Written Testimony of Jonah Crane
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before the
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Thank you Chairman Huizenga, Ranking Member Maloney and members of the Committee for inviting me to participate in today's hearing. Market structure has been a significant focus of my policy work in each of my jobs here in Washington, as an advisor to Senator Chuck Schumer, a senior advisor at Treasury, then as Deputy Assistant Secretary for the Financial Stability Oversight Council.

I am encouraged that the Committee is focusing on fixed income markets, because these markets are critical to the strength and resilience of the U.S. economy. Fixed income markets are undergoing structural changes—driven by technology, changing risk appetites and business models, financial reform, and changes in the investor base—but have supported record levels of bond issuance over the past nine years.

My written testimony will discuss the primary changes taking place in fixed income market structure, related changes in market liquidity, and important developments in the Treasury market. I will conclude with some recommendations intended to bring oversight of the Treasury market into the 21st Century in ways that facilitate the natural evolution in market structure that is already underway.

Market Structure: Fixed Income Markets in Transition

In non-financial markets, "market structure" generally refers to the organizational and other characteristics of a market—in particular, the competitive dynamics: whether a market is monopolistic, oligopolistic, or highly competitive. Competition is an important aspect of a healthy financial market structure—a topic to which I'll return. But, in markets for financial assets, "market structure" usually refers more broadly to the collection of rules, technological infrastructure, processes, and participants that combine to determine how buyers are matched with sellers.

Liquidity, broadly speaking, refers to the *ease* with which buyers are matched with sellers. Questions about liquidity, which have been much-discussed in recent years, thus inherently raise questions about market structure.

The single most important transformation in financial market structure over the past 20-plus years is the shift, in virtually every asset class, towards electronic trading. This evolution began

in equities in the 1990s, and migrated to futures and foreign exchange (FX) markets. The transition has been slower and uneven in fixed income, but it is clearly underway.

Electronic trading can take many forms. In markets for standardized, benchmark securities, high-speed algorithmic trading, often referred to as high-frequency trading or "HFT," has become predominant. HFT accounts for a majority of trading in equities, futures, and FX. Algorithmic trading that relies less on speed, but nonetheless automates trading decisions and order execution, is increasingly common in parts of the fixed income market where trading is less frequent, such as corporate bonds or off-the-run Treasuries.[1] Algorithmic trading can be thought of as a subset of electronic trading, and HFT can be thought of as a subset of algorithmic trading.[2]

As discussed in more detail below, HFT now accounts for a majority of trading in the interdealer market for Treasuries, which in turn accounts for roughly half of all cash Treasury trading volume.[3] The other half of Treasury trading occurs in the "dealer-to-client" market, where there is no HFT and, while electronic trading exists, more than half of trades reportedly are still conducted by phone or message.

In corporate bond markets, where the securities are more customized, algorithmic trading has not yet become prevalent, but more basic electronification is growing. To some extent, this simply means the old ways of transacting by phone are migrating to the screen. But a growing portion of corporate bond trading is happening on "all-to-all" venues—that is, trading directly between end investors without a dealer between them. Precise estimates are difficult to come by, but nearly 20% of corporate bond trading is now electronic,[4] and the most popular all-to-all trading venue for corporate bonds reported record volumes in the first quarter of 2017.[5]

Alongside the transition to electronic trading, fixed income markets are experiencing a shift from "principle-based" intermediation to "agency-based" intermediation.[6] Historically, fixed income markets have relied heavily on dealers to act as intermediaries, often in a principal capacity. That is, a dealer would step in and buy bonds from a trader who wants to sell, holding the bonds on its own balance sheet until a willing buyer could be found. To compensate for warehousing that

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[1] Off-the-run refers to all but the most recently-issued securities of a given tenor.
[2] See "Electronic trading in fixed income markets," Bank for International Settlements, *available at* http://www.bis.org/publ/mktc07.pdf.
[3] See Joint Staff Report: The U.S. Treasury Market on October 15, 2014, July 13, 2015 (JSR), *available at* https://www.treasury.gov/press-center/press-releases/Documents/Joint_Staff_Report_Treasury_10-15-2015.pdf.
[4] Greenwich Associates, "Understanding the U.S. Fixed-Income Market," (2016).
[5] See Rick McVey, Liquidity in the Post-Crisis Era: The Difference a Decade Makes, *available at* http://www.marketaxess.com/trading/opentrading.php.
[6] See "Electronic trading in fixed income markets," Bank for International Settlements, *available at* http://www.bis.org/publ/mktc07.pdf.

risk, dealers would charge a "spread" between the price at which they were willing to buy and willing to sell.

When acting as an agent, a dealer is effectively acting as a broker, matching buyers and sellers for a fee or commission, generally without putting its own balance sheet at risk. Fixed income markets are increasingly shifting toward agency-based intermediation, aided in part by the technological changes discussed above and by the entry of new competitors in the marketplace.

These transitions likely reflect the confluence of several factors. In addition to technology changes that predate the crisis, as discussed above, regulatory reform and changes in business models following the crisis also have likely contributed. Large banks and broker-dealers have significantly reduced their leverage, heightened risk management, and sought more resilient sources of funding.

Changes in Market Liquidity

Some have viewed these changes as detrimental to liquidity in fixed income markets—corporate bond markets in particular. To date, the data do not show a broad-based deterioration in corporate bond liquidity. In fact, by many traditional measures liquidity is at least as healthy as the pre-crisis period. Bid-ask spreads are back at pre-crisis lows, and trading volumes reached record levels earlier this year.[7] Other liquidity measures show a more mixed picture: average trade sizes are down, as is the proportion of block trades.[8]

In the aggregate, it is difficult to say if liquidity is "higher" or "lower," but the data are consistent with the trends outlined above: a greater preponderance of electronic trading, and a shift toward agency-based intermediation. That is, the shifts in market structure are changing the nature of liquidity provision.

Recent studies of bond market liquidity appear to support this conclusion. A study by Federal Reserve Bank of New York economists, for example, shows that corporate bonds traded by dealers with high levels of leverage and high reliance on repo funding (i.e., dealers who may face greater constraints as a result of regulatory capital requirements) are less liquid than bonds traded by less-constrained dealers, and those institutions appear to trade less with customers.[9]

Considered in light of the rest of the data, which do not show a deterioration of liquidity overall, the best interpretation seems to be that all of the factors described above are contributing to the

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[7] Data available at http://www.sifma.org/research/statistics.aspx.

[8] For a comprehensive discussion on market liquidity since the crisis, see Market Liquidity After the Financial Crisis, Federal Reserve Bank of New York Staff Report No. 796 (revised June 2017), *available at* https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr796.pdf?la=en.

[9] See Tobias Adrian, Nina Boyarchenko, and Or Shachar, Dealer Balance Sheets and Bond Liquidity Provision, Federal Reserve Bank of New York Staff Research Report No. 803, *avaialble at* https://www.newyorkfed.org/research/staff_reports/sr803.

trend toward more agency- and less principal-based intermediation. This may make larger transactions more difficult to complete, but market participants are responding by looking to technology for more sophisticated trading strategies. Investors are particularly focused on deploying technology in corporate bond markets to improve block trading and execution in high yield bonds—which tend to be less liquid.[10]

These trends have occurred against a backdrop of record corporate bond issuance, resulting in the outstanding stock of corporate bonds doubling since 2009. At the same time, the changing profile of the investor base is also altering the nature of fixed income markets. Mutual funds and ETFs now account for nearly 18% of corporate bond ownership, up from 6.3% in 2008.[11] The combination of greater difficulty executing large trades and increased bond ownership by mutual funds and ETFs has raised concerns that fund managers might have difficulty managing large redemptions. Mutual funds and ETFs offer their investors much greater liquidity (daily and immediate, respectively) than is typically found in markets for the bonds owned by those finds. The SEC recently adopted rules requiring more stringent liquidity risk management by mutual funds that, if implemented rigorously, should mitigate this risk.

When assessing whether current policy is achieving the right balance, it is important to keep in mind that not all liquidity is created equal. Much of the liquidity apparent prior to the crisis was fueled by excessive leverage, and excessive speculation, on the part of banks and broker-dealers, as trading became a central profit center for the industry. Not only did this liquidity disappear when financial markets became stressed, the rapid unwinding of leveraged positions likely contributed to the panic. Liquidity is an important factor but by no means the only test. Robust liquidity is a feature of a well-functioning market, but it should not be prioritized at the expense of important financial stability safeguards.

"Flash" Events and "Fragile" Liquidity

In more standardized fixed income markets, where algorithmic trading has become prevalent, price-based measures of liquidity such as bid-ask spreads have improved. However, a series of "flash" events in various fixed income markets have raised questions about the nature of liquidity in these markets. While liquidity may have improved in normal times, has it become more fragile—that is, more prone than liquidity supplied by traditional intermediaries to disappear during periods of extreme volatility?

The most notable of these events occurred on October 15, 2014, when Treasury yields dropped 16 basis points in a span of just six minutes, fully recovering only minutes later. The 37-basis point round-trip in yields that day was the fourth largest moves over the past 20 years, and occurred without any apparent fundamental catalyst.

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[10] See Greenwich Associates, "Innovations Ease Corporate Bond Trading," (April 2017).
[11] See https://www.ici.org/viewpoints/view_17_corp_bond_etf.

These "flash" events, while not common, nonetheless appear to be a persistent feature of markets with a large proportion of high-speed algorithmic trading. We have seen similar events in U.S. equities (May 2010), Indian equities (October 2012), the Swiss Franc (January 2015), the British Pound (October 2016).[12]

The Joint Staff Report notes that "while liquidity … on average, may have benefited from the advent of electronic trading, the changing nature of liquidity provision may have increased the likelihood of periodic episodes of intraday volatility."[13]

Of course, liquidity often deteriorates during volatile periods. One recent New York Fed staff research paper examines three recent case studies, including the October 15, 2014 Treasury flash event, and concludes that "the degree of deterioration in market liquidity was within historical norms, suggesting that liquidity remained resilient even during stress events."[14] However, that conclusion is based on traditional measures of liquidity, such as bid-ask spreads and market depth. One of the important questions raised by flash events across several markets, and implied by the Joint Staff Report, is whether traditional definitions and measures of liquidity are sufficient in markets where HFT is predominant and flash events may be expected to occur periodically.

The Bank of England has posed similar questions, and attempted to measure the "resilience" of liquidity in various ways.[15] Others have proposed incorporating efficient pricing into the concept of liquidity to account for the fact that, in flash events, prices often move in ways that appear completely untethered from any new information.[16]

Treasury Market Bifurcation

October 15, 2014 put a spotlight on the rise of algorithmic trading and PTFs in the Treasury interdealer market, which has evolved into a fully-electronic marketplace, with two primary

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[12] The Market Crash of 1987 shared many characteristics with these recent events—the most notable difference being the speed with which recent events have unfolded due to the overall increase in the speed of trading. Indeed, such "failures" may be a persistent feature of all complex systems involving the interaction of social systems with technological ones. The construction of the Millenium Bridge is one example of the failure to take into account the complex interaction of large social systems—in this case the tendency of large groups of pedestrians to simultaneously shift their weight in the same direction. See Dave Cliff & Linda Northrup, *The Global Financial Markets: An Ultra-Large-Scale Systems Perspective*, Government Office for Science (2012).

[13] See JSR, p. 42.

[14] Tobias Adrian, Michael Fleming, and Or Shachar, Market Liquidity After the Financial Crisis, (June 28, 2017), at http://libertystreeteconomics.newyorkfed.org/2017/06/market-liquidity-after-the-financial-crisis.html. See also Market Liquidity After the Financial Crisis, Federal Reserve Bank of New York Staff Report No. 796 (revised June 2017), *available at* https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr796.pdf?la=en.

[15] See Niki Anderson, Lewis Webber, Joseph Noss, Daniel Beale and Liam Crowley-Reidy, "The Resilience of Financial Market Liquidity," Bank of England Financial Stability Paper No. 34 (October 2015).

[16] Nathaniel Wuerffel, "Market Structure and Liquidity in the U.S. Treasury and Agency Mortgage-Backed Security (MBS) Markets," May 17, 2016, *available at* https://www.newyorkfed.org/newsevents/speeches/2016/wue160517.

venues (BrokerTec and Nasdaq Fixed Income, formerly eSpeed) that employ central limit order books. As discussed above, PTFs now account for a majority of trading on these platforms, similar to equities, futures, and FX.

Perhaps just as notable, however, is the degree to which the Treasury market remains bifurcated between the client market and the inter-dealer market. The conundrum of the Treasury market is that, despite Treasuries being the most standardized security—issued by a single issuer, in large quantities, at regular intervals in benchmark maturities, carrying no credit risk—roughly half of all trading in cash Treasuries still occurs in the heavily intermediated and largely opaque dealer-to-client markets.

When end users of Treasuries—such as mutual funds or insurance companies—want to trade, they still generally do so only with large bank dealers. And most of this trading is done over the phone. The dealers internalize a great deal of those transactions—that is, offset risk from customer flows across their portfolio—and send the rest to the inter-dealer market. Clients generally don't participate in the more transparent interdealer markets. Furthermore, the dealer-to-client market remains dominated by a handful of large dealers. According to Greenwich Associates, "[t]he top five dealers in U.S. Treasuries handled 58% of client trading volume in 2016."[17]

This bifurcation may be starting to soften. Non-bank dealers have recently begun to provide quotes directly to clients (end users) on Bloomberg and Tradeweb, the two largest dealer-to-client trading platforms.[18] Other initiatives have sought to improve liquidity in less liquid segments of the market. For example, Nasdaq's off-the-run liquidity offering and new players such as OpenDoor, which is bringing together dealers with customers for all-to-all trading sessions of off-the-run securities.

These are, overall, positive trends. Healthy financial market ecosystems, much like biological ecosystems, require diversity—in this case, diversity in sources of both demand and supply for liquidity. The Treasury market's current bifurcated structure makes little sense. But as the events of October 15 illustrate, these benefits come with certain risks.

I expect the advent of trade reporting in Treasury markets to lead investors to take a closer look at how their liquidity needs are being met. Experience in other markets shows that transparency breeds competition, and competition breeds efficiency. The implementation of TRACE reporting for corporate bonds reduced trading costs in that market by as much as 50%, and similar

[17] See Greenwich Associates, "New Landscape in U.S. Treasury Trading Benefits the Buy Side," (2016).
[18] "Citadel Securities ratchets up fight against big banks," Crain's Chicago Business, June 21, 2017, *available at* http://www.chicagobusiness.com/article/20170621/NEWS01/170629970.

improvements were seen more recently when interest rate swap markets were opened up to competition following Dodd-Frank.

Over time, it is likely that the Treasury market will become a less bifurcated marketplace, one where end users with diverse needs have a spectrum of choices when seeking liquidity. Greater diversity of supply and demand for liquidity will enhance the Treasury market ecosystem, bringing benefits to taxpayers and end investors alike.

Modernizing Oversight of the Treasury Market

The structure of the Treasury market has evolved significantly over the years, and the regulatory framework governing the Treasury market no longer fully reflects who is participating in that market or how they are transacting.

The first step for reform was for the official sector to get access to Treasury transaction data. That proposal became a reality just this week, with Treasury transactions now reported to FINRA's TRACE.[19] Regulators have also established standing information sharing agreements to facilitate joint analysis in response to future events. The implementation of official sector reporting of cash Treasury market transactions was a critical step forward. But there are other important gaps to fill in the oversight framework for the cash Treasury market.

FINRA and the SEC have taken initial steps to re-examine their rulebooks, and determine whether all of the exemptions that historically applied to the Treasury market still make sense. FINRA already proposed, for example, to make rules against front-running customer orders or block orders applicable in Treasury markets.

There are many important ways in which the Treasury market is unique, and its unique status should be reflected in the rules governing trading. But it is a large, standardized, liquid market—the kind of market in other words, where the benefits of transparency and competition are most likely to outweigh the costs.

Therefore, I would argue for a presumption that Treasuries should be traded more or less like other securities, except where the unique features of the Treasury market, and the role of Treasuries in the economy, dictates a different result. For example, the fact that the dollar is a global reserve currency means that central banks and other reserve managers hold large stocks of Treasuries—the largest asset class denominated in dollars—and may need to transact in very large quantities relative to most other traders and most other markets. There are benefits that accrue to the United States as the issuer of the global reserve currency and safe haven asset, so we should be sure to preserve a market structure where very large block trades can be facilitated without being exposed to the market.

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[19] See http://www.finra.org/newsroom/2017/finra-successfully-launches-reporting-treasury-transactions.

Indeed, this is the approach proposed by the Treasury department last year in suggesting a framework for enhanced public transparency of Treasury market activity. Specifically, Counselor Antonio Weiss proposed three ways to mitigate concerns that had been raised about additional transparency:

- First, appropriate time delays to enable intermediaries time to hedge or find the other side of a trade, especially in less liquid products like off-the-runs or TIPs;

- Second, limitations on disclosure of size for large trades (i.e., masking of block trades) largely for the reasons suggested above; and

- Third, a phased-in, gradual approach over time, similar to the way TRACE was phased in for corporate and mortgage bonds. Gradually phasing in public transparency allows for adjustments along the way, and has the added benefit of facilitating independent analysis of each phase--much like a series of pilots. All told, the implementation of TRACE for corporate bonds took more than three years and involved extensive consultation and adaptation along the way.

In addition, I would urge this Committee and other policy makers to consider the following steps, all of which reflect the work undertaken in the comprehensive review of Treasury market structure we conducted following the events of October 15, 2014:

- **Registration of PTFs.** We know that some of the biggest players in this market are different than they used to be, and are not subject to the same level of oversight as traditional intermediaries—or in some cases any oversight at all. The SEC should require registration of PTFs who are active in the Treasury market. At the very least this would allow the transaction reporting now underway to identify PTFs, who currently do not report trades directly because they are not FINRA members.

- **Registration and oversight of trading venues.** When it proposed revisions to Reg ATS, the SEC asked preliminary questions regarding whether alternative trading systems (ATSs) for government securities should be required to register. The SEC should follow up on those questions by establishing minimum standards applicable to all Treasury trading platforms. The membership and trading rules for these venues should be clear and public, and they should be required to implement important operational risk controls such as Reg SCI. For its part, the CFTC should move forward with Reg AT to address operational risks in the futures market.

- **Central Clearing.** Cash Treasury transactions are not required to be centrally cleared in the way that equities and futures are, and the way most swaps now are following Dodd-Frank—including interest rate swaps, which can act as a substitute for Treasuries. Moreover, many PTFs active in the Treasury cash market are not members of Fixed Income Clearing Corporation (FICC), the central counterparty that facilitates clearing and settlement for a significant portion of the cash Treasury market.[20] As a result, PTF transactions are often cleared bilaterally, increasing counterparty risks. Many PTFs limit their overnight exposures, but may rapidly accumulate large intraday exposures. The request for information issued by Treasury in January 2016 asked whether existing the clearing arrangements and margin regime are sufficient or whether reforms are necessary.

  Relatedly, increased access to central clearing for repurchase agreement transactions—an important source of financing for Treasury securities—has the potential to both reduce counterparty risk and facilitate the entry of more new competitors in the Treasury market. Concerns have been raised about the impacts of post-crisis reforms, specifically the supplemental leverage ratio applicable to the largest banks, on repo funding. The leverage ratio is an important backstop, and should not be set aside to address marginal concerns about trading liquidity. Instead, policymakers should consider ways to facilitate broader access to central clearing for repo transactions.

As we often reiterated at Treasury, our first maxim in dealing with the Treasury market was "do no harm." But that does not mean doing nothing. Markets and market participants are evolving, and in the face of this change the biggest risk may be doing nothing at all. I am encouraged by the progress made by the SEC and FINRA to date, and hope that this Committee will work with them and other policy makers to continue on the path of steadily bringing oversight of the world's most important asset class into the 21st Century.

Thank you and I look forward to taking your questions.

[20] See https://www.newyorkfed.org/medialibrary/media/newsevents/events/markets/2016/keane-102416.pdf?la=en.