86-TS8R] (recommending "closing the gap in the granularity of PTF data" by requiring "trading platforms operated by FINRA member broker-dealers that facilitate transactions in Treasury securities . . . to identify customers in their reports of Treasury security transactions to TRACE"); Harkrader & Puglia, supra note 15 ("PTFs . . . were anonymous in the 'original' version of the TRACE data . . . [since] most do not meet the definition of 'dealer' as set in the Securities Exchange Act of 1934. As such, PTFs were and still are not required to register with FINRA or report their transactions to TRACE."). PTFs generally refer to HFT firms in Treasury markets. See Javers, supra note 228.

231. See Mnuchin & Phillips, supra note 230, at 79–80 (noting that "the activity of unregistered PTFs in the IDB market is captured by TRACE through the reports of these interdealer brokers," but "the interdealer brokers do not identify the unregistered PTF trade counterparts . . . because the PTFs are not FINRA members"); see also U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 9–10 (discussing the multifarious agencies that regulate the Treasury Market); Scaggs, Dealer–Trader Distinction, supra note 15 ("[HFTs] may be forming separate entities to trade Treasuries and claiming they fall into the SEC's 'trader' category, dodging the [FINRA] registration requirement . . . [which] may also help them avoid the 'dealer' designation.").

232. See Fin. Indus. Reg. Auth., Regulatory Notice 16-39, Reporting Transactions in U.S. Treasury Securities: SEC Approves Rule Change to Require Reporting of Transactions in U.S. Treasury Securities to the Trade Reporting and Compliance Engine (TRACE) 2–3 (2016), https://www.finra.org/sites/default/files/notice_doc_file_ref/Regulatory-Notice-16-39.pdf [https://perma.cc/ZH96-W5LC] [hereinafter FINRA TRACE Regulatory Notice 16-39] (providing notice of new 2017 rule requiring FINRA member firms to report transactions in Treasury securities and acknowledging a continued gap in reporting for institutions that regularly trade in Treasuries but are not FINRA members).

intimidation and coordination rules).[233] More broadly, by falling outside of this regulatory oversight, most HFTs avoid coming under the direct scrutiny of a major regulator, affording them arguably greater flexibility in developing riskier trading strategies.

This relative asymmetry in compliance burdens faced by HFTs on the one hand and primary dealers on the other imports a novel competitive dynamic into Treasury markets.[234] HFT firms like Virtu Financial, Citadel, or Jump Trading may not be commonly recognized, but they occupy a critical position in maintaining market function due to the variety and volume of securities they transact daily.[235] Their broad presence throughout capital markets strengthens interconnections between different types of securities and trading platforms: By linking markets together at ultra-high speeds, HFTs fluidly connect the Treasury market to others, and vice versa.[236]

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233. Elad L. Roisman, Comm'r, SEC, Remarks at U.S. Treasury Market Conference (Sept. 29, 2020), https://www.sec.gov/news/speech/roisman-us-treasury-conference-2020-09-29 [https://perma.cc/CKB6-GPVZ] ("PTFs that are not SEC-registered dealers are not necessarily subject to capital requirements and thus can trade intraday in amounts that could significantly exceed the firm's capital."); see also Luparello, FINRA Request Letter, supra note 17 (requesting that FINRA "undertake a comprehensive review of its rulebook to identify existing FINRA rules that exclude or may otherwise not apply to U.S. Treasury securities (or government securities more generally) . . . and to assess the continuing validity for such exclusions").

234. See infra section III.B.

235. See Jonathan A. Brogaard, High Frequency Trading and Its Impact on Market Quality 64 (July 16, 2010) (on file with the *Columbia Law Review*) (unpublished manuscript); Kevin McPartland, What's Next for High Frequency Traders?, Greenwich Assocs.: Blog (Sept. 27, 2019), https://www.greenwich.com/blog/what%E2%80%99s-next-high-frequency-traders [https://perma.cc/WQM9-7H8N] [hereinafter McPartland, What's Next?] (arguing that HFTs "do in fact improve overall market liquidity—both directly via the trading that they do (i.e. tightening spreads, offering firm pricing), but also indirectly by fostering greater competition and technology innovation amongst all bank and non-bank liquidity providers"). Indeed, HFT firms recently expanded their reach, with Jump Trading entering into the customer–dealer space in addition to the interdealer market. See Joe Rennison, Jump Trading Joins Challenge to Banks in Treasury Market Making, Fin. Times (Aug. 20, 2018), https://www.ft.com/content/8c8a39be-9990-11e8-ab77-f854c65a4465 [hereinafter Rennison, Jump Trading] (on file with the *Columbia Law Review*); McPartland, What's Next?, supra ("Jump Trading created Jump Liquidity, a strategy that trades both U.S. Treasuries, FX and other asset classes on a name-disclosed basis with customers."). There are also HFT collaborations. In 2016, for example, Virtu and J.P. Morgan Chase announced a strategic partnership, with Virtu providing technology to J.P. Morgan to trade in the interdealer market, and J.P. Morgan returning a fixed payment and portion of the profits. Nicole Bullock, High-Frequency Traders Adjust to Overcapacity and Leaner Times, Fin. Times (Oct. 9, 2017), https://www.ft.com/content/ca98bd2c-80c6-11e7-94e2-c5b903247afd (on file with the *Columbia Law Review*); Nicole Bullock & Joe Rennison, JPMorgan and Virtu Financial in U.S. Treasuries Tie-Up, Fin. Times (Aug. 3, 2016), https://www.ft.com/content/04687116-5998-11e6-9f70-badea1b336d4 (on file with the *Columbia Law Review*).

236. See Gerig, supra note 177, at 1 (providing "evidence that HFT synchronizes security prices in financial markets" by ensuring that "a price change in the first security coincides nearly instantaneously with a similar price change in the second security").

The success of HFT firms in Treasuries, therefore, marks the emergence of a new category of firm that is now dominant in this all-important marketplace.[237] While these traders bring expertise and generate liquidity, the success of HFT means competition for primary dealers and reduced returns from their preeminent position throughout Treasury primary and secondary markets. As the next Part details, this growing market influence increases the challenges of motivating compliance and cooperation between one set of highly regulated actors (primary dealers) and those that face a far lower burden (HFTs).

III. FRAGILITY AND FAILURE IN TREASURY MARKET OVERSIGHT

This Part addresses the implications for Treasury markets under conditions created by both a fragmented regulatory environment and HFT domination. Because Treasury markets lack a meaningful and effective oversight structure, regulators have been slow to even become aware of the new reality of the risks HFT has imported into Treasuries.[238] These weaknesses leave regulators ill-equipped to impose well-crafted ex ante constraints on risky market behavior, which in turn makes ad hoc and ex post interventions—like broad, openhanded interventions by the Fed with public money—inevitable. This regulatory gap has the additional effect of making private firm risk-taking in Treasury markets cheaper than in other spaces supported by a workable and diligent oversight structure (like equities).[239] With interdealer competition, limited accountability, and weak economic constraints tying them to Treasuries, traders may also rationally exit the market during times of trouble or unpredictability. Cheap exit by dealers drains the market of liquidity and leaves it vulnerable to volatility and price instabilities, as seen during the COVID-19 market panic.[240]

This set of circumstances would be problematic for any market, but for *the* global safe haven for financial stability, it constitutes an especially pernicious systemic threat. From the standpoint of the domestic U.S. economy alone, cracks in Treasuries' armor diminish the country's unparalleled power to borrow expansively.[241] This Part therefore sets out the deficiencies arising from fragmentation and limited attention to adaptive rulemaking within public regulation and highlights the costs resulting from a competitive trading structure for private self-regulation.

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237. See Harkrader & Puglia, supra note 15 ("[N]ew data . . . suggests that PTFs are making inroads into parts of the Treasury cash market outside of their traditional domain.").

238. See supra section I.B.

239. See supra section II.C.2.

240. See infra section III.C.

241. See supra notes 70–75 and accompanying text.

A. *An Ineffective Model of Public Oversight*

Unlike equities or derivatives markets overseen by an expert primary regulator (the SEC and CFTC mainly, assisted by FINRA), Treasuries function under a looser framework of multiple regulators working together without any of them taking the lead.[242] In some ways, this fragmentation is advantageous: Collaborative oversight should be less costly than setting up a new agency to regulate Treasuries.[243] As Professors Freeman and Rossi observe, administrative agencies sharing regulatory burdens is nothing new; indeed, there are advantages to this arrangement.[244] By strategically harnessing expertise and varying sources of authority, shared oversight can be better informed, tailored, and anchored by a bedrock of historical practice that makes agency action familiar to respectively regulated firms.[245]

But as Freeman and Rossi also caution, "[I]nteragency coordination is one of the central challenges of modern governance."[246] Shared oversight of Treasuries is emblematic of this.[247] Fragmentation creates institutional hurdles that hamper regulators' ability to develop an understanding of the risks facing Treasury markets.[248] Thus, the kind of decisionmaking needed to agree on these risks, how they might manifest, and what to do about them—complex even for a single agency—takes on added difficulty when multiple regulators must all come to agreement.

A first-order problem lies in agencies suffering difficult information deficits that preclude them from developing a picture of the risks created by the activities of firms within the Treasury marketplace. These arise on account of (1) a longstanding lack of systematic and detailed reporting in Treasuries trading, and (2) gaps in entity-based regulation that limit the ability of agencies to extract information, through certification and discipline, from firms active in Treasuries intermediation.

1. *Limited Historical Reporting.* — A lack of a historical trade reporting regime in the secondary market has left agencies without a bank of deep institutional memory from which to derive insights about the risks created

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242. See supra notes 92–107 and accompanying text (setting out the mandates of the various regulators involved in overseeing Treasuries, their regulatory spheres, and the aspects of the market they are tasked with overseeing).

243. U.S. Dep't of the Treasury et al., Government Securities Regulation Joint Study, supra note 56, at 2–4.

244. See Freeman & Rossi, supra note 9, at 1140–43, 1146 (exploring the challenges and mechanisms of agency coordination, highlighting the benefits and shortcomings of shared regulation, and suggesting strategies for improved coordination).

245. See id.

246. Id. at 1134.

247. See id. at 1181–88 (arguing that while coordination may raise agency costs in administrating decisionmaking, this is an "up-front investment" that can "produce savings down the line").

248. See id. at 1150–51 (noting that following Flash Rally, the CFTC, which maintains confidential Treasury futures transactions, "didn't initially have a legal agreement to share it with" Treasury, the Fed, or the SEC).

by Treasuries trading firms.[249] As noted, Treasuries only became subject to mandatory TRACE reporting in 2017.[250] Before 2017, reporting on Treasuries trading was patchy and came from a mishmash of sources. For example, firms reported only their large trading positions,[251] and primary dealers provided weekly reports to the N.Y. Fed about their exposures just to inform it about the state of the market, rather than to detect market misbehavior.[252] Regulators were thus unavoidably dependent on information warehoused by trading platforms to fill in some of the gaps.[253]

With real-time trade-by-trade reporting implemented only in 2017—and still excluding firms that are not FINRA-registered broker-dealers—agencies have endemic deficits in historical data that impair a fulsome understanding of how firms have traded in Treasuries, as well as the kinds of risks generated by their behavior.[254] Far from being obsolete, historical reserves of information offer invaluable insights into critical present-day questions, such as: Which firms have been the most active suppliers of

249. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 6–7 (describing how the 2014 Flash Rally underscored the inadequacy of the current system of monitoring and surveillance of the Treasury market).

250. See Notice of Filing of Amendment No. 1 and Order Granting Accelerated Approval of a Proposed Rule Change, as Modified by Amendment No. 1, Relating to the Reporting of Transactions in U.S. Treasury Securities to TRACE, 81 Fed. Reg. 73,167, 73,168–69 (Oct. 18, 2016).

251. See 15 U.S.C. § 78o–5(f) (2018) (authorizing the Treasury Secretary to "adopt rules to require specified persons . . . controlling large positions in to-be-issued or recently issued Treasury securities to file such reports regarding such positions . . . for the purpose of monitoring the impact . . . in the Treasury securities market . . . ."); U.S. Dep't of the Treasury et al., Government Securities Regulation Joint Study, supra note 56, at 6–7.

252. See, e.g., N.Y. Fed, Primary Dealer List, supra note 22 ("Primary dealers are required to provide data on their market activity. The New York Fed expects primary dealers to submit accurate data, but it does not audit the data."); FR 2004: Government Securities Dealers Reports, Bd. Governors Fed. Rsrv. Sys., https://www.federalreserve.gov/apps/reportforms/reportdetail.aspx?sOoYJ+5BzDZq2f74T6b1cw== [https://perma.cc/C2TA-FHFU] [hereinafter The Fed, Government Securities Dealer Reports] (last visited Feb. 24, 2021) (collecting reports that gather "information on market activity from primary dealers in U.S. government securities").

253. U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 15 (noting that data supporting the report's findings had to be collated and pieced together from major interdealer Treasuries trading platforms).

254. Granted, this gap has been remedied somewhat since 2019. Trading platforms like BrokerTec are now required to identify traders in reports to regulators. See Fin. Indus. Reg. Auth., Regulatory Notice 18-34, SEC Approves Amendment to Require Alternative Trading Systems to Identify Non-FINRA Member Subscribers in TRACE Reports for U.S. Treasury Securities 2 (2018), https://www.finra.org/sites/default/files/notice_doc_file_ref/Regulatory-Notice-18-34.pdf [https://perma.cc/3CH6-NN2N]. Previously, an HFT may have only been identified generically as "customer" in these reports, but now a platform has to provide an actual identifier. Harkrader & Puglia, supra note 15. While this is clearly an improvement, however, the benefits of this more granular reporting are still questionable. This design suggests that, rather than requiring an HFT to report directly and internalize a reporting costs ex ante—thus motivating the trader to be careful in how it behaves—the system looks to lagging, ex post reporting by a third-party platform to cover the gap.

liquidity through the years? How committed are they as key providers of liquidity? In other words, are they ready to buy and sell even during periods of market stress—or do they simply exit en masse in times of trouble? The Flash Rally revealed the costly effect of such information gaps by catching regulators in a state of unpreparedness.[255] Indeed, the implementation of the 2017 TRACE reporting regime has at least helped regulators begin answering such fundamental questions more systematically by unraveling insights about how the market divides intermediation between primary dealers and HFTs as well as its implications for market quality.[256]

A lack of granular historical information also prevents regulators from developing a thorough picture of the kinds of trading activities that may be specifically harmful and disruptive in Treasuries intermediation. For example, does sudden exit by certain liquidity providers result in damaging price distortions—and if so, how costly can such damage be when occurring in the premier risk-free security? Do traders engage in activities designed to manipulate or bluff others, and what form does such manipulation or bluffing take? Do customers receive best prices from the dealers with which they transact for Treasuries or cash?

The Flash Rally made clear that Treasury markets are, at minimum, vulnerable to some of these potentially manipulative practices. During the event, an unusual amount of "self-trading" (or "wash trades"), representing around 14% of the market volume, occurred between Treasuries traders.[257] Essentially, a number of automated traders were trading with themselves.[258] A recent study suggests that self-trading appears to be somewhat pervasive to Treasuries, representing 5% of overall volume in the interdealer market.[259] It is not clear why this should be the case, but one implication of these self-trades is that markets convey a false impression of liquidity due to the inflated trading volume generated by illusory trades.[260]

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255. See, e.g., Tracy & Ackerman, supra note 14 (reporting on how regulators were caught by surprise at the level of automation in interdealer markets).

256. Brain et al., supra note 119; Monahan, supra note 16 (noting the importance of TRACE reporting for revealing insights about Treasury market operations).

257. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 32–33; see also Treasury Mkt. Practices Grp., Automated Trading in Treasury Markets 6 (2015), https://www.newyorkfed.org/TMPG/medialibrary/microsites/tmpg/files/TPMG-June-2015-Automated-Trading-White-Paper.pdf [https://perma.cc/BN32-RM3Z] ("'Wash trades' are . . . intentionally manipulative non-bona fide transactions that do not result in a change in beneficial ownership of the security . . . . [Even] where trading is bona fide and not designed to be disruptive, certain automated trading strategies could nevertheless create a false or misleading impression of market liquidity.").

258. U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 32–33.

259. See Harkrader & Puglia, supra note 15 (finding that PTFs account for nearly all self-trading in the interdealer market).

260. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 54 (noting that automated trading provides traders with opportunities to create "false impressions of market depth, trading volume, and prices").

Without robust, systematic data on these kinds of historical and present-day firm activities, however, regulators lack effective means to gain perspective into disruptive practices in Treasuries and subsequent effects on price integrity and trader behavior.

2. *Limited Entity-Based Regulation.* — Information opacity arising from the absence of historical trading data is compounded by the lack of a certification regime for Treasuries traders. Conventionally, information gaps can be mitigated by entity-based checks on who can enter the market in the first place based on whether they possess the resources to participate. Although gatekeeping is detrimental to competition, regulatory certification can still aid in safeguarding systemic stability and reliability.[261] But Treasury markets lack a uniform and systematic public certification regime for major traders and platforms, further contributing to the costs of public oversight and regulatory action. As explained, a number of major HFTs that trade in Treasuries expressly structure their operations with the goal of escaping broker-dealer designation under either FINRA or SEC oversight.[262] The twenty-four primary dealers, of course, do undergo certification to be eligible and must furnish various disclosures to qualify; indeed, regulators have sought to tweak eligibility conditions in a bid to encourage leading HFTs to consider applying for primary dealer designation.[263] The fact that some of the most active HFT firms in Treasuries trading have not been tempted to opt into primary dealer certification, however, indicates that it is still too costly an undertaking for such algorithmic firms.[264]

This limited entity-based (or "firm-level") regulation of nonprimary dealer traders hinders regulators' capacity to police firm behavior in real time. Firms that avoid registration have every incentive to pursue privately profitable yet risky trading strategies, while divergences in current reporting rules mean that instances of bad behavior by nonreporters can

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261. The literature on the relationship between certification and market stability is extensive. See, e.g., Dean Corbae & Ross Levine, Competition, Stability, and Efficiency in Financial Markets 2 (Aug. 10, 2018), http://online.wsj.com/public/resources/documents/corbae_levine_paper_0825.pdf?mod=article_inline [https://perma.cc/YM6H-BSBS] (unpublished manuscript) (finding that there is a "competition-stability tradeoff: the removal of regulatory impediments to competition increases the fragility of the banking system"). Of course, regulatory certification can also fail, as it did in the 2008 Financial Crisis. See Sokol, supra note 225, at 120 (noting how the financial crisis "led countries to provide various benefits to favored companies, which may distort competition").

262. See Scaggs, Dealer–Trader Distinction, supra note 15; Harkrader & Puglia, supra note 15; see also supra notes 230–233 and accompanying text.

263. See Alexandra Scaggs & Joe Rennison, Citadel Looking into Becoming a Treasury Primary Dealer, Fin. Times, (Nov. 15, 2016), https://www.ft.com/content/47912e56-ab4b-11e6-ba7d-76378e4fef24 (on file with the *Columbia Law Review*) (explaining that the rule changes "reduce the barriers to entry, in an effort to 'expand and diversify the pool of firms eligible to apply for primary dealer status'"); see also N.Y. Fed, Primary Dealer List, supra note 22.

264. See Scaggs, Dealer–Trader Distinction, supra note 15 (detailing efforts by trading firms to stay outside of FINRA's regulatory perimeter).

be costly to track.[265] Because forcible exclusion from the market and other serious penalties become less likely due to these costs, and reputational harm through public disclosures is limited, punishment becomes too weak a deterrent to dissuade traders from taking risks.

In fact, traders need not even anticipate large profits in order to behave riskily, given these weak constraints and the low chance of detection and punishment. Traders might send enormous volumes of orders to platforms that stress their systems, fail to test algorithms before use, crowd out or trick other traders through creative strategies, transact on unreliable news sources, or engage in manipulative activities that hurt price integrity. It is a decent bet that their bad actions will go unnoticed and unpunished in a market where regulators are fragmented, poorly coordinated, and lack fulsome information. A limited rulebook means that disruptive conduct may not even be prohibited; for example, within the body of the FINRA rules that do bite, there is some doubt as to whether behaviors like frontrunning, intimidation, and coordination are even applicable to Treasuries.[266] Disciplinary actions are thus likely to be fewer, reducing the ability of regulators to extract information from investigations and limiting litigation against misbehaving trading firms.

In addition to a lack of historical institutional memory, agencies are also hobbled by barriers to pooling and sharing intelligence with one another, diminishing regulators' understanding of how individually collected insights form the bigger picture of market-wide trends and practices. Treasuries regulators possess unique repositories of internal data, but do not consolidate this information by releasing it publicly. Under the 2017 TRACE reporting rules, member firms report secondary market trades to FINRA, but this data is not disclosed to the public.[267] Only in March 2020 did FINRA begin to release weekly aggregate statistics of secondary market activity—a far cry from the efforts the SEC has led in equities markets to speed up and increase the detail in public dissemination of real-time trading data.[268] Data from bank dealers,

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265. See Harkrader & Puglia, supra note 15.

266. See Fin. Indus. Reg. Auth., Regulatory Notice 18-05, FINRA Requests Comment on the Application of Certain Rules to Government Securities and to Other Debt Securities More Broadly (2018), https://www.finra.org/sites/default/files/Regulatory-Notice-18-05.pdf [https://perma.cc/3F9F-8KWQ].

267. See Notice of Filing of Amendment No. 1 and Order Granting Accelerated Approval of a Proposed Rule Change, as Modified by Amendment No. 1, Relating to the Reporting of Transactions in U.S. Treasury Securities to TRACE, 81 Fed. Reg. 73,167, 73,167 (Oct. 18, 2016).

268. Now Available—Weekly Aggregated Reports and Statistics for U.S. Treasury Securities, Fin. Indus. Reg. Auth. (Mar. 10, 2020), https://www.finra.org/filing-reporting/trace/now-available-weekly-aggregated-reports-and-statistics-us-treasury [https://perma.cc/63YT-9PHK] [hereinafter FINRA, Reports and Statistics for U.S. Treasury Securities]; see also Press Release, SEC Adopts Rules to Modernize Key Market Infrastructure Responsible for Collecting, Consolidating, and Disseminating Equity Market Data (Dec. 9, 2020), https://www.sec.gov/news/press-release/2020-311 [https://perma.cc/C7Q2-TQQY].

meanwhile, is collected by the Fed and N.Y. Fed.[269] The Fed and FINRA are currently exploring finalizing a pact to allow FINRA to collect data submitted by banks, but this initiative still appears to be a work in progress despite around three years of negotiation.[270] The lack of centralized private reporting and pooling among regulators means that data collected by various agencies has to be reconciled, standardized, and shared systematically. This can add delays before each regulator gets to see the information, and it raises the risk of data loss where such processes are weakly set up and supervised. Beyond trading data, of course, regulators each also possess institutional information on the firms that they supervise (such as assessments and disciplinary actions, among others) and may consider it useful to regularly share this intelligence with each other as part of their collective oversight of Treasury markets.[271]

Individual agencies, however, are also constrained by institutional rules that prevent them from freely sharing data with other regulatory bodies. The CFTC needed two months to conclude a legal agreement with partner agencies to share confidential data from the futures market in the Flash Rally investigation.[272] The new 2017 TRACE reporting regime also did not alter the GSA's allocation of regulatory responsibility assigning each agency responsibility for policing its own regulated entities.[273] Individual regulators thus lack the institutional incentive—and possibly the authority—to demand information from one another on private entities that they do not directly oversee. Thus, even if one agency is willing to take a lead in monitoring the market as a whole, it is unlikely to be able to take direct action against those firms that do not fall under its supervision, and it will incur costs just in exercising basic diligence due to bureaucratic and legal roadblocks to sharing data and insights.

Thus, differentiated regulators obscure a systemwide understanding of aggregate trends, practices, and risks created by the transforming market structure. As Part II details, high-speed automated trading has swiftly created new sources of market fragility.[274] Diverging spheres of

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269. See N.Y. Fed, Primary Dealer List, supra note 22 ("Primary dealers are required to provide data on their market activity. The New York Fed expects primary dealers to submit accurate data, but it does not audit the data."); The Fed, Government Securities Dealer Reports, supra note 253 (collecting reports that gather "information on market activity from primary dealers in U.S. government securities").

270. After announcing a plan to negotiate in 2016, there does not appear to have been an update with news of a successful collaboration between the Fed and FINRA since then. See The Fed, FINRA Negotiation Press Release, supra note 15; see also Kate Davidson & Gabriel T. Rubin, Brainard: Fed Close to Finalizing Deal on Treasury Market Data Collection, Wall St. J. (Dec. 3, 2018), https://www.wsj.com/articles/brainard-fed-close-to-finalizing-deal-on-treasury-market-data-collection-1543851220 (on file with the *Columbia Law Review*).

271. See supra notes 93–111 and accompanying text.

272. See Tracy & Ackerman, supra note 14.

273. U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 2, 9–10.

274. See supra section II.C.1.

regulatory authority are a barrier to agency efforts to piece together the systemic quality of the new risks that market transformations have generated. For example, a large HFT securities firm that ranks as a major trader in the interdealer space will either be overseen by the SEC and FINRA as a broker-dealer or fall outside that definitional perimeter.[275] Either way, this makes it difficult for the Fed or N.Y. Fed, as expert regulators of the financial system as a whole, to understand a given firm and its trades, strategies, and impact on market quality. A large firm that engages in wash trades, for instance, may be creating a false illusion of liquidity that risks the price quality of Treasuries.[276] Or an HFT not subject to the usual broker-dealer capital requirements may take risks and trade in amounts exceeding the capital it actually holds.[277] Similarly, trading platforms like BrokerTec and eSpeed nominally fall under the SEC's Regulation ATS regime, albeit as exempt entities.[278] At the same time, the systemic importance of both platforms is undeniable: Were BrokerTec to fail, the ripple effects on the financial system as a whole would likely be grave.[279] Put simply, varying jurisdictional boundaries make it difficult to assign the best-suited regulator to a particular entity.

This state of affairs is problematic. Transformations in Treasury market structure demonstrate the importance of regulatory cooperation in basic information gathering in order to understand the novel risks posed by high-speed automatic trading.[280] The multiplicity of responsible agencies, along with the light and largely unchanged present-day rulebook, signals that regulators have struggled to coordinate to develop a responsive system of rules and constraints to address emerging risks. It also suggests that regulators lack the necessary administrative motivation to collectively deploy their individual stores of information and access to monitor new technologies and firms.[281] The consequences of this

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275. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 9–10; Scaggs, Dealer–Trader Distinction, supra note 15; Harkrader & Puglia, supra note 15.

276. Treasury Market Practices Group, Automated Trading in Treasury Markets 6 (2015), https://www.newyorkfed.org/TMPG/medialibrary/microsites/tmpg/files/TPMG-June-2015-Automated-Trading-White-Paper.pdf [https://perma.cc/88GL-5EGS] ("'Wash trades' are . . . intentionally manipulative non-bona fide transactions that do not result in a change in beneficial ownership of the security. . . . [Even] where trading is bona fide and not designed to be disruptive, certain automated trading strategies could nevertheless create a false or misleading impression of market liquidity.").

277. See Roisman, supra note 233.

278. See supra notes 124–129 and accompanying text.

279. See TMPG, Jan. 2019 Meeting Minutes, supra note 212, at 1.

280. See Katy Burne, Concern About Trading of U.S. Treasurys Prompts Review by Regulators, Wall St. J. (July 12, 2015), https://www.wsj.com/articles/concerns-about-trading-of-u-s-treasurys-prompts-review-by-regulators-1436729365 (on file with the *Columbia Law Review*) [hereinafter Burne, Concern Prompts Review].

281. In the case of equities, for example, regulators have crafted a detailed process to study and implement a host of rules to respond to vulnerabilities created by high-speed automation and HFT firms. For rules governing direct market access to utilize HFT on equity exchanges, including reasonable levels of checks and controls on automated traders

fragmentation amplify the costs of action and the likelihood of regulatory apathy or inertia.[282]

Finally, these frictions in information gathering, sharing, and aggregation cast doubt on regulators' ability to craft effective, responsive rules and ex ante constraints on firm behavior. Because market risks are imperfectly understood, regulators face high hurdles in determining how best to construct legislation and enforcement priorities. For example, regulators would need to consider how harmful a particular action might be in the context of Treasuries trading. A single trader deciding to exit the market might not be serious, but an entire group of traders doing so (as they may well do automatically in high-speed markets) could rapidly drain the market of much-needed liquidity.[283] Another important issue for regulators is determining who bears responsibility for harm from disruptive behaviors like wash trades or stuffing the market with orders without good reason, and how does such conduct affect other traders (perhaps by causing them to retreat)? What are the externalities transmitted into other markets by this sort of behavior, such as those for Treasury futures? What is the optimal regulatory constraint that reduces risk-taking while preserving market-makers' willingness to provide ready liquidity—capital requirements, stricter reporting, or punishment through high fines and public sanction?

Answering such questions would be difficult for any single regulator attempting to craft tailored rules to govern the complex Treasury market. But they raise nearly impossible hurdles for a loosely organized and uncoordinated group of agencies—burdened with varying institutional mandates, turf conflicts, constraints on information sharing, and enhanced internal negotiation costs—to develop rules and enforcement priorities for a fast-moving, integrated, and interconnected marketplace. The need to secure agreement between multiple regulators on complicated matters of technological detail is likely to result in regulation that addresses either only the most flagrant violations or concerns that are uncontroversial and relatively minor. In the meantime, evolutions in

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and their systems, see, for example, SEC Risk Management Controls for Brokers or Dealers with Market Access, 17 C.F.R. § 240.15c3-5 (2020). Exchanges must also demonstrate operational resilience. See Regulation Systems Compliance and Integrity, Exchange Act Release No. 73639 (Nov. 19, 2014), 79 Fed. Reg. 72,252 (Dec. 5, 2014) (codified at 17 C.F.R. pts. 240, 242 & 249). The CFTC also proposed amendments to its regulatory regime governing electronic trading for derivatives. See Electronic Trading Risk Principles, 85 Fed. Reg. 42,761, 42,766–69 (proposed July 15, 2020) (to be codified at 17 C.F.R. pt. 38); see also Press Release, U.S. Commodity Futures Trading Comm'n, CFTC Approves Two Final Rules and Two Proposed Rules at June 25 Open Meeting (June 25, 2020), https://www.cftc.gov/PressRoom/PressReleases/8188-20 [https://perma.cc/LH9L-RLQA].

282. See Freeman & Rossi, supra note 9, at 1146, 1147–51 (detailing the costs of agency fragmentation in fostering coordination costs, barriers to information sharing, and inaction in areas of joint oversight).

283. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 4–7; see also supra section II.C.1.

traders' behavior that are not captured by anemic reporting and registration requirements could be proliferating risks to Treasury markets in regulators' blind spots.

B. *Misaligned Incentives for Private Self-Regulation*

Private, industry-driven self-regulation also lacks effective incentives to fill the gaps left by this fragmented public oversight regime. Traditionally, primary dealers have offered some information about the state of Treasuries and provided a degree of stability and continuity given their economic skin in the game across Treasury markets as a whole. But they have now seen their dominance erode dramatically in the interdealer market, giving way to HFT firms subject to lighter regulatory requirements.[284] In the absence of robust regulatory oversight, private self-regulation in Treasuries to manage the externalities created by HFTs is certainly *possible*. As Professors Egorov and Harstad observe, private self-regulation is likely to arise either in the absence of public regulation, especially to respond to (customer) market demand, or to preempt oversight by a strict regulator.[285] Of course, for Treasuries, the prospect of strict regulation is not a relevant motivating factor given the hands-off, fragmented regulatory framework and the perception of Treasuries as ultrasafe investments. But self-regulation could still theoretically develop to fill the gaps left in public oversight, especially in light of its potential benefits to investors and the market. Major Treasuries traders might come together—primary dealers and HFTs alike—to develop standards and rules to monitor themselves, ensuring that bad behavior is kept in check through private discipline. Yet, as this section argues, the current design of Treasury market structure negates the incentives of primary dealers and HFTs to cooperate in delivering both private oversight and self-discipline.

On paper, the self-interest of primary dealers ought to create a powerful motive for them to use their resources to exercise self-discipline and take losses to fight off episodic crises.[286] As section II.A describes, primary dealers derive profits from each part of the market (primary and secondary) as well as a reputational halo from their efforts. They have, therefore, had a great deal to lose—not only the profits from their Treasuries franchise but also their standing with regulators and clients.[287] Perhaps understanding the compelling incentives created by the privilege of primary dealer status, regulators imposed no affirmative obligations on

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284. See Harkrader & Puglia, supra note 15.

285. See Egorov & Harstad, supra note 34, at 1652–57.

286. See Marco Arnone & Piero Ugolini, IMF, Primary Dealers in Government Securities 19 (2005), https://www.elibrary.imf.org/doc/IMF058/05414-9781589063792/05414-9781589063792/Other_formats/Source_PDF/05414-9781451980325.pdf [https://perma.cc/R5PM-99BC] (noting that countries with primary dealer systems may "establish privileges for the primary dealers, not only as a reward for their function, but also to motivate primary dealers to perform their functions efficiently and in a cost-effective way").

287. See supra note 150 and accompanying text.

primary dealers to either monitor the market or to keep trading and maintain the market's resiliency in case of crisis.[288]

And, as a fairly homogenous cohort of international banks and investment firms, primary dealers are well-situated to police themselves in Treasuries.[289] Owing to repeat interactions within a small, similar, and closed group, firms should have a store of information on each other and have an incentive to conduct peer-to-peer surveillance. Punishment can be meted out by way of reputational sanction or threats of exclusion from the club.[290] Although there are obvious downsides to primary dealer monopolization (such as the potential for collusion), this collective economic stake theoretically promotes good behavior and a shared interest in the market's success.

The interaction of once-dominant primary dealers with now-dominant HFT traders in the interdealer market, however, distorts these cooperative incentives. For a start, the likely returns from the franchise are diminished for primary dealers; primary dealers remain major buyers at debt auctions and in the dealer–client market for now, but they have lost significant turf to HFTs in the interdealer market.[291] Even in auctions and the dealer–client market, primary dealers have seen their costs mount with high government debt issuance and uncertain client demand.[292] HFTs have also begun to nudge into the dealer–client space.[293]

This means that rather than competing within a tight-knit group of similarly advantaged peers, primary dealers are now competing with nimble, market-dominant experts that can afford to deploy aggressive trading strategies with little fear of discovery or sanction by regulators.[294]

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288. Alexandra Scaggs, Opinion, Please Let's Stop Saying U.S. Primary Dealers Are Required to Make Markets (Updated), Fin. Times (June 17, 2016), https://www.ft.com/content/b6c87a0f-6d50-3f46-b27a-5ecc83d12dc5 (on file with the *Columbia Law Review*).

289. See Dupont & Sack, supra note 21, at 787–89 (noting the historical reliance on major banks as primary dealers); see also N.Y. Fed, Primary Dealer List, supra note 22.

290. See, e.g., Thomas R. Palfrey & Howard Rosenthal, Repeated Play, Cooperation and Coordination: An Experimental Study, 61 Rev. Econ. Stud. 545, 564 (1994) ("Repetition leads to more cooperative behaviour . . . and improves efficiency, and better monitoring has a similar effect.").

291. Harkrader & Puglia, supra note 15 (explaining HFT dominance in the interdealer market).

292. Rennison, Jump Trading, supra note 235; Colby Smith, Huge U.S. Bond Issuance May Compel Fed to Alter Purchase Plans, Fin. Times (Aug. 5, 2020), https://www.ft.com/content/c1d0847f-1f9a-4304-8413-5d64501c2ef4 (on file with the *Columbia Law Review*) [hereinafter Smith, Huge U.S. Bond Issuance] (describing the complex auctions arising out of the large volume of government debt issuance and uncertain client demand).

293. See Jim Greco, The Final Nail in the Coffin, Trading Places (May 15, 2018), https://tradingplacesnewsletter.com/the-final-nail-in-the-coffin-ad2e9e826499 [https://perma.cc/S3ZJ-BA4Q] (tracing the history of dealers' waning influence on the U.S. government debt market and how BrokerTec and eSpeed first permitted HFTs onto their platforms in the early 2000s "to supercharge liquidity in the hopes of gaining an edge in market share"); see also Rennison, Jump Trading, supra note 235.

294. See supra notes 289–293 and accompanying text.

This dynamic suggests that cooperation between primary dealers and HFTs is neither likely nor feasible. A diminished franchise means that primary dealers have much less to lose if they choose to pursue risk—so when crisis strikes, rather than spend scarce capital to weather volatility and take losses, it makes more sense to save themselves. Indeed, during the Flash Rally, bank dealers reduced their trading much more sharply relative to HFTs that continued trading, albeit posting far fewer orders.[295] Similarly, the collapse in the Treasury market during the COVID-19 crisis saw a rapid exit by all major dealers, but HFTs exited especially sharply.[296]

HFT traders also lack formal constraints bonding them to the market and have limited institutional capacity to engage in monitoring, self-disciplining, and liquidity protection.[297] They are also less resilient market participants, tending to run a lean operation using small amounts of their own capital to transact through the day.[298] Margins on individual trades are small, and the business model depends on continuous and incremental gains on trades.[299] Unlike primary dealers, then, this leaves little room for HFTs to invest in the apparatus of active market policing. It also means that HFTs are likely to be especially sensitive to losses—and thus, have limited tolerance to remain in the market during a crisis.

This sensitivity to losses and compulsion to exit trading is especially powerful in the specific context of Treasury markets.[300] As an asset class, Treasuries primarily respond to public information relating to the risk of a single issuer: the U.S. economy. This is a unique market feature compared to equities, corporate bonds, or derivatives.[301] If the stock price of Company X experiences a volatile period, algorithmic traders might withdraw from dealing in its securities for a time, but they can still continue trading shares of Companies Y and Z. But HFT traders possess fewer options to diversify their operations within the Treasury market itself.[302]

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295. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 4–6.

296. Joshua Younger, Revisiting the Ides of March, Part I: A Thousand Year Flood, Council on Foreign Rels.: Follow the Money (July 20, 2020), https://www.cfr.org/blog/revisiting-ides-march-part-i-thousand-year-flood [https://perma.cc/3QA6-WERN]; see also infra section III.C.

297. As noted above, primary dealers are not subject to affirmative obligations to remain trading on the market, and neither are HFTs, which are subject to a lower regulatory burden. See Younger, supra note 296; see also supra section II.B.

298. See Younger, supra note 296.

299. See Miller & Shorter, supra note 188, at 2.

300. See supra section II.C.1.

301. Haitao Li, Junbo Wang, Chunchi Wu & Yan He, Are Liquidity and Information Risks Priced in the Treasury Bond Market?, 64 J. Fin. 467, 469–70 (2009) (stating that Treasuries are mainly affected by public information, though investors can hold private interpretations, while information about stocks varies in accordance with firms' private information).

302. This picture is complicated; some maturities of Treasuries are more heavily traded than others, and different maturities are impacted by information with varying intensity. See Fleming et al., BrokerTec Report, supra note 132, at 1–4.

From this perspective, HFTs have every incentive to build algorithms that retreat as soon as conditions seem stressed, as the risk of staying can expose firms to extensive liability across an entire market. Despite the obvious growth in trading volume since the arrival of high-speed trading in Treasuries, policymakers have groused about the reliability of this liquidity in times of market stress.[303] In other words, the perception of liquidity may turn out to be illusory just when liquidity is needed the most.[304]

Expecting cooperation between HFTs and primary dealers under these conditions is therefore impractical when the market is home to a heterogeneous group, and any group member is free to exit the moment the market appears even slightly inhospitable. When exit is easy and limited regulation and monitoring reduces detection for individual firms, the gains from private cooperation have to be sufficiently large to justify giving up profitable opportunities. But for the lesser-regulated firms, imposing a heavy dose of self-discipline at the cost of their competitive edge is simply irrational. Even for primary dealers, taking periodic risks makes up for losing competitive power to HFTs and internalizing asymmetrical regulatory burdens.

C. *COVID-19 and Revealed Fragility in Treasury Market Structure*

Post–Flash Rally, the real-world effects of these transformations in Treasury market structure came into brutal view during the initial days of the COVID-19 pandemic. Treasury market disruptions of this kind are alarming for two reasons: (1) Treasury markets constitute the recognized systemic bulwark against risk and uncertainty, designed to provide a safe haven in turbulent times; and (2) their workings interconnect deeply with other markets like those for equities, bonds, and derivatives.[305] High-profile breakdowns in Treasuries like the March 2020 incident suggest underlying structural fragilities and, most importantly, expose the reality that current Treasuries traders possess few private incentives to remain in the market during a crisis.

In March 2020, Treasury market trading conditions deteriorated sharply in response to growing panic about the impact of COVID-19 on the U.S. economy. Since late February, stock markets had been wrenched from a high-flying decade toward a rapid cratering, with the S&P 500 index losing almost 30% of its value in just twenty-two trading days—the quickest

303. Bouveret et al., supra note 1, at 5 (noting an "illusion of liquidity" in Treasury markets); see also Fleming & Ruela, supra note 4 (detailing the diminished liquidity in Treasuries during and following the March 2020 COVID-19 crisis).

304. See Katy Burne, The New Bond Market: Algorithms Trumps Humans, Wall St. J. (Sept. 23, 2015), https://www.wsj.com/articles/the-new-bond-market-algorithms-trump-humans-1443051304 (on file with the *Columbia Law Review*) (reporting on concern about bond market liquidity among regulators in 2015 when the Fed signaled its intention to raise interest rates).

305. See supra section I.A.

on record.[306] With extreme uncertainty about the impact of the pandemic pervasive across equities and corporate bonds, investors sought out Treasuries as the go-to recourse for cash and fail-safe, liquid securities. Analysts observed that the month of March saw Treasuries experience various glitches, in part related to the large-scale shift of traders away from their offices to working from home in lockdown.[307] Reflecting the impact of remote work on how analog traders engaged and communicated with one another, transaction costs rose and the number of orders being posted started to decline.[308]

Then on March 12, 2020, Treasury market function in the dealer–client and interdealer markets came close to collapse. The period was characterized by heavy investor demand to sell Treasuries and realize cash.[309] From the standpoint of panicking investors, evidence of market failure came in two main forms. First, they could not find dealers to trade with them.[310] In the dealer-to-client market, the normal system for dealers posting available prices lurched toward extreme disruption.[311] Prices sometimes failed to appear on screens.[312] Second, when investors did manage to see prices, they encountered sky-high quotes for otherwise normal trades that would ordinarily have been much cheaper.[313] As liquidity drained out of the market, prices became highly volatile, further

306. Eva Su, Cong. Rsch. Serv., R46424, Capital Markets Volatility and COVID-19: Background and Policy Responses 5–6 (2020), https://crsreports.congress.gov/product/pdf/R/R46424 [https://perma.cc/M36N-N8Z6].

307. Samson et al., supra note 2.

308. Id.

309. Smith & Wigglesworth, supra note 1. There is some evidence that hedge funds engaging in the Treasuries bond-basis trade, a trade that exploits minute differences in price between the price of a Treasury and that of a Treasury future, contributed to the Treasuries sell-off. See Annette Vissing-Jorgensen, Bond Markets in Spring 2020 and the Response of the Federal Reserve 26 (Jan. 7, 2021), http://faculty.haas.berkeley.edu/vissing/vissing_jorgensen_bonds2020.pdf [https://perma.cc/4K2D-BD9H] (unpublished manuscript); Adam Tooze, What Happened in the U.S. Treasury Market in March 2020?, Chartbook (Nov. 28, 2020), https://adamtooze.substack.com/p/chartbook-newsletter-5 [https://perma.cc/4SX8-GZJ8]. The Fed's official account, however, hedges against this interpretation. See Fed. Rsrv. Sys., Financial Stability Report 34–35 (2020), https://www.federalreserve.gov/publications/files/financial-stability-report-20201109.pdf [https://perma.cc/53HM-U99A] ("[T]he reduction in hedge fund Treasury positions may have contributed notably to Treasury market volatility in mid-March amid a massive repositioning by a wide range of investors. However, so far, the evidence that large-scale deleveraging of hedge fund Treasury positions was the primary driver of the turmoil remains weak.").

310. Lorie K. Logan, Treasury Market Liquidity and Early Lessons from the Pandemic Shock (Oct. 23, 2020), https://www.newyorkfed.org/newsevents/speeches/2020/log201023 [https://perma.cc/9MF8-96SZ] (detailing the enormous volume of sell orders and dealers' difficulties in trying absorb the order flow).

311. Smith & Wigglesworth, supra note 1; Fleming & Ruela, supra note 4.

312. Smith & Wigglesworth, supra note 1.

313. Id.; Fleming & Ruela, supra note 4.

fueling the feedback loop toward dealers simply stepping back from trading with investors.[314]

Trading was also deeply disrupted in the interdealer market, as evidenced by a rapid decline in liquidity as well as a sudden increase in transaction costs as liquidity providers stepped away.[315] Rather than traders staying in and supplying continuous trading opportunities to one another, traders disengaged quickly as conditions became choppy, and the interdealer markets predictably saw a sharp and lasting decline in their quality.[316] HFT activity in the interdealer market had been up to as much as 76% of the trading volume in the two months prior to March 12.[317] But HFTs withdrew dramatically as conditions turned sour.[318] Given the heavy dependence on their provision of ready liquidity, this retreat spelled immediate doom, triggering price instability.[319] For example, the costs of a thirty-year Treasury bond spiked by almost 50%.[320]

In addition to the apparently weak constraints binding Treasuries traders to the market in the midst of a crisis, highly automated trading systems simply struggled to cope with the extreme trading conditions.[321]

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314. See Cheng et al., supra note 1; see also Smith & Wigglesworth, supra note 1; Fleming & Ruela, supra note 4.

315. See Henry St. John, Joshua Younger & Sejal Aggarwal, J.P. Morgan, The Life Aquatic: Deeper Depth in the Treasury Market Microstructure 2 (2020) (on file with the *Columbia Law Review*) ("[HFTs'] rapid withdrawal from market making contributed significantly to the spike in volatility during March, including some evidence of short-lived but violent price action evoking the events of October 15, 2014."); Smith & Wigglesworth, supra note 1; Younger, supra note 296.

316. St. John et al., supra note 315, at 1, 5; Fleming & Ruela, supra note 4; Younger, supra note 296.

317. St. John et al., supra note 315, at 2.

318. BlackRock, Lessons from COVID-19: Market Structure Underlies Interconnectedness of the Financial Market Ecosystem 8–9 (2020), https://www.blackrock.com/corporate/literature/whitepaper/viewpoint-lessons-from-covid-19-market-structure-november-2020.pdf [https://perma.cc/B2HC-EDQJ] (noting that PTFs pulled back from market-making in Treasuries in response to deteriorating conditions); see also Younger, supra note 296.

319. St. John et al., supra note 315, at 2–3; Fleming & Ruela, supra note 4.

320. Liz McCormick & Alyce Andres, Treasuries Liquidity Drying Up Puts $50 Trillion in Question, Bloomberg (Mar. 11, 2020), https://www.bloomberg.com/news/articles/2020-03-11/-50-trillion-in-question-after-u-s-treasury-liquidity-dries-up?sref=2qugYeNO (on file with the *Columbia Law Review*).

321. Dhara Ranasinghe & Saikat Chatterjee, Pandemic Propels Old-School Bond Traders Towards an Electronic Future, Reuters (June 22, 2020), https://www.reuters.com/article/us-health-coronavirus-bond-trading-insig/pandemic-propels-old-school-bond-traders-towards-an-electronic-future-idUSKBN23T0MP (on file with the *Columbia Law Review*) (noting that, despite increased use of electronic systems during the COVID-19 crisis, a number of traders sought to use personal interactions to deal with heightened volatility). Algorithms generally encounter challenges when navigating complex and stressed scenarios. See Jonathan Brogaard, Matthew C. Ringgenberg & Dominik Rösch, Does Floor Trading Matter 5–6 (Jan. 25, 2021), https://ssrn.com/abstract=3609007 (on file with the *Columbia Law Review*) (unpublished manuscript) (explaining that since market quality is lower when complexity is high, floor traders become more important when the price process is more complex); Vikas Raman, Michel A. Robe & Pradeep K. Yadav, Man v. Machine:

With HFT firms being, by definition, automated in their operations, the inability to rely on their programs to maneuver through the costly volatility likely contributed to their sharp and rapid exit.[322] These disruptions are not surprising in light of the unprepared and ill-equipped system of public and private oversight currently tasked to oversee Treasuries.[323] Despite the warning shot fired by the Flash Rally years earlier, the impact of transformations in technology and dealer firms has gone largely unaddressed. Burdened by fragmentation and constrained information sharing, public regulators failed to take the opportunity to develop a workable disaster plan that might have insulated Treasury markets from such unexpected shocks.[324]

Given that Treasuries effectively constitute a kind of disaster insurance for investors, this preventative regulatory neglect is striking. Early warning signals—rising transaction costs and decreasing market depth, for example—might have triggered a cooperative effort between the major Treasuries regulators to share surveillance and plan for the potential that Treasuries might buckle under the weight of extreme volatility. Limited coordination and clogged information highways between agencies likely also acted as a brake on developing a map of interconnections between Treasuries and other markets, and vice versa.

After all, as studies from regulators and industry experts into the March 2020 crisis emerge, one of the key potential accelerants of the collapse might have been trades that exploit differences between the prices of Treasuries and those for Treasuries futures (derivatives written on the value of Treasuries).[325] As markets grew turbulent, dislocations in the costs of trading Treasuries futures caused investors—notably, leveraged hedge funds—to rapidly unwind their positions and sell Treasuries, putting pressure on secondary market liquidity.[326] Without a preexisting means of engaging in monitoring, communication, and information sharing, regulators were caught off-guard by this channel for

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Liquidity Provision and Market Fragility 2–4 (2015), https://ifrogs.org/PDF/CONF_2015/Ramann_Robe_Yadav_2015.pdf [https://perma.cc/28KE-Q3LT] ("[A]lgorithms pre-programmed *ex ante* cannot deal with the complexity of turbulent periods as effectively as manual traders.").

322. Molly Smith & Matthew Leising, Humans Top Bots in COVID Crisis Electronic Bond Trading Test, Bloomberg (May 20, 2020), https://www.bloomberg.com/news/articles/2020-05-20/humans-top-bots-in-covid-crisis-test-of-electronic-bond-trading (on file with the *Columbia Law Review*); Younger, supra note 296.

323. See supra section I.B.

324. See supra section III.A.

325. Daniel Barth & Jay Kahn, Off. of Fin. Rsch., Basis Trades and Treasury Market Illiquidity 14 (July 16, 2020), https://www.financialresearch.gov/briefs/files/OFRBr_2020_01_Basis-Trades.pdf [https://perma.cc/J8ZF-NBHB]; Jeanna Smialek & Deborah B. Solomon, A Hedge Fund Bailout Highlights How Regulators Ignored Big Risks, N.Y. Times (July 23, 2020), https://www.nytimes.com/2020/07/23/business/economy/hedge-fund-bailout-dodd-frank.html (on file with the *Columbia Law Review*).

326. See Barth & Kahn, supra note 325, at 14; Smialek & Solomon, supra note 325.

transmitting risk between Treasuries and other markets.[327] And without a taxonomy of risks to quickly ascertain the pathways by which Treasuries might become destabilized, regulators did not develop prophylactic measures that could have contained some of the damage ex ante (like checking leverage in the Treasuries futures market).[328] In the absence of a plan and effective constraints to control, mitigate the chance of, or reduce the scale of a fallout, public authorities had little choice but to deploy blunt tools ex post: expansive and open-ended financial resources to stabilize the market. In March 2020, the Fed did just that by preparing to lay out over $5 trillion to revive the functions of Treasury market–related operations.[329]

Moreover, fragmentation between banking and securities regulators meant they had little prognostication of what might be expected to happen if the highly automated market structure for Treasuries was suddenly confronted with a fast-moving and uncertain crisis. That prices might grow volatile, causing HFT and other market markers to rapidly exit, is something that has already occurred in other spaces with a longer history of automation and high-speed trading (like derivatives or equities).[330] While other markets have responded with efforts at containment—testing the resiliency of trading systems and platforms or implementing circuit breakers to reset panicked markets—Treasuries have undergone no such engaged reflection.[331] In other words, this individually rational, but deeply damaging, mass flight of traders from the world's most significant market was an extreme but still fairly predictable response to sudden market panic.

Moreover, as the COVID-19 crisis in Treasuries revealed, private traders—primary dealers and HFTs alike—cannot be relied on to step in and close liquidity gaps through private self-regulation. Private actors did not step in to push each other to promote market stability and resiliency at a critical time. To be sure, it is unrealistic and administratively irrational to expect otherwise. As section III.B illustrates, there are no affirmative requirements on the industry to engage in self-discipline and peer monitoring.[332] There are also no obligations imposed on key traders to

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327. Smialek & Solomon, supra note 325.

328. Id.

329. Stephen Spratt, How a Little Known Trade Upended the U.S. Treasury Market, Bloomberg (Mar. 17, 2020), https://www.bloomberg.com/news/articles/2020-03-17/treasury-futures-domino-that-helped-drive-fed-s-5-trillion-repo (on file with the *Columbia Law Review*).

330. See, e.g., Andrei Kirilenko, Albert S. Kyle, Mehrdad Samadi & Tugkan Tuzun, The Flash Crash: The Impact of High Frequency Trading on an Electronic Market, 72 J. Fin. 967, 968 (2017) (examining the role of HFT liquidity providers and their rapid exit amplifying the flash crash in May 2010, when the Dow Jones crashed almost 1,000 points before rebounding).

331. See, e.g., SEC, Algorithmic Study, supra note 181, at 55–69.

332. See supra section III.B.

continue trading and absorb losses if the market is in dire need.[333] In such circumstances, confronted by enormous uncertainty, losses, and deteriorating conditions, traders should be expected to prioritize their own interests and cut and run.

Of course, the COVID-19 pandemic market shock was an extreme stress test of Treasury markets, and hindsight offers a comfortable perch from which to draw conclusions about the consequences of regulatory omission. Nevertheless, these concessions fail to reassure in the specific context of Treasury markets. For one, they are supposed to function smoothly at all times, and *especially* during crisis, however grave.[334] While the pandemic is certainly epochal, smaller, unexplained disruptions such as the Flash Rally are likely to become more frequent. Yet in both extreme disasters as well as banal snafus, the existing regulatory system for Treasuries has largely failed to mobilize.

Additionally, the assumption that the COVID-19 crisis in Treasuries is just a one-off event may be optimistic. The U.S. government expects to borrow trillions in order to stage an economic recovery over the coming years, heightening dependence on investors in government bonds rather than U.S. taxpayers to meet immediate needs.[335] Yet if investors suspect that the United States no longer constitutes the ideal debtor because of an unexpectedly fragile market structure, then taxpayers will have to pick up the slack. Impending turbulence in Treasury markets if the COVID-19 pandemic worsens, for example, may be especially damaging. The Fed has already deployed its immense resources to bolster markets, but how fully it can keep doing so—and whether it even should—is an ongoing, heated policy debate that hints at possible limits to this aid and its effectiveness.[336]

In summary, weaknesses in the public and private oversight model for Treasuries have proven to be a point of profound fragility for both the market and the broader economy. Fragmentation and a lack of coordination leaves regulators unprepared and bereft of effective ex ante mechanisms to mitigate the disruptive effects of new technology. Private oversight, meanwhile, has not stepped in to supervise the market, especially as primary dealers' ties to Treasuries have weakened due to newly

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333. See supra note 297 and accompanying text.

334. See Bouveret et al., supra note 1, at 5–6; Noeth & Sengupta, supra note 1, at 18; see also supra section I.A.

335. See, e.g., Smith, Huge U.S. Bond Issuance, supra note 292 (reporting on the Treasury Department's plan to issue long-dated debt).

336. Michael Fleming, Asani Sarkar & Peter Van Tassel, The COVID-19 Pandemic and the Fed's Response, Liberty St. Econ. (Apr. 15, 2020), https://libertystreeteconomics.newyorkfed.org/2020/04/the-covid-19-pandemic-and-the-feds-response.html [https://perma.cc/GV73-JEPQ]. The Fed has come under significant scrutiny for its expansive role during the COVID-19 crisis, with attempts to reduce its legislative authorities debated as part of congressional negotiations over the terms of the December 2020 stimulus package. See Jeanna Smialek, The Year the Fed Changed Forever, N.Y. Times (Dec. 23, 2020), https://www.nytimes.com/2020/12/23/business/economy/jerome-powell-federal-reserve.html (on file with the *Columbia Law Review*).

vigorous competition from HFTs. Moreover, neither HFTs nor primary dealers possess any real incentive to remain in the market during emergencies, the precise time when Treasuries are needed most. With these regulatory failures in both the public and private domains, Treasury markets are vulnerable to deterioration and a longer-term decline in the perception of reliability that has so far made them the safest security market on the planet.

IV. TWO PROPOSALS FOR REFORMING PUBLIC AND PRIVATE OVERSIGHT

This Article concludes by advocating for a thorough review and reform of Treasury market regulation. Attention is most commonly trained on the question of whether the United States can pay its debts on time,[337] but the health of secondary markets is essential to ensuring that investors and economies can depend on Treasuries to meet a broad spectrum of financial need. Ineffective regulation of this trading structure allows fragilities to develop, risking the ability of investors to fully realize the economic utility of Treasuries and undermining how efficiently the United States can access vast pools of investor capital as it currently—and often—needs to do.

The vulnerabilities Part III highlights risk extensive economic damage to U.S. interests, but are frequently overlooked or dismissed. There are the usual reasons for doing so: Transformations arising on account of high-speed trading algorithms might appear esoteric at first glance, and a newly tech-savvy cast of characters in interdealer Treasury markets seems far removed from the prosaic demands of funding government. Flash events blow over; glitches usually inflict fleeting blows to Treasury prices; and risky traders causing losses to another Wall Street firm represent pocket-shifting between sophisticated players that can, and should, look after themselves.

But as demonstrated by the COVID-19 catastrophe,[338] failure to provide effective regulation of Treasury markets presents a far more insidious source of structural harm than first meets the eye, demanding focus on their integrity as an essential priority for regulators. Thinly regulated Treasury markets heighten uncertainties about whether high-speed algorithms, and the infrastructure needed to support them, will perform under conditions that require Treasury markets to hold firm when other markets cannot. If traders know they can simply stop trading in tough times, why bother investing in building resilient systems to

337. See, e.g, James McBride, Andrew Chatzky & Anshu Siripurapu, The National Debt Dilemma, Council on Foreign Rels., https://www.cfr.org/backgrounder/national-debt-dilemma [https://perma.cc/6H98-MZNY] (last updated Sept. 9, 2020) ("The massive borrowing due to the pandemic has renewed debate over the peril posed by the national debt.").

338. See supra section III.C.

anticipate and weather future crises?[339] A loss of investor confidence in the market's reliability and robustness can directly threaten the United States' global standing as a financial safe haven, opening the door for other countries to offer their markets as the choicest destinations for international capital. The singular importance of the Treasury market makes it imperative for its structural workings to be safeguarded at all times. Yet weaknesses in public and private oversight leave the Treasury market dangerously vulnerable to this sort of disruption and liquidity flight, creating systemic risks for the economy and financial system that are virtually impossible to effectively mitigate under the current framework.[340]

This Part offers two proposals as near-term correctives. Rather than advocating for the pursuit of "nirvana" solutions, this Part proposes practical, workable ideas that fit within the current overall tenor of financial regulation and can be implemented in the relatively short term.[341] These reforms aim to (1) remedy fragmentation deficiencies in public regulation by securing more formal and systematic interagency coordination through the FSOC, and (2) remedy private incentives to encourage industry-focused risk mitigation and peer monitoring by introducing a clearinghouse for secondary markets in Treasuries. This proposed framework provides an initial set of structural safeguards to improve public oversight and foster incentives for private actors to invest in monitoring the market as well as each other. These recommendations are by no means perfect. Clearinghouses, for example, can be risky in their own right.[342] However, the objective is simply to introduce regulatory mechanisms that have long proven effective in other markets in order to minimize the fallout from the rare but catastrophic "tail risks" unique to Treasuries.

A. *Formalizing Coordination in Public Oversight*

Establishing an effective public oversight structure for Treasuries is a first priority. Just as the interdealer market for Treasuries has shifted toward full automation and high-speed trading, the dealer–client market can be expected to eventually experience a similar change as technology makes it easier for market participants to connect with one another.[343] As clients (like big mutual funds) look for price efficiencies of their own when buying and selling Treasuries, the wall separating one part of the Treasury market from another is unlikely to hold for long.[344] These radical changes

339. See supra sections III.B.

340. See Bouveret et al., supra note 1, at 4–5.

341. For a larger treatment of the famous "Nirvana Fallacy" and the tendency to propose "ideal" but ultimately unworkable solutions, see generally Harold Demsetz, Information and Efficiency: Another Viewpoint, 12 J.L. & Econ. 1, 3 (1969).

342. Yadav, Problematic Clearinghouses, supra note 48, at 393.

343. See, e.g., Greco, supra note 293 (detailing the various technology software that have eased access to the market); Rennison, High-Frequency Traders, supra note 198, (describing the increasing prevalence of the dealer–client market due to electrification).

344. See, e.g., Greco, supra note 293.

in the operation of a market vaunted for its stability calls for regulators to invest in understanding how these transformations fuel new risks, or reshape existing ones in troubling ways. An initial priority should be to overcome the institutionalized deficiencies of regulatory fragmentation in order to build mechanisms that more fully facilitate information collection, monitoring, and enforcement.

A reflexive response to the need to remedy fragmentation might point to a proposal designed to consolidate oversight in a single new agency created specifically for monitoring Treasuries. In other contexts, policymakers have floated the idea of reducing the fragmentation in financial regulation by creating a single or a small set of agencies that fold the functions of many multiple, existing regulators into a more streamlined model.[345] The rationale driving these proposals broadly lies in ensuring that the regulatory state more fully reflects the interconnected nature of financial markets.[346] Formal distinctions, which might mean that a capital markets regulator like the SEC only oversees securities firms while a banking regulator only supervises banks, are replaced by a more substance-driven mode of regulation that is able to capture complex risks more easily.[347]

While certainly attractive, such a radical overhaul of financial regulatory structure is impractical. This has been made abundantly clear by the fact that efforts to dismantle the current framework and formally consolidate regulatory agencies have consistently failed.[348] The force of political economy has worked to preserve existing spheres of agency power rather than giving way to reform.[349] In light of the urgency of Treasuries reform, the creation of a single regulator for Treasuries appears to be a chimerical aspiration that cannot be relied on to address the weaknesses Parts II and III identify.

Moreover, as Freeman and Rossi convincingly argue, consolidation does not always provide a ready or even the most optimal answer to the

345. U.S. Dep't of the Treasury, Blueprint for a Modernized Financial Regulatory Structure 137–80 (2008), https://www.treasury.gov/press-center/press-releases/documents/blueprint.pdf [https://perma.cc/4HBC-644B] [hereinafter U.S. Dep't of the Treasury, Blueprint]; see also Howell E. Jackson, A Pragmatic Approach to the Phased Consolidation of Financial Regulation in the United States 3–7 (Harv. L. Sch., Pub. L. & Legal Theory Working Paper Series No. 09-19, 2008), https://ssrn.com/abstract=1300431 (on file with the *Columbia Law Review*) (detailing the advantages of creating a more consolidated regulatory framework under a "United States Financial Regulatory Authority" that would replace agencies like the SEC and CFTC).

346. U.S. Dep't of Treasury, Blueprint, supra note 345, at 137–80.

347. See id.

348. See Freeman & Rossi, supra note 9, at 1151 (noting that calls to consolidate the SEC and the CFTC have long failed to succeed).

349. See id.

problems of interagency bureaucratic inefficiencies.[350] Logistically, consolidation demands political will and congressional action—a tall order during periods of partisan gridlock. Calls for consolidation in securities regulation have long gone unheeded.[351] And even then, consolidation by itself does not guarantee expertise and optimal deployment of regulatory power; after all, a new bureaucracy may be slow-moving or insufficiently endowed with authority.[352]

So, in order to mitigate the challenges of present-day fragmentation, regulators need to determine how best to cooperate and to establish institutional levers that facilitate effective rulemaking, surveillance, and oversight of Treasuries. Without formal structural consolidation of Treasuries oversight in a single authority, a detailed MOU offers a low-cost mechanism for agencies to coordinate as a first, workable step. That is, rather than collapsing respective authorities into a single agency or expecting major regulators to give up their power to one among them, MOUs can at least create a specific practical framework for agencies to collectively address deficiencies through a kind of quasi-contract.[353]

An MOU can more easily permit regulators to draw up workable procedures to share information and establish priorities for rulemaking.[354] This would allow Treasuries regulators to create a forum for regular discussion on existing and emerging risks (for example, in relation to automated trading and new trading firms) and allow policymakers to develop a taxonomy of fragilities that need to be addressed. As Parts II and III identify, regulators face a number of urgent questions key to advancing reform of Treasury markets: They must identify (1) how precisely automated, high-speed trading exposes Treasury interdealer markets to new risks; (2) how the risks of misfiring algorithms might spread to other markets; (3) what degree of scrutiny ought to be applied to platforms like BrokerTec that host trades in Treasuries; (4) what kinds of safeguards (like

350. See id. (highlighting the shortcomings of consolidating agencies within the administrative state).

351. See id. The Treasury's proposed Blueprint in 2008 has not been implemented despite the opportunity to do so after the Financial Crisis.

352. See id. at 1151–53 ("[I]t is not clear that large-scale consolidation achieves its purported goals. It may, for example, simply relocate rather than eradicate bureaucratic redundancy and inefficiency.").

353. See id. at 1161 (noting that MOUs resemble contracts, though they lack any enforcement power).

354. See id. at 1161–65 (describing the flexibility of MOUs in organizing relationships between agencies). As Professors Freeman and Rossi note, MOUs between agencies offer their drafters flexibility, discretion in choosing the purposes and content of the MOU and are not subject to a specific federal legal regime that mandates that particular requirements be followed. Id. They can be helpful in securing mutually binding commitments between agencies to fulfill a stated mission, ensuring that personnel are allocated efficiently and that shared authority between agencies is precisely clarified to avoid confusion and duplication. Id. These features can make a detailed MOU especially apt for the Treasury market where the significance of the issues at hand makes it necessary for regulators to craft a complex bargain.

circuit breakers) might protect Treasury markets from unduly sharp and anomalous price movements like those seen during the Flash Rally and COVID-19 crises; and (5) how regulators should motivate major traders to keep providing liquidity in a crisis—whether through a formal mandate to stay trading, or soft inducements.[355]

An MOU would permit regulators to navigate their varying mandates to be in a position to oversee Treasuries together effectively by securing necessary institutional approvals to share data with one another, pool insights, and determine actionable protocols (for example, if evidence of misconduct or risk is detected).[356] An MOU can also allocate supervisory responsibilities, like requiring Treasuries trading platforms to be overseen jointly by the SEC and the Fed, in recognition of their significance for trading and systemic stability.[357] And it can assign responsibilities and procedures for progressing enforcement actions, like if a securities firm engages in manipulation in the interdealer market.[358] To overcome turf issues and regulatory capture concerns,[359] regulators might agree to delegate enforcement decisions to a joint panel charged with determining appropriate enforcement actions. The process of creating an MOU will also force deliberation on how best to deploy agency expertise, skill, and constitutional authority to oversee Treasury markets.

To be clear, existing legislation does establish a formal demarcation of authority between regulators: The Fed monitors bank dealers, the SEC supervises securities firms, and the N.Y. Fed oversees Treasury auctions.[360] But as Part II argues, this current arrangement is lacking. It failed to identify the effects of the transformative and (arguably predictable) arrival of high-speed automated trading in interdealer secondary markets.[361] Attempts to study the 2014 Flash Rally were constrained by the need for regulators to negotiate permission to share data,[362] and it took several years

355. See supra sections III.B–.C.

356. See Freeman & Rossi, supra note 9, at 1161–62; see also Rory Van Loo, The Missing Regulatory State: Monitoring Businesses in an Age of Surveillance, 72 Vand. L. Rev. 1563, 1573–85 (2019) (detailing the tradeoffs involved in government monitoring of businesses).

357. See supra section III.A.

358. See Freeman & Rossi, supra note 9, at 1161–62.

359. See, e.g., James Cox & Randall Thomas, Revolving Elites: The Unexplored Risk of Capturing the SEC, 107 Geo. L.J. 845, 848–55 (2019) ("In recent years, the revolving door phenomenon—where attorneys transition between positions at the SEC and position in private practice—has become commonplace.").

360. See supra notes 111–113 and accompanying text.

361. U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 46–47; see also supra section II.C.

362. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 47–49 (explaining that Treasuries trading data is only available for a small "subset of trades and only to those trading on a specific platform or venue," and noting the planned development of a "standing multilateral information sharing agreement" among members of an interagency working group to alleviate issues created by the lack of information sharing); Tracy & Ackerman, supra note 14, (noting that accessing critical Treasuries trading data took over two months because the CFTC didn't have an agreement in place to share it with

for fairly basic trade reporting regulations to be put in place, amended, and implemented.[363]

This suggests that a refreshed and more systematized MOU is needed. Dividing responsibility for monitoring bank dealers from securities firms in interdealer Treasuries trading markets makes little sense where nearly all firms are engaged in securities trading with one another using various kinds of automated technologies. The traditional functional classifications between different types of market actors have little meaning when banks and securities firms are fluidly transacting with one another, as they do in the interdealer Treasuries space.[364]

To be sure, relying on MOUs alone imperfectly fills in bureaucratic gaps, particularly among established financial regulators long used to dominating their own spheres of authority. MOUs invariably leave out important details, lack specificity sufficient to coordinate action in a crisis, and are judicially unenforceable.[365] So, to add greater institutional accountability and formalization, regulators should take advantage of the FSOC, a body created by the Dodd–Frank Act in 2010, to coordinate supervision over systemic risk and large, complex financial institutions.[366] The FSOC offers an institutional locus of responsibility to coordinate overseeing Treasuries and to apply greater pressure on individual agencies to enforce and follow through on an MOU.

The FSOC is well placed to take on the role: It convenes fourteen of the country's major financial services regulators, including the Treasury Secretary (who chairs the FSOC), Comptroller of the Currency, and Chairs of the Fed, SEC, and CFTC.[367] The FSOC enjoys an expansive mandate to monitor and respond to systemic financial risks, having the authority to surveil both financial and nonfinancial firms and to "designate" them as a systemically important financial institution (SIFI) if they pose a threat to systemic stability, which then permits the imposition of measures to curb

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other agencies); Bouveret et al., supra note 1, at 28 ("[S]ignificant data gaps prevent authorities from having a complete view of the U.S. Treasury market.").

363. See Harkrader & Puglia, supra note 15 (describing the adoption of a new 2019 FINRA rule requiring IDBs to identify customers in TRACE data reporting).

364. Id.

365. See Freeman & Rossi, supra note 9, at 1161–65.

366. Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd–Frank), § 111(a), 12 U.S.C. § 5321(a) (2018); see also Jeffrey M. Stupak, Cong. Rsch. Serv., R45052, Financial Stability Oversight Council (FSOC): Structure and Activities 1 (2018), https://fas.org/sgp/crs/misc/R45052.pdf [https://perma.cc/UEL4-KUWT] ("[T]he FSOC's primary mission includes identifying risks to financial stability emanating from large interconnected financial institutions and utilities, promoting market discipline by eliminating investor expectations of government support to financial institutions' creditors, and responding to emerging threats to financial instability."); Bouveret et al., supra note 1, at 26 ("It is self-evident . . . that strong interagency coordination, eventually under the auspices of the Financial Stability Oversight Council, is warranted.").

367. 12 U.S.C. § 5321(b)(1)–(2); see also Christina Skinner, Regulating Nonbanks: A Plan for SIFI Lite, 105 Geo. L.J. 1379, 1389–90 (2017).

their riskiness.[368] Granted, the FSOC has exercised its designation power sparingly over the last decade.[369] That said, as a body specifically designed to facilitate the coordination of these major financial regulators in the interest of supervising interconnected firms and markets, it offers expertise and experience to help bridge the supervisory gaps over Treasury markets.[370] And, as an *existing* body officially organized under the aegis of the U.S. Treasury, relying on the FSOC elides the need for policymakers to create a new agency specifically designed to oversee Treasury markets.

The FSOC, designed to operate as a kind of "financial stability czar" that is supposed to respond to actual and future threats to financial markets' systemic safety, already ought to possess skills in data collection and analysis to build a map of how risks from one market or firm can spread outward and into the financial system a whole.[371] This places oversight of the systemically essential Treasury market squarely within its sphere of action.[372] The FSOC's membership also already gathers together most of the major regulators that are collectively entrusted to supervise Treasuries.[373] And as part of determining whether to treat a firm as a significant risk, the FSOC is supposed to undertake a deep and thorough

368. 12 U.S.C. §§ 5321(a)(1)(A), 5322(d), 5323(a); Skinner, supra note 367, at 1390; see also Authority to Require Supervision and Regulation of Certain Nonbank Financial Companies, 12 C.F.R. § 1310 (2020); Stupak, supra note 366, at 1. These measures can include requiring the firms to submit to oversight by the Fed as well as to maintain stronger capital buffers. See FSOC: Designations, U.S. Dep't of the Treasury, https://home.treasury.gov/policy-issues/financial-markets-financial-institutions-and-fiscal-service/fsoc/designations [https://perma.cc/MX77-8D83] [hereinafter U.S. Dep't of the Treasury, FSOC Designations] (last visited Feb. 2, 2021).

369. See U.S. Dep't of the Treasury, FSOC Designations, supra note 368. The FSOC has only designated four nonbank financial firms as SIFIs, and these designations have been rescinded as firms have reformed their businesses to become less systemically risky, or in the case of MetLife, challenged this designation in court. See MetLife, Inc. v. Fin. Stability Oversight Council, 177 F. Supp. 3d 219, 242 (D.D.C. 2016). In addition, the FSOC has designated eight financial markets utilities, firms that offer clearing and settlement services in financial markets infrastructure, as "systemically important." See U.S. Dep't of the Treasury, FSOC Designations, supra note 368.

370. See Skinner, supra note 367, at 1389–92 (analyzing the critical role of the FSOC in financial stability by regulating nonbanks and its broad designation power over systemically important financial entities); see also Hillary Allen, Putting the "Financial Stability" in Financial Stability Oversight Council, 76 Ohio St. L.J. 1085, 1090 (2015) (highlighting the risk that the FSOC can fail to secure fulsome oversight of systemic risks due to issues of political economy); Daniel Schwarcz & David T. Zaring, Regulation by Threat: Dodd-Frank and the Nonbank Problem, 84 U. Chi. L. Rev. 1813, 1817–20 (2017) (advocating for the FSOC's designation powers to highlight their role in preemptively deterring firms from engaging in systemically risky behavior).

371. See Skinner, supra note 367, at 1382.

372. See id. at 1382–83.

373. See 12 U.S.C. § 5321(b)(1).

analysis of its activities and impact, harnessing the expertise of its member regulators.[374]

To be clear, during its short history, the FSOC has been criticized for having a nebulous mandate, insufficient transparency, and flawed deliberative process.[375] Its work has also been viewed as vulnerable to capture by the prevailing political economy and dominant agencies.[376] This is despite the fact that the intensity of its oversight has been relatively light, with the FSOC using its power to designate firms as systemically risky only a handful of times.[377] Indeed, even when it has acted, legal challenges have successfully undone its SIFI designation decisions.[378]

But while the FSOC is not free of either criticism or controversy, it remains an available regulatory forum with a mandate suited to the task of overseeing Treasuries and ensuring MOU compliance. Establishing MOUs and centralizing negotiation invariably requires political will and buy-in from agencies, and undertaking this task through the FSOC, where each agency retains its authority but functions within the framework of a larger coordinating whole, makes this task easier than if each had to cede power to a new body.[379] And the creation of a detailed MOU—buttressed by coordination under the purview of the FSOC—at least permits agencies to harness the benefits of shared interagency supervision of the Treasury market, within an existing mechanism already designed to foster more cooperative supervision and rulemaking. This solution adapts to the

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374. See id. § 5322(3)(A) ("[The FSOC] may require the submission of periodic and other reports from any nonbank financial company or bank holding company for the purpose of assessing the extent to which . . . the nonbank financial company or bank holding company . . . poses a threat to the financial stability of the United States."); see also Skinner, supra note 367, at 1389–96 (describing the designation process and its reliance on detailed analysis of firm businesses and the risks they create).

375. See, e.g., Bora Yagiz, U.S. House Republican Report Slams Federal Council FSOC for 'Inconsistent' SIFI Designation Process, Reuters (Mar. 7, 2017), https://www.reuters.com/article/bc-finreg-fsoc-sifi-designation/u-s-house-republican-report-slams-federal-council-fsoc-for-inconsistent-sifi-designation-process-idUSKBN16E238 (on file with the *Columbia Law Review*).

376. See Allen, supra note 370, at 1120–34 (noting the impact of political economy on FSOC decisionmaking with the Fed and Treasury having an outsize role); John C. Coffee, Jr., The Political Economy of Dodd–Frank: Why Financial Reform Tends to Be Frustrated and Systematic Risk Perpetuated, 97 Cornell L. Rev. 1019, 1021–25 (2012) (discussing how regulatory attention on systemic stability is impacted by temporary political forces and how attention to such regulation becomes more intense following a crisis).

377. See U.S. Dep't of the Treasury, FSOC Designations, supra note 368.

378. See, e.g., MetLife, Inc. v. Fin. Stability Oversight Council, 177 F. Supp. 3d 219, 242 (D.D.C. 2016).

379. Some agency authority must be pooled, and accommodations must be made. This is, granted, a tough sell; recent years have seen rancorous debates surrounding the expansion of FSOC authority at some cost to its prestige and authority. See Allen, supra note 370, at 1120–34 (arguing that "there are flaws in the FSOC's structure and mandate that will likely increase its susceptibility to the cycle of political economy and to regulatory capture").

current state of financial regulation,[380] rather than implausibly waiting for Congress to create a new agency or an entirely new regulatory approach in coming years.

B. *Central Clearing and Private Incentives for Oversight*

Complementing greater public oversight through MOUs and the FSOC, regulators must also focus on building strong, workable mechanisms for private self-regulation in Treasury markets. Regulators, however, face tradeoffs when increasing the compliance burden on key participants, such as those requiring the industry to engage in self-monitoring and peer-discipline.[381] Imposing high transaction costs on traders can discourage them from entering the market, potentially increasing the Treasury's borrowing costs where secondary markets lack liquidity or are dominated by only large players that charge higher spreads.[382] On the other hand, an absence of private incentives to preserve market integrity creates the potential for risk-taking and suboptimal cost shifting.[383] As Part II shows, this regulatory balancing act historically relied on primary dealers to both maintain liquidity and keep the market in good order out of pure self-interest.[384] More recently, this approach is being tested as primary dealers face competition from HFTs subject to asymmetrically lower compliance costs.[385]

Clearinghouses offer a compelling private solution that promises to mitigate newly distorted incentives, at least in the Treasuries secondary market. Specifically designed to mitigate default risks in trading, clearinghouses are a tried-and-tested mechanism to harness private ordering in the interests of reinforcing security and resilience in financial markets, and they have long been a familiar and reassuring actor in equities and

380. See Markham, supra note 8, at 199–204 (noting that the "[r]egulatory jurisdiction over the Treasury market has been allocated among several regulators").

381. See Darrell Duffie, Market Making Under the Proposed Volcker Rule 3–7 (Rock Ctr. for Corp. Governance, Working Paper No. 106, 2012), https://ssrn.com/abstract=1990472 (on file with the *Columbia Law Review*) [hereinafter Duffie, Volcker Rule] (noting the potential adverse impact on Treasury market-making following the imposition of rules forbidding banks from using their own money to undertake proprietary trading—the "Volcker Rule"—and highlighting the sensitivity of market-makers to a regulation that constrained their activities and increased their compliance burden); Telis Demos, CME Warns of Volcker Rule Impact on Treasuries, Fin. Times (Feb. 14, 2012), https://www.ft.com/content/6fae1290-5728-11e1-be25-00144feabdc0 (on file with the *Columbia Law Review*) (reporting on the potential negative impact of the Volcker Rule on primary dealer participation in Treasuries).

382. See Duffie, Volcker Rule, supra note 381, at 3–7.

383. See Saule T. Omarova, Wall Street as Community of Fate: Toward Financial Industry Self-Regulation, 159 U. Pa. L. Rev. 411, 413–17 (2011) (underscoring the private incentives embedded in financial markets toward risk-taking and shifting the costs to the taxpayer, while also noting the importance of creating a framework of building incentives for financial firms to exercise private self-regulation).

384. See supra section II.A.

385. See supra section III.B.

derivatives markets.[386] As automation and algorithmic trading causes the secondary market in Treasuries to more closely resemble those markets, there is good reason to believe they can deliver similar benefits.[387]

In other markets, clearinghouses reduce the risk that a trading party will fail to follow through on their side of the bargain—either to supply securities (a seller) or to provide cash (a buyer).[388] If this happens in the case of a trader's insolvency, for example, the clearinghouse steps in to make good on the trade.[389] The basic idea is that the clearinghouse will use its own resources to buy securities from a seller or ensure that a buyer gets their assets under these conditions.[390] The key innovation of clearinghouses is that they become the legal counterparty to each side of the trade.[391] Once a deal is concluded on an exchange, a clearinghouse takes over and becomes the buyer to the seller and a seller to the buyer, standing in the middle of the two parties to prevent each trader from having to take risks on the other.[392] Clearinghouses are an invisible yet essential pillar of modern securities markets. To take just one example, the Depository Trust and Clearing Corporation (DTCC)—a clearinghouse for around fifty exchanges and equity trading platforms—reported settling over two

386. See Ben S. Bernanke, Chairman, Bd. of Governors of the Fed. Rsrv. Sys., Speech to the 2011 Financial Markets Conference: Clearinghouses, Financial Stability, and Financial Reform (Apr. 4, 2011), https://www.federalreserve.gov/newsevents/speech/bernanke20110404a.htm [https://perma.cc/77FA-KUUA].

387. Notably, Professor Duffie also proposes introducing central clearing for Treasury markets and highlighted it as a way to mitigate some of the risks that surfaced in the March COVID-19 panic. See Duffie, Redesigning After COVID-19, supra note 2, at 4–5, 15–16. It should be noted that the Treasury market does have limited clearing for trades that are concluded between primary dealers. This is undertaken through a clearinghouse known as the Fixed Income Clearing Corporation. See Treasury Market Practices Group, White Paper on Clearing and Settlement in the Secondary Market for U.S. Treasury Securities 2–3, 34 (2018), https://www.newyorkfed.org/medialibrary/Microsites/tmpg/files/CS-DraftPaper-071218.pdf [https://perma.cc/XX62-ERVL] [hereinafter TMPG, Clearing in the Secondary Market White Paper] (describing the products cleared by the FICC, including Treasuries).

388. See Paolo Saguato, The Ownership of Clearinghouses: When "Skin in the Game" Is Not Enough, the Remutualization of Clearinghouses, 34 Yale J. on Regul. 601, 614–19 (2017) (highlighting the protective role played by clearinghouses in reducing counterparty risks through their ability to become a counterparty to each side of the trade, ensuring that each trader is transacting with a strong institution rather than a potentially risky trader).

389. Id.

390. Id.

391. Id.

392. See Craig Pirrong, The Economics of Clearing in Derivatives Markets: Netting, Asymmetric Information, and the Sharing of Default Risks Through a Central Counterparty 16–17 (Jan. 8, 2009), https://ssrn.com/abstract=1340660 (on file with the *Columbia Law Review*) (unpublished manuscript). But see Darrell Duffie & Haoxiang Zhu, Does a Central Clearing Counterparty Reduce Counterparty Risk?, 1 Rev. Asset Pricing Stud. 74, 74–75 & n.1 (2011) (showing that clearinghouses that clear certain classes of derivatives, like credit default swaps, can see lowered ability to manage risk).

quadrillion dollars' worth of trades annually in 2019.[393] Clearinghouses also largely benefit the market as a whole by assuring traders that their bargains will be honored, meaning they do not have to undertake—and pay for—preemptive due diligence on counterparties. This allows trades to flow more freely and without traders having to discount what they put into the market to reflect systematic counterparty risks.[394]

Clearinghouses can also, in theory, incentivize their members—usually comprising the leading firms in a given market—to behave with more risk aversion.[395] Clearinghouses operate like insurance; to take advantage of the clearinghouse's protections, members contribute into its reserves, providing sufficient resources to withstand crises and also to ensure that they can make good on their obligations on an ongoing basis.[396] Should a crisis arise, these reserves can be used up by the clearinghouse to fulfill any shortfalls on outstanding bargains.[397]

Because their funds are on the line in case of an overly risky participant, clearinghouses have a direct economic interest in staying alert to risk-taking and fraudulent, malicious, or disruptive trading. Clearinghouses are also well placed to take advantage of their position at the center of a market to collect data, process this information, and maintain vigilance about emerging risks and possible exposures. Clearinghouses thus offer a compelling private mechanism requiring market participants to take responsibility and pay for their own risk-taking ex ante, rather than relying on the Fed to pump trillions to save the market from collapse as a last-ditch measure.[398] In addition to the secondary market, situating the interdealer market, if not also the dealer–client market, into an ecosystem of central clearing can also bring the known advantages of clearinghouses into Treasuries.[399] Central clearing can also help mitigate some of the

393. Advancing Financial Markets Together, Depository Tr. & Clearing Corp. (Apr. 9, 2020), https://www.dtcc.com/dtcc-connection/articles/2020/april/09/dtcc-2019-annual-report-advancing-financial-markets-together [https://perma.cc/STW5-2EJ7].

394. See Pirrong, supra note 392, at 16–17.

395. See id. at 18–19 (expanding on the theoretical ability of clearinghouses to encourage good behavior among members). But see Yadav, Problematic Clearinghouses, supra note 48, at 433–42 (detailing the potential for clearinghouses to also encourage risk-taking by members if not properly checked); Mark Roe, Clearinghouse Over-Confidence, Project Syndicate (Oct. 26, 2011), http://www.project-syndicate.org/commentary/roe6/English (on file with the *Columbia Law Review*) (noting the potential for clearinghouses to cause members to transfer risk into the financial system).

396. See Saguato, supra note 388, at 120–21.

397. Id.

398. Reflecting this thinking, the role of clearinghouses has expanded significantly after the 2008 Financial Crisis and the passage of Dodd–Frank, which covers over-the-counter derivatives markets. See G-20 Pittsburgh Summit, Leaders' Statement: The Pittsburgh Summit 7 (2009), http://ec.europa.eu/commission_2010-2014/president/pdf/statement_20090826_en_2.pdf [https://perma.cc/7W5D-GALM] (pushing for mandatory clearing for over-the-counter derivatives).

399. Of course, some clearing does already exist in Treasuries. See TMPG, Clearing in the Secondary Market White Paper, supra note 387, at 7–8. It is, however, limited to a small

specific frictions in Treasuries trading that contribute to investor uncertainty and systemic risks, helping to hold markets up when a crisis like COVID-19 or the Flash Rally strikes or if a major Treasuries trader is close to failure or fails outright.

The intervention of a clearinghouse ensures that trades, once agreed to on a platform, are essentially guaranteed to settle, with securities and cash changing hands. This helps create investor confidence, because investors will be able to get the benefit of their bargain even if a dealer or counterparty fails or decides not to perform for whatever reason. This certainty is especially valuable in Treasuries given their significance for investor portfolios and financial stability. In fact, this certainty is even more valuable because Treasuries become especially important during a crisis—a period during which it is more likely that counterparties will renege on their bargains owing to the heightened possibility of private financial stress. The panic in March 2020, when investors sought to sell their Treasuries quickly and in large numbers, caused a wave of transaction failures.[400] Treasury trades that were centrally cleared experienced far fewer such failures, however, supporting the potential benefits of central clearing for backstopping transaction continuity and preventing systemic spillovers.[401]

In the context of automated, high-speed trading, moreover, a clearinghouse can help contain the costs of HFT firm failure. Since HFT firms trading in Treasuries are often not subject to the usual FINRA rulebook for broker-dealers, including those governing how much capital must be maintained as a safety buffer,[402] markets are vulnerable to a scenario where an HFT firm fails without having a sufficient amount of cash on hand to make good on overly large commitments. Its inability to fulfill its obligations can quickly bleed into the financial system where investors and others do not receive Treasuries or cash. In a high-speed, interconnected market, the prospect of disorderly and rapid failures is all

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fraction of the secondary market and operates only as between primary dealers. Id. With HFTs predominant in the interdealer market, central clearing for these Treasuries trades is, for the most part, patchy, if not largely absent from the modern market. See id. at 8–9 (reviewing the current and limited patchwork clearing arrangements in the Treasury secondary market and advocating for reevaluating the scope of clearing in Treasuries in light of the changing market structure that draws in HFT firms).

400. See BlackRock, supra note 318, at 9–11. BlackRock's post-COVID-19 crash report noted heightened failure in certain kinds of Treasuries, with affected sellers that normally hold their securities exiting instead. Id. Because these firms then loan out these securities, their need to quickly sell them required them to terminate these lending arrangements and recall the securities. This demand led to a higher number of failures as securities were not returned in time. Id.

401. See id. As noted, limited clearing exists in the Treasury market, notably between primary dealers and undertaken through the Fixed Income Clearing Corporation, which reported clearing around $40 trillion in Treasuries in March 2020. Id.; TMPG, Clearing in the Secondary Market White Paper, supra note 387, at 7–8; see also supra note 399 and accompanying text.

402. See supra section III.B.

too familiar. In 2012, for example, Knight Capital—a top HFT firm and liquidity provider that was responsible for around 11% of trading volume in U.S. stocks—lost around $440 million in forty-five minutes because of a technical malfunction.[403] This disaster caused Knight Capital to end up on the verge of bankruptcy almost overnight.[404]

That Treasury markets are also vulnerable to algorithmic mishaps is suggested (although never fully understood by regulators) by shock events like the Flash Rally. Central clearing in Treasuries would offer assurance that such a failure does not have to result in falling dominoes, because a clearinghouse can step into the shoes of the failing firm and make good on its trades. It makes sense, then, to adopt a well-worn mechanism that has shown itself able to handle large-scale failures without stressing the market.

Clearing also ensures that the settlement system for processing Treasuries and cash is streamlined across the secondary markets, assuring that each trader and investor receives their entitlement in accordance with a set process and timetable. This kind of procedural certainty offers those using the Treasuries secondary market the capacity to make decisions about how to use the assets they are selling and purchasing. As it currently stands, the patchwork of post-trade settlement systems in Treasury secondary markets—with some using central clearing, while others rely on bilateral processes—is ad hoc and results in a confusing and nonstandardized system.[405] Systematization, however, offers a pathway toward a more efficient and cost-effective market. As Professor Duffie has suggested, central clearing can help promote a secondary market that is not bifurcated by the dealer–client and interdealer distinction.[406] In other words, the Treasuries secondary market might look more like equities markets, allowing investors to transact directly with a wider swath of counterparties.[407]

Of course, central clearing is neither a perfect solution nor one comprehensive enough to tackle all of the known and unknown problems

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403. Nathaniel Popper, Knight Capital Says Trading Glitch Cost It $440 Million, N.Y. Times: Dealbook (Aug. 2, 2012), https://dealbook.nytimes.com/2012/08/02/knight-capital-says-trading-mishap-cost-it-440-million (on file with the *Columbia Law Review*).

404. See Nathaniel Popper, High-Speed Trade Giants to Merge, N.Y. Times (Dec. 20, 2012), https://www.nytimes.com/2012/12/20/business/knight-capital-announces-sale-to-getco.html (on file with the *Columbia Law Review*). As an example of how clearinghouses can mitigate large firm failures in other markets, however, consider LCH (then called LCH.Clearnet), a major clearinghouse that successfully resolved Lehman Brothers's $9 trillion worth of outstanding interest-rate derivatives after its 2008 downfall. Julia Lees Allen, Note, Derivatives Clearinghouses and Systemic Risk: A Bankruptcy and Dodd-Frank Analysis, 64 Stan. L. Rev. 1079, 1089–92 (2012).

405. See TMPG, Clearing in the Secondary Market White Paper, supra note 387, at 2.

406. See Duffie, Redesigning After COVID-19, supra note 2, at 16 ("[T]he existence of broadly accessible central clearing also allows for . . . the emergence of trading directly between ultimate non-dealer buyers and non-dealer sellers . . . .").

407. See id.

in today's Treasury markets. It is not clear whether and how well a clearinghouse might have mitigated the scale of the March 2020 fallout before the Fed intervened. A clearinghouse would not by itself disincentivize traders from misbehaving, using badly tested algorithms, or engaging in dangerous and predatory strategies that disrupt a platform (like stuffing the venue with orders). If traders are not subject to effective oversight restraining the use of suboptimal algorithms or checking misbehavior like cheating, the clearinghouse simply picks up the costs of any fallout. In fact, the presence of a clearinghouse might even encourage risk-taking precisely because a bad trader is able to shift some of the costs of disruptive acts onto the risk-bearing capacities of the clearinghouse.[408]

Moreover, a clearinghouse does not compel traders to keep their capital in the market during troubled times. Traders can still exit abruptly or reduce their engagement in response to unsettled and unexpected conditions, as they did during the March 2020 COVID-19 panic and Flash Rally.[409] A clearinghouse can certainly step in where exit might result in traders failing to deliver Treasuries or cash, but it does not prevent them from removing themselves and draining the market of liquidity. Finally—and perhaps most worryingly—an improperly designed clearinghouse can grow to become one of the most fundamentally systemic risks anywhere in the financial system. By becoming the counterparty for hundreds of billions of dollars' worth of daily trades, a clearinghouse may effectively become itself indispensable and too big to fail.[410]

Thus, a clearinghouse cannot be haphazardly thrown into Treasury markets without careful design choices precisely crafted to ensure safety and soundness by answering the following outstanding questions: Which firms can be members of the clearinghouse? How fully should a clearinghouse maintain reserves, and which kinds of assets qualify? What governance arrangements would ensure that clearinghouses make sound risk management decisions and do not imperil the safety and soundness of the financial system and economy?[411]

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408. See Yadav, Problematic Clearinghouses, supra note 48, at 393; see also Pirrong, supra note 392, at 5.

409. See U.S. Dep't of the Treasury et al., Joint Staff Report, supra note 13, at 4–7; Younger, supra note 296.

410. See Yadav, Blueprint, supra note 213, at 15 (elaborating on how requiring a clearinghouse may create an institution that is too big to fail); see also Laura Noonan & Phillip Stafford, Ex-BoE Deputy Governor Fears 'Utter Mayhem' from Clearing House Reform, Fin. Times (Aug. 2, 2020), https://www.ft.com/content/01669e74-8585-43e6-9aa7-39086573dccd (on file with the *Columbia Law Review*).

411. See, e.g., Letter from Systemic Risk Council to the Hon. Randal Quarles, Chairman, Fin. Stability Bd., Bank for Int'l Settlements (July 31, 2020), http://www.systemicriskcouncil.org/wp-content/uploads/2020/07/Comment-Letter-of-Systemic-Risk-Council-on-FSB-Consultation-on-CCP-Resolution-Guidance7.31.2020.pdf [https://perma.cc/R3J7-B9EV] (describing outstanding issues in relation to risks posed by clearinghouses, such as whether clearinghouse owners are properly incentivized to monitor and protect the clearinghouse). A full treatment of central clearing design for secondary Treasury markets

These are not simple questions to answer and remain open for future research. This Article, however, forwards two proposals to take first steps toward filling the gaps in public and private oversight of Treasury markets. A more formal system of coordination anchored by an MOU through the FSOC harnesses an existing administrative mechanism to streamline communication, monitoring, and discipline between public regulators. And to help align the incentives of private traders toward protecting Treasury market integrity, central clearing in Treasuries presents a possible solution. Both pathways—while representing efforts at fundamental market reform for Treasuries—would strengthen the market's foundations using tried-and-tested means common to other major markets.

CONCLUSION

This Article argues that the U.S. Treasury market lacks effective public and private oversight to support its essential functions for the U.S economy and global financial stability. Excessive and uncoordinated fragmentation in public oversight has hobbled the development of a workable rulebook that creates basic guardrails against misbehavior and disruption. Private actors, comprising comparatively unregulated HFT traders competing with highly regulated primary dealers, lack meaningful incentives to bind themselves to each other and to the market. This Article proposes two solutions—one to tackle the public shortfall in oversight, and the other to build a private system for risk management—that can help make the Treasury markets more resilient and responsive to the demands of a modern, automated ecosystem. A way forward is necessary given the singular importance of Treasuries to the domestic and global financial system. This analysis is only the first step of a longer scholarly study into a market whose enormous significance highlights a tension between the perception of a risk-free asset and the real-life fragility of the market structure that governs its trading.

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is beyond the scope of this Article, which simply endeavors to present a preliminary sketch of a credible proposal to bring attention to the need to build strong private incentive structures for Treasury oversight.