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Flattening the (bid/offer) curve

Repo market microstructure responding well to Fed actions

- Market structure in the brokered repo market has proven fairly resilient amidst shocks to liquidity in adjacent markets…
- … the Fed interventions already in place to facilitate better liquidity after September last year, have been the major contributors to this resilience
- We use trade level data to capture measures of liquidity in the brokered repo market, allowing us to compare the recent widening with previous episodes
- We find that widening in March was significantly smaller than episodes in 2008 and September of 2019
- The dispersion of trades throughout the day have also increased measurably, suggesting liquidity is no longer as isolated to early in the morning
- Following the introduction of overnight and term TOMOs in September of last year, average bid/offer narrowed and intraday volatility in liquidity fell…
- … more recently, the market has responded preferentially towards an abundance of daily liquidity injections, even when this liquidity ends up being filtered back via RRP

US Fixed Income Strategy

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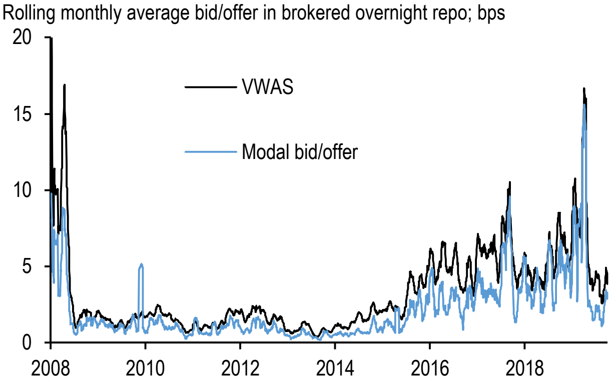
Repo market microstructure responding well to Fed actions

Our liquidity work to date has been focused predominantly on interdealer trading in on-the-run Treasuries, with a focus on vicious cycle dynamics and breakdowns in market microstructure (see e.g., *Did US rates markets just experience a mini "flash rally"*, M. Salem et al., 3/5/20). Though this has been the case for some time, the most recent episode has been among the most violent in recent memory, leading to severe liquidity tiering among fixed income instruments. This triggered a delevering which, combined with other sales of securities, overwhelmed the capacity of dealers to intermediate (see *Why we should all care about Treasury futures basis*, J. Younger et al., 3/12/20). To alleviate these pressures, the Fed has engaged in an array interventions, including expanded temporary and permanent open market operations, as well as 2008-vintage and some new facilities, provide liquidity in the hopes of arresting the risk of a broader delevering cycle (see *Funding market interventions, done 3 ways*, J. Younger & H. St John, 3/22/20 and references therein) as well as regulatory relief to smooth their eventual exists (see *What about Bonds?*, J. Younger & H. St John, 4/2/20 and *What if GSIB rules are relaxed as well?*, J. Younger & H. St John, 4/7/20). **These efforts have been broadly successful in many areas but particularly so in Treasury repo markets** (see also *Are we there yet? An update on fixed income market liquidity*, J. Younger & H. St John, 4/1/20): rates have been trading in the lower end of the policy rate corridor for some weeks, and the spread between GC and tri-party rates has narrowed quite a bit.

Exhibit 1: The widening in brokered repo bid/offer has been less dramatic than previous episodes, owing to both less interbank stress and Fed repo interventions already partially being in place…

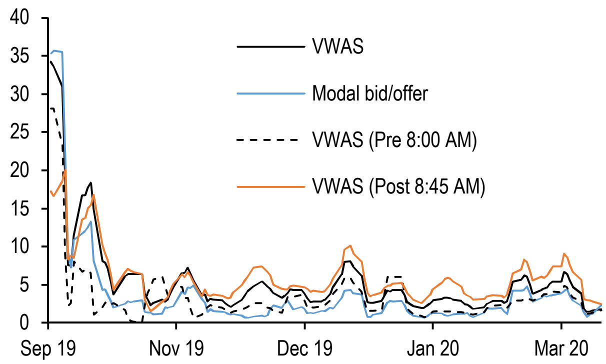
Rolling monthly average bid/offer in brokered overnight repo; bps



Note: We collapse daily transactional data into discrete 5-minute windows, in which we compare bid/offer on trades with the same maturity. VWAS measures the volume weighted average bid/offer spread for each 5-minute interval over that day. The Modal bid/offer takes the bid/offer spread for the 5-minute window of each day in which volumes are at their highest, reflecting bid/offer when liquidity is at its best.
Source: J.P. Morgan.

Exhibit 2: … As Fed action has taken effect, the spread between pre and post OMO bid/offer has narrowed

Rolling weekly average bid/offer in brokered overnight repo; bps



Note: See Exhibit 1 for detail.
Source: J.P. Morgan

One area of less focus, however, has been the impact of these interventions on transaction costs and the microstructure of repo markets themselves, which is our focus here. Though granular data are hard to come by, we do have transaction-level information on brokered FICC trades going back 10+ years, for which we can produce estimates of bid/ask spreads and examine other aspects of the underlying flows. While this admittedly comes with its own limitations, including abstracting away from the eventual flow of Fed interventions to end users of repo funding, such

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as asset managers and hedge funds, it does provide a snapshot into how interdealer conditions have evolved.

To compute a proxy for bid/offer, we make use of interdealer market trades in overnight GC repo. We then reduce the transactional data of like trades into 5-minute intervals, in order to minimize the impact of fundamental price fluctuations. Bid/offer spreads are computed within these time intervals, and then in turn we calculate bid/offer for each trading day. Note this differs from some of our previous work, in which bid/offer can be directly observed from a central limit order book (CLOB). In this instance, we are observing tagged trades with the same terms on either side of the market, and using small windows of time to measure their spread. We employ two methodologies:

- **Volume Weighted Average Spread (VWAS):** The average bid/offer spread over the course of the day, weighted by the quantity of trades within each interval
- **Modal bid/offer:** The bid/offer spread computed at the highest volume interval during the day – in effect reflecting bid/offer at the most liquid point during the day

We find that, using the VWAS metric, bid/offer averaged ~3.5bp over the last decade, and in more recent years, such as 2016-19, **this spread came averaged slightly wider at +5.3bp, widening alongside growing dealer inventory and increased funding pressure via regulatory constraints and Fed balance sheet shrinkage** (**Exhibit 1**). Historically, the modal bid/offer is 1-2bp narrower than the VWAS. **We also see evidence of significant widening in interdealer bid/offer amidst bouts of funding market stress beginning in mid-2015**. Quarter-ends since 2016 are an obvious example, with the average bid/offer widening out to 7.2bp over the week prior. Another recent example is the period of more persistent and acute repo stress in mid-September of last year. During that time, daily bid/offer averaged over the week reached as high as 22bp, signifying a significant liquidity breakdown. Moreover, we can observe the effect of the Fed's program of overnight and term temporary open market operations (TOMOs). Following those interventions, liquidity quickly stabilized to below 5bp, widening by substantially less over year-end 2019 (**Exhibit 2**).

Placed in the context of these previous episodes of repo market liquidity deterioration, the widening seen from mid-March appears to be negligible (Exhibit 2 again). What do we make of this? **To begin, it shows the extent to which Fed interventions have kept the repo market amply lubricated even under severe stress**. Of particular note, the spread between bid/offer prior to 8:00am and after 8:45am (either side of daily operations) has narrowed substantially since September as overall liquidity has improved. This suggests that, beyond whatever signaling effect the TOMOs provide in calming market tensions, they have also had direct effects on market structure. **It is also reflected via shifts in the distribution of trading volumes, with 50% of the day's trades clearing by around 8:30am, a significant shift earlier in the day relative to what the market has become accustomed to in recent years (Exhibit 3).** Moreover, dispersion of market activity over the course of the day has increased, as the time by which 90% of daily trades have cleared has held steady around 2:30pm (**Exhibit 4**). In other words, favorable liquidity is no longer as singularly compressed into a particular time of day, and transactions are also occurring ahead of daily operation times, both of which are indicative of better market functioning.

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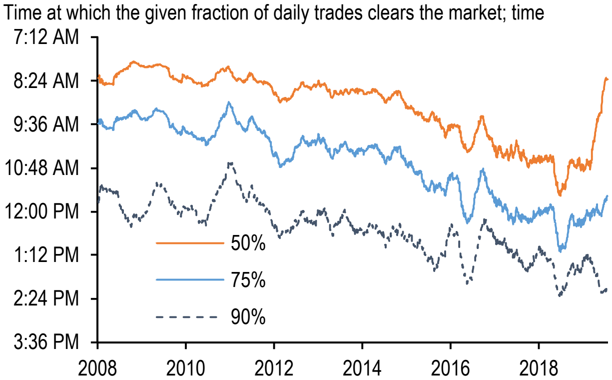
Exhibit 3: Half of the daily volume in trades is clearing the market earlier in the day…

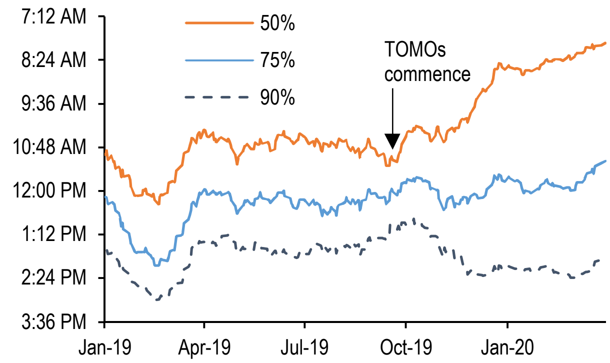
Time at which the given fraction of daily trades clears the market; time



Source: J.P. Morgan.

Exhibit 4: … and the dispersion in market activity across the day has risen significantly

Time at which the given fraction of daily trades clears the market; time



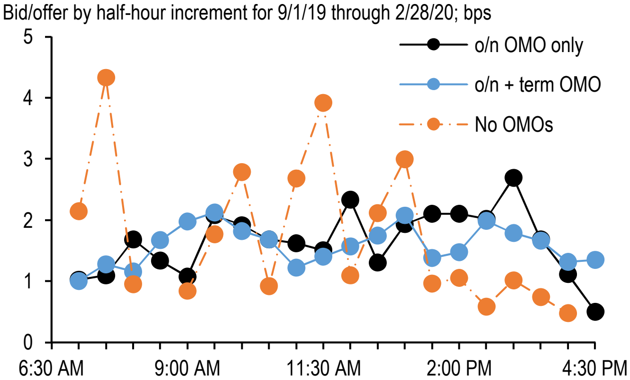
Source: J.P. Morgan

We can see this development of repo market liquidity more clearly by mapping the intra-day bid/offer spread. In the two weeks leading up to the September repo market disruptions, **deteriorations in liquidity in the interdealer market appeared to crop up rather sporadically** (**Exhibit 5**). Bid/offer was on average significantly wider earlier in the day, when the bulk of trades tend to occur (Exhibit 4 again), but also appeared to display significant intra-day volatility. By contrast, days in which overnight and term TOMOs were being conducted, leading up to the end of February, tended to see a far more stable and narrow bid/offer spread prevail.

Focusing solely on the September 2019 – February 2020 time frame, repo market liquidity did not appear to vary widely between days on which just overnight TOMOs were conducted versus both overnight and term operations. In both cases, the market bid/offer tended to average between 1-2bp throughout the day. By contrast, **in recent weeks we have seen repo market depth becoming more responsive to the volume of liquidity on offer**. Days in which both overnight and term operations are being carried out have tended to see narrower bid/offer spreads prevailing in the market, particularly in the afternoon session (**Exhibit 6**).

Exhibit 5: Prior to the recent market stress, TOMOs have proven effectual in improving market function…

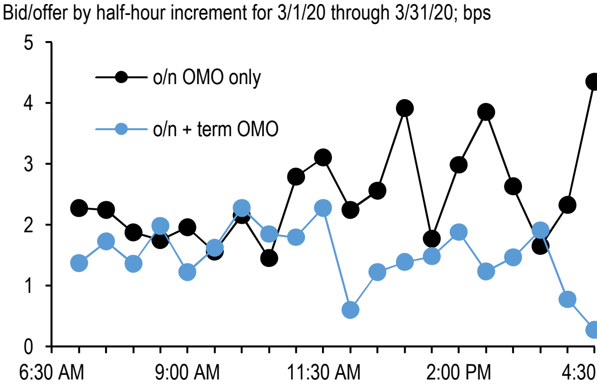
Bid/offer by half-hour increment for 9/1/19 through 2/28/20; bps



Note: See Exhibit 1 for detail. Bid/offer levels are volume weighted averages by time window.
Source: J.P. Morgan

Exhibit 6: … amidst the more recent market stress, repo market liquidity has tended to be more resilient on days in which the Fed is offering both term and overnight TOMOs

Bid/offer by half-hour increment for 3/1/20 through 3/31/20; bps



Note: See Exhibit 1 for detail. Bid/offer levels are volume weighted averages by time window.
Source: J.P. Morgan

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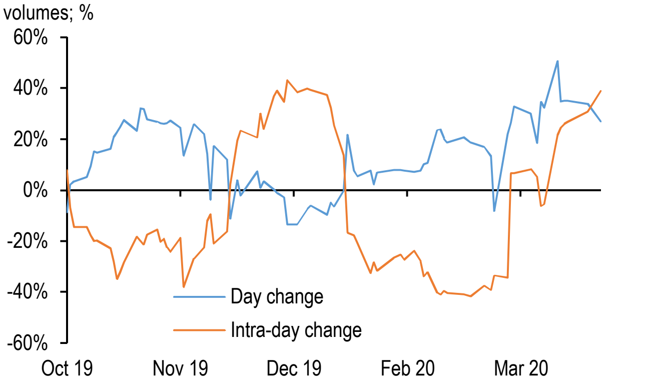
From a policy perspective, this strongly implies the market has traded with a "more is more" approach to funding market liquidity. The correlation between aggregate volume of Fed reserve injections in terms of liquidity offered and daily changes in repo liquidity has moved sharply higher over the last month (**Exhibit 7**). Moreover, the increase in RRP volumes over the last few weeks suggests that even when Fed liquidity turns out to exceed daily demand, the market is functioning more smoothly with the safety net in place. It's worth noting as well we see a broadly similar pattern with REG settle trades, with bid/offer patterns on both an intra and inter-day basis tracking the same, albeit with more widening during periods of market stress (**Exhibit 8**). With numerous facilities now in place to ensure ample liquidity in short-term markets, and the strong cyclical inflow into government MMFs also increasing the supply of funding, these improvements in liquidity are not surprising. That said, more structural changes lie ahead for the repo market, given both the impending supply of new Treasury collateral to the market over the course of this year, and the Fed's announcement of temporary carve-outs to SLR. As we have discussed (see *What about bonds?*, J. Younger et al., 4/2/20), the latter should ultimately improve the capacity of dealers to intermediate the former, at least until the relief sunsets next year.

Exhibit 7: Over the last month, the correlation between volume of Fed reserve injections and repo market liquidity has steadily risen

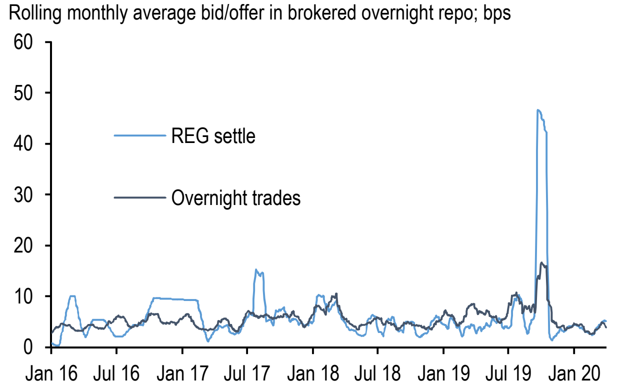
Rolling monthly correlation of daily changes in bid/offer and o/n + term OMO offered volumes; %



Note: Daily change refers to the change between the day of the operation, and the business day following. Intra-day change reflects the different in bid offer between pre-8:00am and post-8:45am. See Exhibit 2 for detail.
Source: J.P. Morgan

Exhibit 8: Reg settle tends to track the same bid/offer pattern as regular overnight trades, although the breakdown in conditions in September of 2019 was significantly worse

Rolling monthly average bid/offer in brokered overnight repo; bps



Note: Both bid/offer spreads measured using a VWAS. REG settle trades are overnight with a one day-ahead forward start.
Source: J.P. Morgan

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