

# Financial Fragility: Funding Risk

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People would like to invest their money for a long-term, to take advantage of *returns to time*, but can't because of fear of liquidity shock.

*Pooling* can solve the problem:

- ▶ Standard insurance won't work since the liquidity shock is unverifiable.
- ▶ Everyone deposits their funds in a bank: checking account.
- ▶ The bank makes loans and keeps reserves to meet the liquidity demand.
- ▶ Note that the economy now has no liquidity risk.

What if out of the blue, I fear that some of the people lining up to withdraw, did not suffer a liquidity shock?

I'd jump in line (since withdraws are first-come, first-served), so would everyone else.

Now the bank's reserves are inadequate, it must start liquidating its loans, and this throws the economy into a depression.

The only viable solution to this kind of bank run is federal deposit insurance. Any private insurance is subject to the same bank-runs problem.

Of course deposit insurance creates a new set of problems: *Moral Hazard*.

- ▶ Depositors lose incentive to monitor loan quality.
- ▶ Bankers in trouble have incentive to roll the dice.

- ▶ Bank regulation can mitigate the moral hazard problem.
- ▶ If you want to participate in FDIC, you accept restrictions on your activities (supervision) and pay for the insurance. These include the maintenance of reserves (which limit leverage).
- ▶ Much of the history of finance over the past 50 years is characterized by attempts to circumvent these costs of being a bank while providing liquidity intermediation. This is broadly known as shadow banking. These *advances* are enabled by:
  - ▶ Technology
  - ▶ Deregulation
  - ▶ Financial Innovation (Financial Engineering)

Liquidity  
Transformation

Bank Runs

Deposit Insurance

FDIC Regulation

LTCM

Repo

PIVe Trade

March 2020

Swap Spread

Whither Repos?

The rest of this lecture focuses on three recent episodes of funding crises:

1. The Fed-supervised recapitalization of Long-Term Capital Management in September 1998.
2. The run on repo in the context of Lehman Brothers' bankruptcy: September 2008.
3. The collapse of repo in March 2020.

- ▶ Facts:
  - ▶ Beginning 1998: \$5 Billion in Equity, \$129 Billion in Assets, (+ \$1.25 Trillion notional swaps).
  - ▶ Lenders evidently unaware of the extent of leverage, and involvement of other lenders.
  - ▶ Hedge Funds: Unregulated.
  - ▶ August 1998 Russian event induces a run on LTCM.
  - ▶ September 1998: Fed intercedes to stabilize financial markets.

- ▶ Investment strategy explicitly recognized the need to lock up investors' money:
  - ▶ Convergence Trades (arbitrage).
  - ▶ Problem: Because there is very low risk, there is also low return (especially on the margin):
    - ▶ So LTCM "levered up" (25 X).
    - ▶ This involves lenders—whose terms are not as restrictive as equity investors.
  - ▶ In the context of the Russian Federation loan default some of the lenders became concerned.
  - ▶ Even though LTCM had no risk of losing money provided that they simply held on to their positions until maturity (several more years), as lenders became aware of the numbers of other lenders involved, this fact was irrelevant should another lender force liquidation.
  - ▶ This is a classic bank run or coordination failure.
  - ▶ One consequence is that falling asset prices do not induce buying – but a cycle of selling that is disconnected from fundamental values.



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Transformation

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FDIC Regulation

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- ▶ The potential “run” on LTCM had nothing to do with fundamentals.
- ▶ The Fed had to intervene since the single hedge fund’s collapse could greatly destabilize global financial markets.

- ▶ Repurchase agreements are the most common way financial institutions finance long positions—especially in government securities and other fixed income instruments.
- ▶ Repos are also used to construct a short position. In what seems to be a backward transaction, the security lender borrows cash and uses the loaned security as collateral.
- ▶ Collateral may be re-hypothecated.
- ▶ Prior to 2008, the standard structure was that hedge funds would obtain funding from money market funds using repos. Note that this On June 30, 2006, the yield on the newly issued 5-year US Treasury note was 5.1% and the 5-year swap rate was 5.7%.
- ▶ Asset backed securities (structured products) were heavily financed with repo. With the collapse of real estate prices, this source of financing rapidly dried up.

- ▶ Consider another convergence trade to capture the swap spread. *Details about this trade are in this spreadsheet I created.*
  - ▶ On June 30, 2006, the yield on the newly issued 5-year US Treasury note was 5.1% and the 5-year swap rate was 5.7%.
  - ▶ Our hedge fund PiVe Corp (Veronesi, *Fixed Income Securities*) wants to lock in this 60 basis point spread:
    - ▶ Enter receive-fixed, pay floating 5-year swap with notional principal of \$100 million, and short \$100 million of the 5-year note.
    - ▶ Swap obligates us to pay 90-day Libor and short sale cash is placed with repo dealer, earning 90-day repo. (Both roll every 90 days).

- ▶ On June 30, 2006, 90-day Libor was 5.5% and 90-day repo was 5.3%.
- ▶ So, if *relative* rates stay around where they are, PiVe will make a net 40 basis points on the trade, for a profit of around \$400,000 per year.
- ▶ As characterized, this trade does not require any of the firm's valuable capital. So what could possibly go wrong?
- ▶ Three things:
  1. Libor spiked in 2008 as concerns about bank viability affected the risk of this unsecured debt.
  2. The yield on US Treasuries and swaps dropped dramatically – which at first blush is no problem as the trade is hedged.
    - ▶ But there is a mark-to-market asymmetry.
    - ▶ As the bill's price jumped (from par on initiation to 110.6 on December 31, 2008), PiVe has to post \$10.6 million of its own capital to roll over its repo on the short.

### 3. The swap spread inverted.

- ▶ But we're hedged – the swap's value has also risen proportionately. But our swap counterparty is Goldman-Sachs, and because they are a AAA-rated prime dealer, we do not have a collateral arrangement with them.
- ▶ This at a time when capital is scarce.
- ▶ So PiVe has to buy the note to close its position putting further upward pressure on its price – unrelated to fundamentals.
- ▶ Changes in regulatory environment inverted the relative prices.

The failure of Lehman Brothers changed the risk landscape. *Liquidity* risk becomes more important than traditional risk sources. Counterparty risk rises to surface (hitherto: largely ignored).

Indeed, repo financing was penalized by Basel regulatory response to the global financial crisis.

This has led to a curious inversion of swap spreads.

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Transformation

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Repo

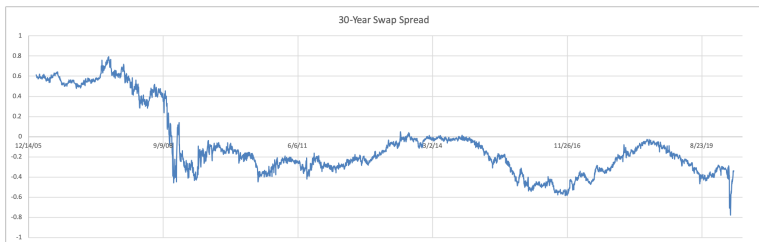
PiVe Trade

March 2020

Swap Spread

Whither Repos?

- ▶ 2018 and 2019 saw a dramatic increase in Treasury futures arbitrage trades by hedge funds.
- ▶ The trade entails going long in the Treasury note and bond while simultaneously selling in the futures market.
- ▶ Facing a downgrade which would have forced AIG into default and contagion effects through the CDS market would have been far ranging.
- ▶ On September 16, 2008, the Federal Reserve implemented a rescue package for up to \$85 Billion. In exchange the Fed got warrants for 80% of AIG stock.
- ▶ Another \$67 Billion added in November, 2008.
- ▶ March 2009: AIG announces \$62 Billion loss for Q4 2008. Treasury announces additional \$30 Billion in Aid.



## Figure.

30-year US Treasury - Swap Spread. Feb 9, 2006 – April 13, 2020.

Maximum: 79 bps on August 1, 2007.

Minimum: -77 bps on March 20, 2020.



Liquidity  
Transformation

Bank Runs

Deposit Insurance

FDIC Regulation

LTCM

Repo

PIVe Trade

March 2020

Swap Spread

Whither Repos?

Prior to the global financial crisis the swap spread was thought to reflect the counterparty risk associated with swaps. Market behavior in the context of the crisis as well as afterwards suggests that the spread is more accurately a reflection of funding costs.

Conditions in wholesale funding can give rise to puzzling asset price behavior. Consequences of the shortage of repo in March 2020 show up in the Treasury Markets. The story starts with growing convergence trade in T-Bill and T-Bond bases as shown in the next slide.

# Leveraged Fund Futures Positions

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Transformation

Bank Runs

Deposit Insurance

FDIC Regulation

LTCM

Repo

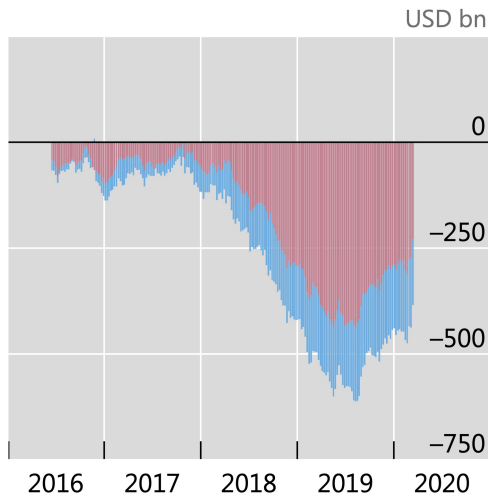
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March 2020

Swap Spread

Whither Repos?

## Leveraged fund futures positions<sup>3</sup>



Maturity: ■ 2 - 5 years  
■  $\geq 10$  years

- ▶ The preceding figure shows that going long notes and bonds, and short futures has been an increasing popular convergence trade for hedge funds in the months leading up to the novel corona virus crisis.
- ▶ Generally in response to the pandemic crisis, there was a flight to quality which is usually characterized by:
  1. Falling equity values
  2. Rising Treasury prices
  3. Rising VIX
  4. Rising credit spreads.
- ▶ But in mid-late March 2020, Treasuries were all over the place.
- ▶ As the next figure shows, repo provides an increasing share of hedge fund financing.

# Repo again to blame

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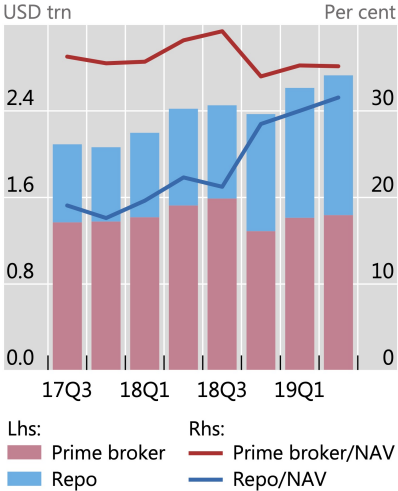
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FDIC Regulation

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PiVe Trade  
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Swap Spread

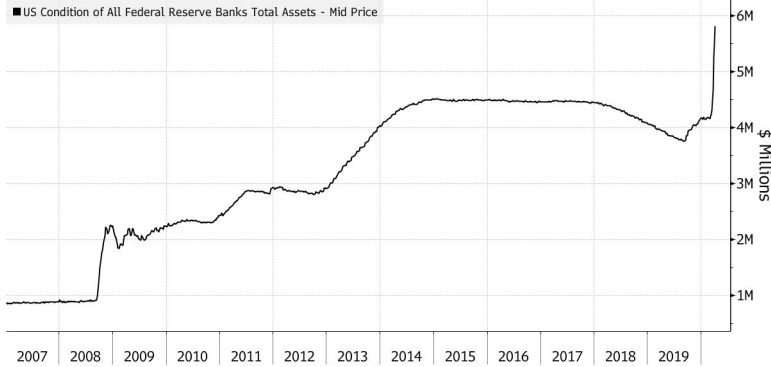
Whither Repos?

### Hedge fund funding sources



## Buyer of Last Resort

The Federal Reserve balance sheet has risen by \$2 trillion in 7 months



Source: Bloomberg

- ▶ Modern finance rests heavily on a smoothly functioning repo market.
- ▶ The global financial crisis revealed problems related to using risky assets as collateral and long rehypothecation chains.
- ▶ The global regulatory responses to the crisis, as well as changes in central bank operating policies have dramatically impacted repo markets: in general increasing the costs of repo lending to financial institutions.
- ▶ This has several interesting consequences including:
  - ▶ Asset prices may be pushed around in a manner that is unrelated to fundamental values.
  - ▶ It is impossible to characterize an arbitrage without taking funding considerations into account. (What is the “no-arbitrage” relationship between Treasury and swap yields?)