Discussion of
"The Central Bank's Balance Sheet and Treasury Market Disruptions"

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Disclaimer: Views are those of the author and should not be attributed to the BIS.

Disruptions in the Treasury repo and cash market

Figure: The DvP repo rate and volumes

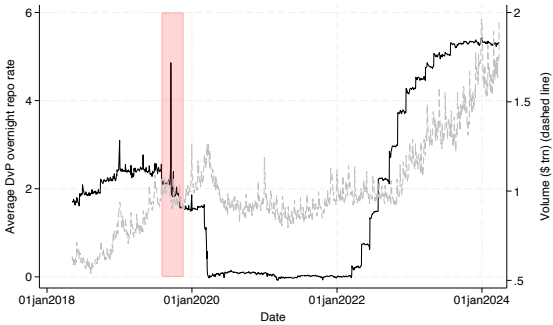
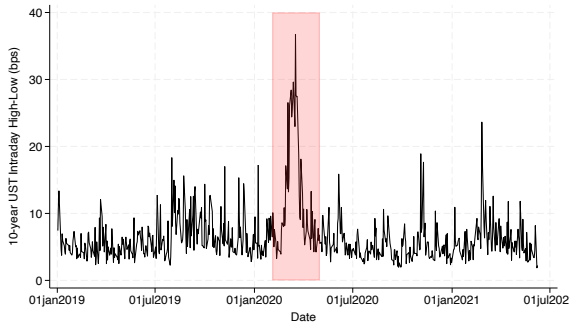
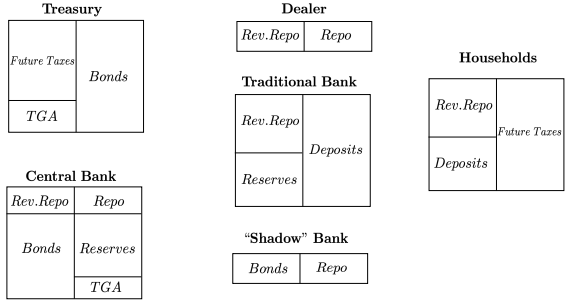


Figure: Treasury volatility



- September 2019: Large spike in Treasury repo rates (also other spikes)
- March 2020: Volatility in Treasury markets amid dash-for-cash

A dynamic model of the Treasury and repo market



- A rich multi-sector model with realistic frictions.
- Treasury and repo market disruptions arise as a joint consequence of:
  - Balance sheet costs
  - Intraday reserve requirements
  - Imperfect substitutability between repo and deposits

Model intuition

Trace the impact of HH deposit preference shock (α)

- Case 1: Only HHs absorb, banks do nothing (also no sales).
  - Repo spread rises, but HHs go further away from their optimal deposit/repo mix.
- Case 2: Bring in banks and Treasury sales
  - Upto intraday reserve constraint, banks can improve and bring HH closer to optimum.
  - Beyond that, HHs lend, this constraint is priced and repo spreads rise.
  - After some point: shadow banks fire sell Treasuries. This outside options puts a cap on repo spreads.

Main results

- "Shadow" banks have low balance sheet costs and arbitrage e.g. Treasury basis.
  - High repo leverage + overnight repo $\rightarrow$ liquidity risk $\rightarrow$ Basis remains open.
  - Consequence of regulation: Warehousing of USTs switches from banks to HFs.
- Banks increase repo lending during repo dislocations up until they hit their constraints
- Expectations of the duration of shock affect whether repo or Treasury mkt absorbs it.
- ... and more on CB BS, repo facilities, quarter-ends, tax dates, Treasury issuance, regulation counterfactuals...

Roadmap for this discussion

Repo market: Great model of (broad) repo markets! The model nails September 2019, quarter-ends, tax days etc. It can trace many realistic shocks and implications of policies. This is already an important contribution. Only a few comments.

Treasury market: There are important features outside the model that were key in March 2020. To reform UST markets, we need to understand those. A separate paper.

Future work: The model has most necessary ingredients. Suggest some adjustments.

March 2020

Data from OFR/SEC Form PF

Figure: The DvP repo market

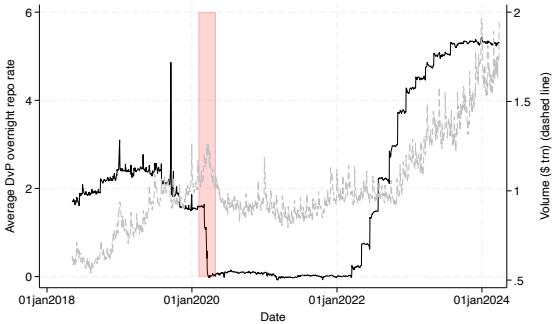
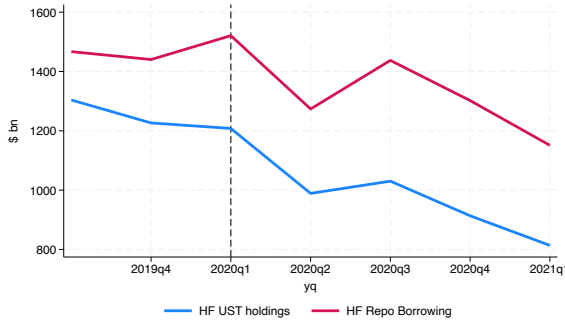


Figure: HF Treasury/repo positions



- Repo spikes were more benign than previous episodes.
- Hedge fund repo volumes did not go down in March 2020, if anything they went up.
- Hedge fund Treasury holdings did not go down materially until April 2020 (the shock was over).
- Kruttli et al. (2021): relatively unchanged bilateral repo volumes and conditions. Internal risk limits.

March 2020 was not an episode of higher α, it was a flight-to-repo

Dash-for-cash $\rightarrow$ Inflows into government MMFs $\rightarrow \uparrow$ repo supply (Source: Eren et al. (2020), MMF SEC filings)

Figure: Flight-to-repo

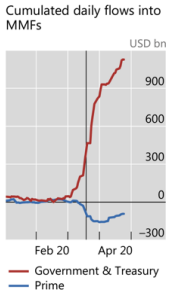
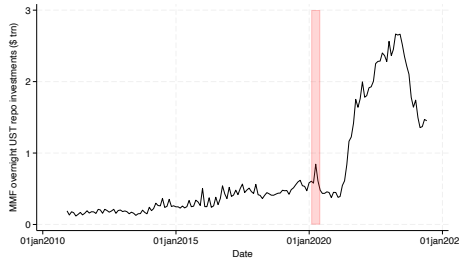


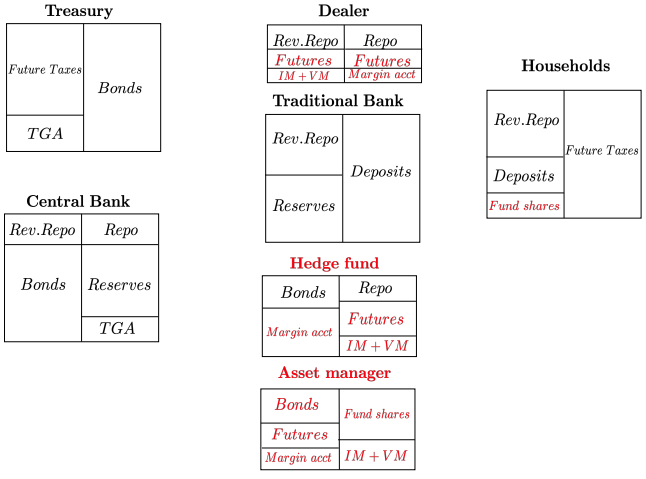
Figure: MMF repo supply



- Intermediation shocks is a better candidate to explain March 2020, but...
- ...authors still need to reconcile why the Treasury turmoil was so large...
- ...even when repo spikes were comparatively short-lived and HF UST positions did not change dramatically (and repo volumes went up).

Two key missing ingredients: asset managers and futures markets

AMs lever up using futures → Cash-futures basis widens → HFs long cash UST, short futures to earn the basis

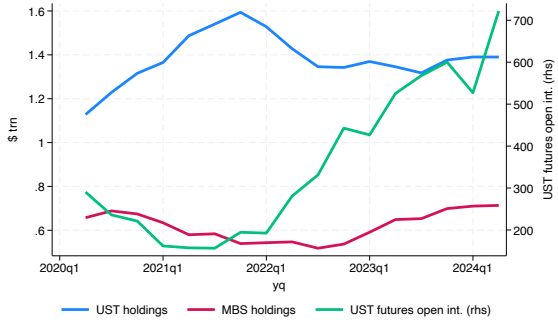


Note: Futures are off-balance sheet items/equity is missing, this depiction is for simplicity.

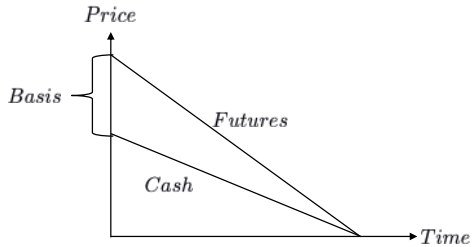
Asset managers, futures markets and Treasury market dynamics

Source: Flow of Funds, CFTC

- Asset managers use futures markets to lever up.
  - More liquid, efficient in accounting terms and to bet on the yield curve movements
- To get $1 million exposure to Treasuries:
  - Either buy $1 million worth of Treasuries (or repo - more on the next slide).
  - Buy UST futures only posting the IM - and buy other cash assets instead (e.g. MBS).
  - Futures are especially good during tightening episodes.



Positive cash-futures basis



- A positive basis means levering through repo is cheaper for asset managers...
  - ..but they don't do it. It is inefficient/they face constraints.

- **In the paper:** Persistent basis attributed to compensation for HF liquidity risk.
- **Alternative explanation:** Asset manager preference for futures over repo.

Hedge funds are just mirrors of asset managers

Source: CTFC

Figure: Open interest in futures

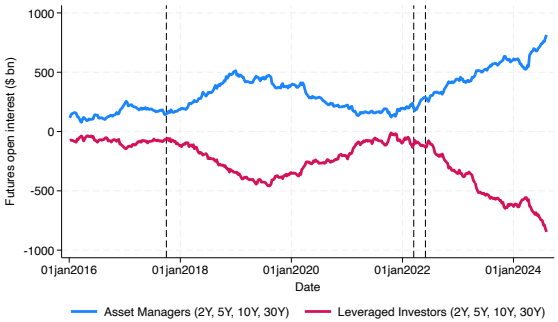
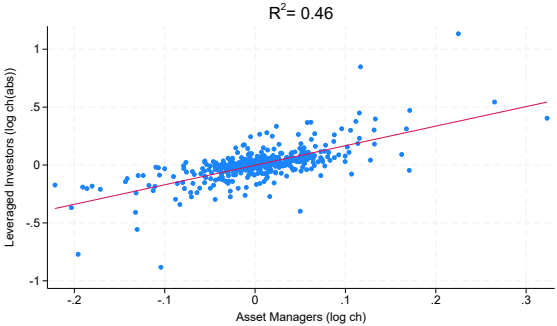
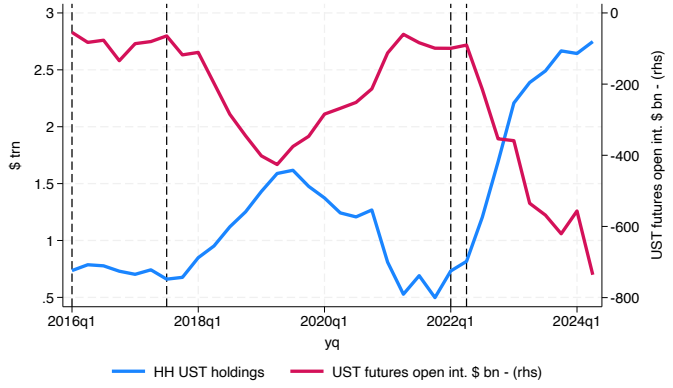


Figure: Scatterplot (log change)



Hedge funds and the cash-futures basis arbitrage

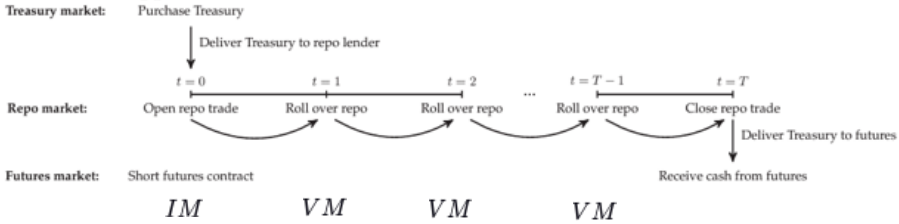
Source: Flow of Funds, CFTC



- HFs short futures (overval) and buy cash UST (undervalued) and fund with ON repo.
- The fewer futures AMs buy, the lower the incentives for HFs to come in.
  - Paper focuses on CB BS, but AM BS as important, if not more.
- Estimated annual excess returns of 9-10% (with significant risk of drawdowns).

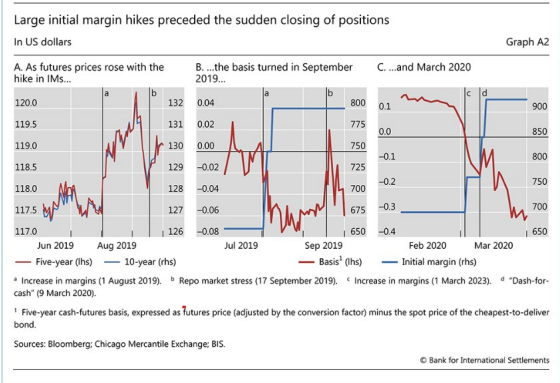
Mechanics of the cash-futures basis arbitrage

Figure 11: **Diagram of a basis trade.** Carrying a Treasury security to delivery to the futures market through the repurchase agreement (repo) market. Arrows denote flow of Treasury security; cash moves in the opposite direction.



Source: Barth and Kahn (2021).

- HF positions: long cash Treasury + short futures.
- Funding costs: repo + IM/VM.
- In the model, it is only repo.



A disorderly reduction in margin leverage exacerbated fixed income market distress in both September 2019 and March 2020. The two episodes were preceded by significant hikes in IMs (Graph A1.C, drops before vertical markers), to which leveraged relative value traders appeared to respond at least in part by unwinding their positions. This was evident from the jump in the price of US Treasury futures on the day of the IM rise, in early August 2019 (Graph A2.A). As cash bond prices outpaced the rise in futures prices amid increased volatility, the basis inverted, creating further incentives for winding down the trades (Graph A2.B, red line). The ensuing dynamics placed protracted upward pressure on futures prices (Graph A2.A). Similar market dynamics were observed in March 2020, exacerbating the heightened volatility in US Treasury markets caused by uncertainty and lockdowns (Graph A2.C).

Source: Avalos and Sushko (2023)

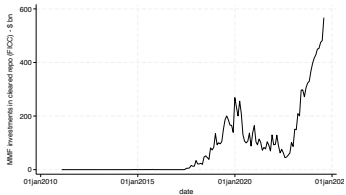
An alternative narrative of March 2020

- Liquidity crunch: Asset managers face redemptions.
- A sell-off in Treasuries ("liquidity paradox") amid dash-for-cash.
- Cash markets are less liquid - cash-futures basis widens!
- Volatility triggers increases in initial/variation margins & HF internal risk limits bind.
- Hedge funds unwind their positions due to rising funding costs/lack of capital...
- **...DESPITE the fact that the trade has just become more profitable.**
- Cash-futures basis widens even further!

- **In the paper:** expectation of the duration of shock determines the unwinding of Treasury positions.
- **Alternative explanation:** repo shocks affect the repo market (September 2019), Treasury shocks affect the Treasury market (March 2020).
- But, **with asset manager fire sales** and **funding costs = repo + IM/VM**, the model can account for March 2020.

Comments/questions about repo

- What is the role of the level of interest rates?
  - Asset managers futures positions rise during monetary tightening $\rightarrow$ HF repo demand $\uparrow$
  - Deposits flow out of banks into MMFs (repo) $\rightarrow$ optimal repo/deposit mix favors repo.
  - Level of interest rates plays a non-trivial role. This is an important area of inquiry.
    - Direct repo lending (with a CCP) between MMFs and HFs has been rising (without rising repo spreads) - Source: OFR.
    - Can we expect an impact from FICC repo on repo competition and spreads?



- Explain international differences of spikes up vs down with the existence of RRP
  - Caution: a simpler explanation is collateral scarcity.
  - We don't need RRP to set an outside option - short-term T-bills are substitutes to repo (Doerr et al., 2023).

Further policy implications

- Despite countless academic and policy conferences since 2020, vulnerabilities remain.
- Important policy questions:
  - Are hedge funds or asset managers at the core of vulnerabilities? Source vs amplification?
  - Policies for hedge funds: callable committed capital, cross-margining etc.
  - For asset managers: reduce risk-taking incentives (Rethink benchmarks? Weaken performance-flow link? Limit derivatives exposures?)
  - Dealers: A lot of repo trades are moving to CCPs, proposals for Treasury as well. Alleviate dealer constraints?
  - Pros and cons of term repo?
- The paper provides a rich picture of the repo market - best if that's the main focus.
- Adding the broader UST market is complicated, but it deserves another paper.
- Answering these questions would tremendously increase the (already high) value added of this agenda.

Thank You!

Avalos, Fernando, and Vladyslav Sushko. 2023. “Margin leverage and vulnerabilities in US Treasury futures.” *BIS Quarterly Review*.

Barth, Daniel, and R Jay Kahn. 2021. “Hedge funds and the Treasury cash-futures disconnect.” *OFR WP* 21–01.

Doerr, Sebastian, Egemen Eren, and Semyon Malamud. 2023. “Money market funds and the pricing of near-money assets.” *Swiss Finance Institute Research Paper* (23-04): .

Eren, Egemen, Andreas Schrimpf, and Vladyslav Sushko. 2020. “US dollar funding markets during the Covid-19 crisis-the money market fund turmoil.”Technical report, Bank for International Settlements.

Kruttli, Mathias S, Phillip Monin, Lubomir Petrasek, and Sumudu W Watugala. 2021. “Hedge fund treasury trading and funding fragility: Evidence from the covid-19 crisis.”

A lot of pennies in front of a steamroller

- 20x leverage $\rightarrow$ around 9-10% annual excess returns...
- but with the risk of large peak-to-trough drawdowns
- This can lead to hitting risk limits and cause an unwind (Kruttli et al., 2021).
- ...and it further contributes to Treasury fire sales.

Figure 26: Cumulative Excess Returns Treasury Index vs. Futures

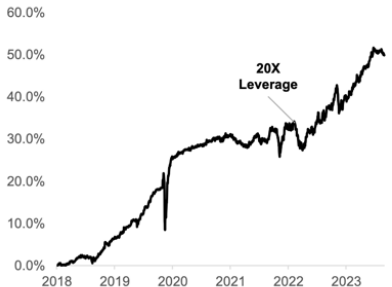


Figure 27: Peak to Trough Drawdown Using 20x Leverage Multiple

Source: TBAC.