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To: File

From: The Division of Economic and Risk Analysis<sup>1</sup>

Date: March 17, 2014

Re: Liquidity Cost During Crisis Periods

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The Division of Economic and Risk Analysis (“DERA”) has prepared an analysis of the spread between same-day buy and sell transaction prices (“spread”) for Tier 1 and 2 securities during the period starting January 2, 2008 and ending December 31, 2009. This analysis is intended to assist the Commission in the development of final rules regarding Money Market Fund (MMF) Reform, including any possible liquidity fee.

The analysis documents changes in the cost of liquidity provision before, during, and after the window that commences with the bankruptcy of Lehman Brothers and ends the day before the Federal Reserve’s announcement of the creation of the Money Market Investor Funding Facility. The results indicate that the average non-crisis period spread is approximately 25 basis points (bps) for both Tier1 and Tier 2 eligible securities. By contrast, the average crisis period spread peaked around 70 bps for Tier 1 eligible securities and 160 bps for Tier 2 eligible securities. The differences in the average spreads between the crisis and non-crisis periods for Tiers 1 and 2 securities, respectively, are 51.4 bps and 104.4 bps.

## DATA AND METHODOLOGY

DERA obtained from January 2, 2008 through December 31, 2009 information on trades in Tier 1 and Tier 2 eligible securities, as defined in Rule 2a-7 from TRACE (Trade Reporting and Compliance Engine), and formed a Tier 1 and a Tier 2 sample.<sup>1</sup> TRACE provides transaction records for TRACE eligible securities that have a maturity of more than a year at issuance.<sup>2</sup> Money market instruments, sovereign debt, and debt securities that have a maturity of less than a

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<sup>1</sup> This is a memo by the Staff of the Division of Economic and Risk Analysis of the U.S. Securities and Exchange Commission. The Commission has expressed no view regarding the analysis, findings or conclusions contained herein.

<sup>1</sup> TRACE is a commercially available database of over-the-counter secondary market transactions in corporate and agency bonds. DERA also obtained ratings, coupons, and other bond characteristics from Bloomberg.

<sup>2</sup> The term “TRACE-eligible security” means all United States dollar denominated debt securities that are depository-eligible securities; Investment Grade and Non-Investment Grade (as defined in the TRACE rules); issued by the United States and/or foreign private corporations; and: (1) registered with the SEC; or (2) issued pursuant to Section 4(2) of the Securities Act of 1933 (Securities Act) and purchased or sold pursuant to Rule 144A under the Securities Act.

year at issuance are not reported in TRACE and hence our sample differs from what MMFs hold.<sup>3</sup> Nevertheless, the samples we construct from TRACE provide estimates for costs of liquidity during market stress since the selected securities have similar time-to-maturity and credit risk characteristics as those permitted under Rule 2a-7. We include in the samples only trades of bonds with fewer than 120 days to maturity and with a trade size of at least \$100,000. We classify bonds with credit ratings equal to AAA, AA+, AA, or AA- as Tier 1 eligible securities. The average days to maturity for Tier 1 securities in the sample is 67 days, which roughly reflects the 60-day weighted average maturity limit specified in Rule 2a-7. Bonds with credit ratings equal to A+, A, or A- represent Tier 2 eligible securities. The average days to maturity for Tier 2 securities in the sample is 28 days, which is somewhat lower than the 45-day weighted average maturity limit required by Rule 2a-7.

The majority, 64%, of our Tier 1 sample of eligible TRACE securities consists of debt securities issued by financial corporations with the Standard Industrial Code (SIC) 60 (“Finance, Insurance, and Real Estate”).<sup>4</sup> Of this majority, 40% have been issued by “Depository Institutions” and 18% by “Holding and Other Investment Offices.” For the remaining 36% of the sample which are issued by non-financial firms, the largest percentage (24%) are corporations with the SIC 3511 “Steam, Gas, and Hydraulic Turbines, and Turbine Generator Set Units.”

Based on 2013 data from Form N-MFP,<sup>5</sup> MMFs allocated approximately 96.08% of their assets in Tier 1 eligible securities and 0.17% in Tier 2 eligible securities. The remaining 3.75% are listed on form N-MFP as Unrated Securities. In 2013, the majority, 67%, of MMF holdings were in financial assets, namely Certificates of Deposit, Financial Company Commercial Paper, VRDOs, Treasury Debt, Treasury Repurchase Agreements, and Government Agency Debt. Although TRACE did not cover many of these types of instruments in 2008 and 2009, our Tier 1 sample contains a significant fraction of debt securities issued by financial firms with similar time-to-maturity profiles as those held by MMFs.<sup>6</sup>

Transactions in TRACE are identified as either “Buys” or “Sells,” coded in TRACE as buyer- or seller-initiated, by the party that reports the transaction. For each CUSIP and trading day, we first calculate the average buy and sell transaction prices weighted by the dollar size of each trade. Then for each CUSIP and trading day, the difference between the average buy and sell transaction prices, measured as a percentage of the midpoint of these prices, is our estimate of the daily spread.

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<sup>3</sup> Furthermore, the actual securities held by MMFs may also differ with respect to other attributes such as trading volume, book depth, or investor characteristics.

<sup>4</sup> US Government assigned SICs were matched with ticker information downloaded from TRACE, and merged with company characteristics from The Center for Research in Security Prices database.

<sup>5</sup> Since MMFs were not required to report portfolio holdings until December 2010, we do not know the MMF portfolio compositions during the TRACE sample and crisis period.

<sup>6</sup> See footnote 8 for a discussion of estimating liquidity costs using only SIC 60 securities.

The difference between the average spread observed during crisis and non-crisis periods provides an estimate for the cost of obtaining liquidity during crisis periods because spreads widen during periods of relative illiquidity. Wider spreads compensate market makers for the risk associated with holding inventory and the search costs associated with finding willing buyers. We measure liquidity cost using the full spread, as opposed to half the spread, because the widening of spreads during a crisis period is more likely to be a result of sell transactions occurring at lower prices rather than buy transactions occurring at higher prices. Increases in the average spread may not capture the entire cost of providing liquidity if securities reflect prior markdowns that not only reflect a deterioration of credit quality but the expected cost of obtaining liquidity in a market that is dominated by sell orders. Therefore, the results below are likely downward-biased estimates of the average total liquidation costs for fixed income securities during periods of market stress.

## RESULTS

Table 1 presents estimates of the differences between the crisis and non-crisis average daily spreads for Tier 1 and Tier 2 eligible securities over various subperiods. Figures 1 and 2, respectively, present the time-series estimates of these differences for Tier 1 and Tier 2 eligible securities. DERA estimates an average 51.4 bps ( $= 77.9 - 26.5$ ) liquidity cost for Tier 1 eligible securities over the 26-day crisis period.<sup>7</sup> Over the 26-day crisis period, the 95-percent confidence interval of the liquidity cost for Tier 1 securities ranges from 39.4 bps to 63.4 bps.<sup>8</sup> The highest average liquidity cost for Tier 1 securities reaches 76.0 bps over the week of October 6, 2008.

Over the same 26-day period, the average liquidity cost for Tier 2 eligible securities is estimated to be 104.4 bps ( $= 127.0 - 22.6$ ), and the 95 percent confidence interval of the liquidity costs for Tier 2 securities ranges from 74.5 bps to 134.2 bps. The highest average liquidity cost for Tier 2 securities reaches 126.9 bps over the week following the bankruptcy of Lehman Brothers on September 14, 2008.

To evaluate the robustness of our estimates, we calculate liquidity costs over a six-day period<sup>9</sup> to capture a period when fixed income markets experienced the greatest liquidity stress. The

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<sup>7</sup> The 26-day period starting on September 12 and ending on October 20 includes one trading day before the bankruptcy of Lehman Brothers and the sale of Merrill Lynch, which occurred over the weekend of September 13 and 14. The sample ends the day before the Federal Reserve announced the Money Market Investor Funding Facility.

<sup>8</sup> DERA estimates a liquidity cost using only Tier 1 eligible SIC 60 debt securities of 59.3 bps over the 26-day crisis window and 68.6 bps over the six-day crisis window. With a limited sample of 6,752 trades, DERA estimates a liquidity cost using only Tier 2 eligible SIC 60 debt securities of 176.0 bps over the 26-day crisis window and 155.8 bps over the six-day crisis window.

<sup>9</sup> During this week, the SEC announced a temporary ban on short selling of all financial sector stocks. Additionally, on September 19, the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) and

liquidity cost estimates over this period are very similar to those estimated over the longer-crisis period. Post-crisis estimated average spreads return to pre-crisis levels, albeit at marginally elevated levels.

**Table 1: Buy-Sell Spreads in Tier 1 and Tier 2 Securities**

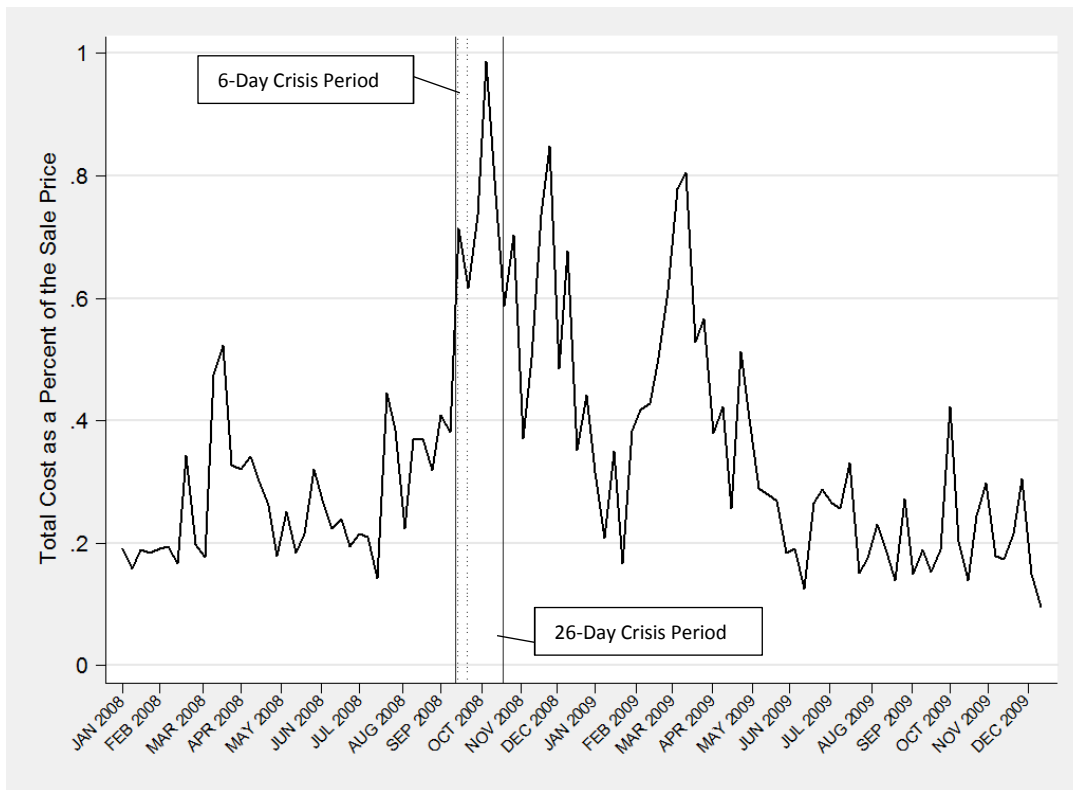
Eligible Securities	Pre-Crisis	26-Day Crisis	6-Day Crisis	Post-Crisis
Tier 1	26.5 <sup>***</sup>	77.9 <sup>***</sup>	72.4 <sup>***</sup>	33.2 <sup>***</sup>
Tier 2	22.6 <sup>***</sup>	127.0 <sup>***</sup>	137.5 <sup>**</sup>	28.0 <sup>***</sup>
Trading Days	176	26	6	301
Trades	9,241	3,988	759	17,620
Sample Start	02 JAN 2008	12 SEP 2008	15 SEP 2008	21 OCT 2008
Sample End	11 SEP 2008	20 OCT 2008	22 SEP 2008	31 DEC 2009

The average total roundtrip cost of a bond as the percentage of the midpoint of the average transaction prices is reported in basis points for Tier 1 and Tier 2 securities and various sample periods. Transaction prices are weighted according to the dollar size of the trade. Significance at the 5% and 1% levels is denoted by <sup>\*\*</sup> and <sup>\*\*\*</sup>, respectively.

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Exchange Stabilization Fund, launched by the Federal Reserve Board and the U.S. Treasury Department, respectively, slowed redemptions in prime money market funds and provided additional liquidity to money market funds.

**Figure 1: Tier 1 Eligible Securities Weekly Average Spread**



**Figure 2: Tier 2 Eligible Securities Weekly Average Spread**

