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Recent Changes in the Resilience of Market Liquidity

Remarks by

Lael Brainard

Member

Board of Governors of the Federal Reserve System

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Recent events and commentary raise concerns about a possible deterioration in liquidity at times of market stress, particularly in fixed income markets.<sup>1</sup> These concerns are highlighted by several episodes of unusually large intraday price movements that are difficult to ascribe to any particular news event, which suggest a deterioration in the resilience of market liquidity. For example, on the morning of October 15, 2014, 10-year U.S. Treasury yields gyrated wildly, and the intraday movement in Treasury prices was 6 standard deviations above the mean. In addition, after 4 p.m. on March 18 EDT of this year, a meeting day for the Federal Open Market Committee, the U.S. dollar depreciated against the euro by 1.75 percent in less than three minutes, an unusually large drop in such a short interval. A few weeks later, markets experienced some very large intraday movements in the price of German bunds during times of little market news.

In contrast, there have been a few notable episodes where market volatility was clearly attributable to significant news but nonetheless appeared to evidence some deterioration in the resilience of liquidity. For example, on January 15 of this year, the announcement by the Swiss National Bank regarding the floor of the exchange rate between the euro and the Swiss franc led to severe disruptions in foreign exchange markets. Separately, the rise in bond yields in May and June 2013, the so-called taper tantrum, also appeared to many observers to have been out of proportion to the news that prompted it.<sup>2</sup>

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<sup>1</sup> These remarks represent my own views, which do not necessarily represent those of the Federal Reserve Board or the Federal Open Market Committee.

<sup>2</sup> See Tobias Adrian, Michael Fleming, Jonathan Goldberg, Morgan Lewis, Fabio Natalucci, and Jason Wu (2013), "Dealer Balance Sheet Capacity and Market Liquidity during the 2013 Selloff in Fixed Income Markets," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, October 16),

A reduction in the resilience of liquidity at times of stress could be significant if it acted as an amplification mechanism, impeded price discovery, or interfered with market functioning. For instance, during episodes of financial turmoil, reduced liquidity can lead to outsized liquidity premiums as well as an amplification of adverse shocks on financial markets, leading prices for financial assets to fall more than they otherwise would. The resulting reductions in asset values could then have second-round effects, as highly leveraged holders of financial assets may be forced to liquidate, pushing asset prices down further and threatening the stability of the financial system.<sup>3</sup>

Although anecdotes of diminished liquidity abound, statistical evidence is harder to come by. Indeed, there is relatively little evidence of any deterioration in day-to-day liquidity. Traditional measures of liquidity, such as bid-asked spreads, are generally no higher than they were pre-crisis. Turnover, an alternative measure of day-to-day liquidity, is lower, but it is unclear whether this reflects changes in liquidity or perhaps changes in the composition of investors. The share of bonds owned by entities that tend to hold securities until maturity, such as mutual funds and insurance companies, has increased in recent years, which would lead turnover to decline even with no change in market liquidity. In some markets, the number of large trades has declined in frequency, which could signal reduced market depth and liquidity, but could also reflect a shift in market participants' preferences toward smaller trade sizes.

Finding a high-fidelity gauge of liquidity resilience is difficult, but there are a few measures that could be indicative, such as the frequency of spikes in bid-asked spreads,

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[www.federalreserve.gov/econresdata/notes/feds-notes/2013/dealer-balance-sheet-capacity-and-market-liquidity-during-the-2013-selloff-in-fixed-income-markets-20131016.html](http://www.federalreserve.gov/econresdata/notes/feds-notes/2013/dealer-balance-sheet-capacity-and-market-liquidity-during-the-2013-selloff-in-fixed-income-markets-20131016.html).

<sup>3</sup> Of course, if the sharp reductions in asset values are fleeting, these second-round effects could be quite limited.

the one-month relative to the three-month swaption implied volatility, the volatility of volatility, and the size of the tails of price-change distributions for certain assets. We see some increases in the values of these indicators, which provide some evidence that liquidity may be less resilient than it had been previously. But this evidence is not particularly robust, and, given the limitations of the existing data, it is difficult to know the extent to which liquidity resilience may have declined.

As we continue to investigate quantitative evidence of the deterioration in the resilience of liquidity in some of the financial markets, we are also trying to tease out the various drivers of liquidity conditions, such as changes in regulation, trading strategies, and market structure. Regulatory changes are often cited as a contributing factor. Trading financial assets is a balance-sheet-intensive activity, and the Dodd-Frank Act, has created incentives for institutions to carefully assess the risks of such activity through stricter requirements on leverage, liquidity, and proprietary trading, raising the cost of market making and possibly affecting market liquidity. Indeed, there is evidence of reductions in broker-dealer bond inventories in recent years. Nonetheless, since not all broker-dealer inventories are used for market-making activities, the extent to which lower inventories are affecting liquidity is unclear. Moreover, reductions in broker-dealer inventories occurred prior to the passage of the Dodd-Frank Act, suggesting that factors other than regulation may also be contributing. In assessing the role of regulation as a possible contributor to reduced liquidity, it is important to recognize that those regulations were put in place to reduce the concentration of liquidity risk on the balance sheets of the large, highly interconnected institutions that proved to be a major amplifier of financial instability at the height of the crisis.

A second possible contributor may be the growing role of electronic execution of trades across equity, Treasury, and foreign exchange markets and the associated increasing role of high-frequency trading. Competition from high-frequency trading in a particular market may reduce the attractiveness of that market for traditional (manual) traders or slower automated traders, leading to a progressive shift in the composition of market participants toward high-frequency traders (HFTs) over time. This shift could be important to the extent that HFTs may have more limited capacity to support liquidity resilience since, on average, HFTs appear to trade with smaller inventories and lower capital than traditional traders. Although having less inventory and capital reduces the cost of trading, it also means that markets increasingly dominated by HFTs may be less able to absorb large shocks. Thus, liquidity may be sufficient and relatively cheap on normal trading days, but it may not be deep enough to prevent large price swings when demand for liquidity is significantly above the norm. This consideration would be most relevant in the markets that are amenable to high-frequency trading, and automated trading more generally, where assets are fairly standardized, such as equities and U.S. Treasury securities, and less relevant in markets where securities are more idiosyncratic, such as corporate bonds. It is also possible that markets that more readily lend themselves to high-speed trading may be characterized by relatively greater concentration over time. Achieving the speed necessary for high-frequency trading requires large technology investments that necessarily may support a relatively more limited number of market participants. Greater concentration in turn might be associated with lower resilience at times of stress. The possible effect of HFTs on the resilience of market liquidity is an important topic for future research.

Of course, other developments may be affecting liquidity in financial markets. For example, market participants have indicated that changes in participants' risk-management practices may be contributing to reduced market liquidity. In particular, the experience of the financial crisis may have led many participants to reevaluate the risk of their market-making activities and either reduce their exposure to that risk, become more selective, or charge more for it, thereby reducing liquidity.<sup>4</sup>

It is also worth noting the increased role of asset managers on the buy side of the fixed income markets. During normal market conditions, the demand for liquidity from this group of bond holders is likely relatively small, since asset managers acting on behalf of retail investors generally buy bonds to hold them for some period. Moreover, managers of open-end funds hold liquidity buffers that enable them to respond smoothly to normal redemption demands. However, because the large increase in bond fund holdings is relatively recent, little is known about how these funds will react to periods of market stress or to abrupt changes in financial conditions and the adequacy of their liquidity buffers for such situations. Because funds potentially allow daily redemptions even against illiquid assets, it is possible that redemptions could be magnified in stressed conditions as individuals try to redeem early, which in turn could lead to liquidations of relatively less liquid assets, thereby amplifying price volatility and reducing market liquidity.

If in fact liquidity resilience has declined recently, it may be a transitional development that will be corrected going forward as participants adjust their risk

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<sup>4</sup> Another potentially important change in markets has been the increased prevalence of dark pools or proprietary trading sites housed inside broker-dealers, which provide no information to the public about the volume or prices of trades. It is possible this activity might be changing price discovery, although there is debate over the net effect.

management practices, and the structure of these markets continues to evolve. For example, if traditional providers of liquidity scale back their activity in response to changes in regulation and market structure, over time, this shift may create incentives for other providers, which are not similarly constrained, to step in.

Stress tests, such as those announced by the Securities and Exchange Commission (SEC) offer one way to help ensure that market participants are prepared for sharper spikes in market volatility. For instance, in the Federal Reserve Board's most recent stress test, the severely adverse scenario featured a large decrease in the prices of corporate bonds.

We are in the early stages of data-based analysis of possible recent changes in the resilience of market liquidity. An upcoming study of the October 15 event will shine some light on the functioning of the U.S. Treasury market, but there is still much we need to learn. More broadly, at the Board, we will closely monitor and investigate the extent of changes in the resilience of liquidity in important markets, while deepening our understanding of different contributors and how market participants are adapting.