

# Sizing Up Repo

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# How Important is Repo in the Crisis?

- Repo has been argued to be important source of financing for growth in securitization; Repo also large source of funding for dealer banks (Gorton and Metrick, Adrian and Shin)
- "Run on repo" often seen as playing a key role in collapse of shadow banking as well as dealer banks (Gorton and Metrick, Adrian and Shin, Duffie, 2010).
- But few facts are known about some basic questions
  - How big is the amount of repo funding of shadow banks?
  - How much did repo funding contract during the crisis?
  - What type of collateral is most commonly financed in the repo market?
  - Who is most reliant on repo during the crisis?

- Our objective: Provide data to answer these basic questions
- Data (micro) on MMF repos from quarterly SEC filings of MMF
- Data (aggregate) on repos of securities lenders from the Risk Management Association
- Transactions data on emergency lending programs of the Federal Reserve

# MMF Data Example: Reserve Fund – Primary Fund

## February 29, 2008 Repurchase Agreements

Notional	Counterparty	Rate	Init.	Rep.	Collateral	Coll. mkt.val.
1,000,000,000	Bear Stearns	3.28%	2/29/08,	3/3/08	ABS, CMO, TRR, TR3	1,048,922,871
450,000,000	Bear Stearns	3.33%	2/29/08	3/3/08	ABS, CMO	472,500,201
500,000,000	Citigroup	3.23%	2/29/08	3/3/08	MNI, TRR	556,131,379
140,000,000	Merrill Lynch	3.43%	2/29/08	3/3/08	WLR	146,599,193
1,000,000,000	Morgan Stanley	3.29%	2/29/08	3/3/08	WLR	1,020,794,540
...						

- Concentrated market: Biggest 10 MMF families control about 60% of MMF assets under management
- Aim: Collect data for 20 biggest MMF families
- Completed so far:
  - Blackrock
  - Fidelity
  - JPMorgan
  - Reserve Funds
  - Morgan Stanley
  - Vanguard
  - Dreyfus
  - Goldman Sachs
  - Federated Funds
  - Schwab

# Securities Lender Data

- Quarterly survey of major securities lenders conducted by Risk Management Association (RMA), including the big securities lenders (AIG, BNY Mellon, State Street, ...)
- Hedge fund borrow stock, leave cash with security lenders.
- Security lenders then invest this cash in repos and ABS.
- Data on cash reinvestments.

- 1 Repo contraction small (3%, \$171bn) relative to stock of non-Agency MBS/ABS
  - Contrast with ABCP: \$662bn contraction.
- 2 “Run on repo” confined to repo collateralized by risky/illiquid securities
  - No run on Treasury/Agency repo
- 3 Repo contraction is small in aggregate, but significant compared to funding needs for select dealer banks
  - Approx 50% of repo funding for Merrill Lynch, Goldman, Morgan Stanley, Citigroup.
  - These firms were also on brink of failure in the crisis.
- 4 Federal Reserve Programs appear to smooth out contraction in private repo.

# Summary of MMF and Securities Lender Repo (\$bn)

Quarter	Money Market Funds			Securities Lenders		Primary Dealer Repo <sup>3</sup>
	Collected Repo	Total Repo <sup>2</sup>	Total Assets <sup>2</sup>	Repo	Cash Collateral	
2006Q4 <sup>1</sup>	144	395	2312	431	1594	3442
2007Q1	210	387	2372	527	1834	3619
2007Q2	213	426	2466	504	1902	3889
2007Q3	274	528	2780	522	1754	3886
2007Q4	298	606	3033	478	1712	4106
2008Q1	323	592	3383	467	1537	4278
2008Q2	281	518	3318	509	1790	4222
2008Q3	273	592	3355	490	1519	3989
2008Q4	287	542	3757	228	954	3208
2009Q1	375	562	3739	212	779	2743
2009Q2	345	488	3585	257	882	2582
2009Q3	334	495	3363	244	865	2499
2009Q4	351	480	3259	229	850	2469
2010Q1	308	440	2931	263	837	2477

<sup>1</sup> Incomplete coverage of funds in MMF sample in 2006Q4.

<sup>2</sup> Source: Flow of Funds Accounts.

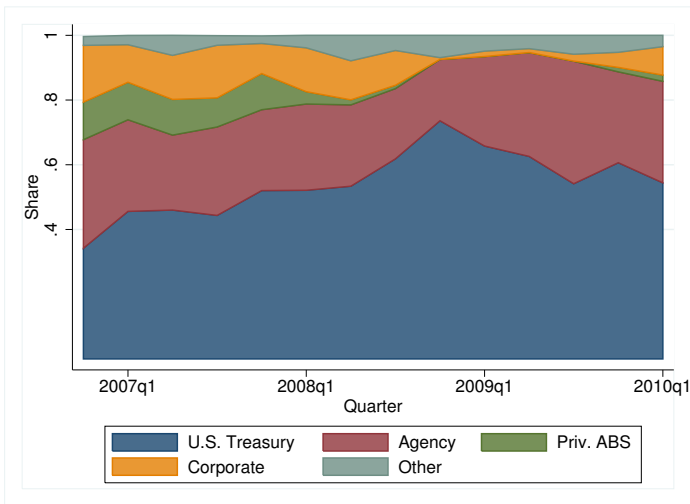
<sup>3</sup> Source: Federal Reserve Bank of New York



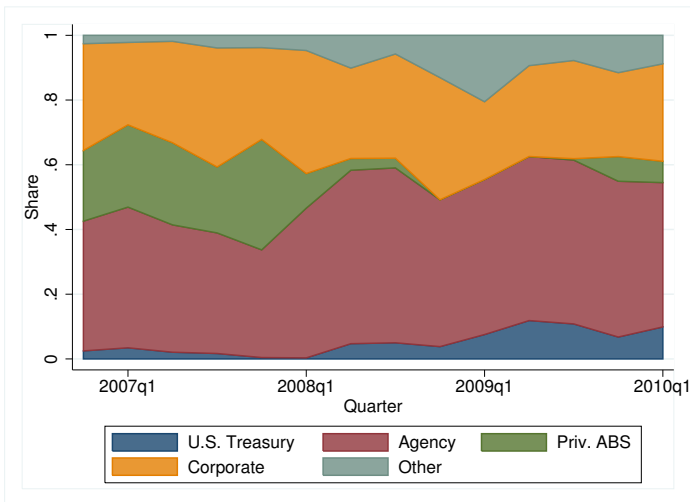
# How much of Total Repo Funding Do We Capture?

- 2007Q4, about \$1.1 trillion repo lending in total from MMF and securities lenders
- Tri-party repo of \$2.5tn, but includes interdealer repo (~\$500bn?).
- Other repo lenders according to Flow of Funds Accounts, 2007Q4 (December 2010 release):
  - State and local governments \$163.3bn
  - Government sponsored enterprises \$142.7bn
  - Rest of the world \$338.4bn
- Who else: Corporations (appear to go through MMFs). Foreign Central Banks (DVP, tri-party, \$100 to \$200bn).

# MMF: Share of Collateral by Type (by value)



# Securities Lenders: Share of Collateral by Type (by value)



# Repo versus ABCP

## Repo of ABS

- Bank holds ABS on balance sheet.
- Issues short-term debt, overcollateralized, against ABS.
- Typically overnight, so lenders can redeem the debt at par.

## ABCP

- Bank takes loans/securities, places them in SPV.
- Issues short-term (often overnight) debt against loans.
- Buyers of debt can sell the debt back to banks at par.

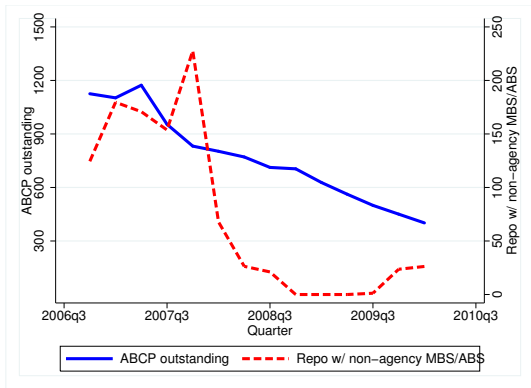
# Short-term Funding Pre-Crisis 2007Q2

	Non-agency MBS/ABS Amount	%	Corporate Bonds Amount	%
Total outstanding <sup>1</sup>	5275	100%	5591	100%
Short-term funding				
ABCP <sup>2</sup>	1173	22%		
Direct holdings <sup>3</sup>				
MMF	243	5%	179	3%
Securities lenders	502	10%	369	7%
Repo <sup>4</sup>				
MMF	44	1%	56	1%
Securities lenders	127	2%	159	3%
Total short-term	2089	40%	763	14%

# Contraction in Short-term Funding

	2007Q2	2009Q1	Contraction
Non-agency MBS/ABS			
ABCP <sup>1</sup>	1173.2	511.0	-662.2
Direct holdings			
MMF <sup>3</sup>	243.3	59.4	-183.9
Securities lenders <sup>2</sup>	501.6	116.0	-385.6
Repo			
MMF	44.3	0.0	-44.3
Securities lenders <sup>4</sup>	126.5	0.0	-126.5
Total			-1402.5
Corporate bonds			
Direct holdings			
MMF <sup>3</sup>	178.9	158.4	-20.5
Securities lenders	368.7	309.1	-59.6
Repo			
MMF	55.9	9.2	-46.7
Securities lenders <sup>4</sup>	159.2	50.9	-108.3
Total			-235.1

# Comparison of repo and ABCP contraction



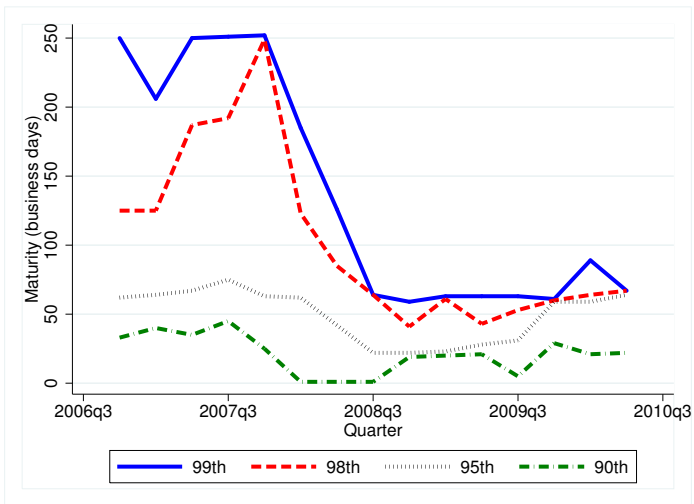
- ABCP outstanding net of amount funded through Fed CPFF program

# Demand or Supply?

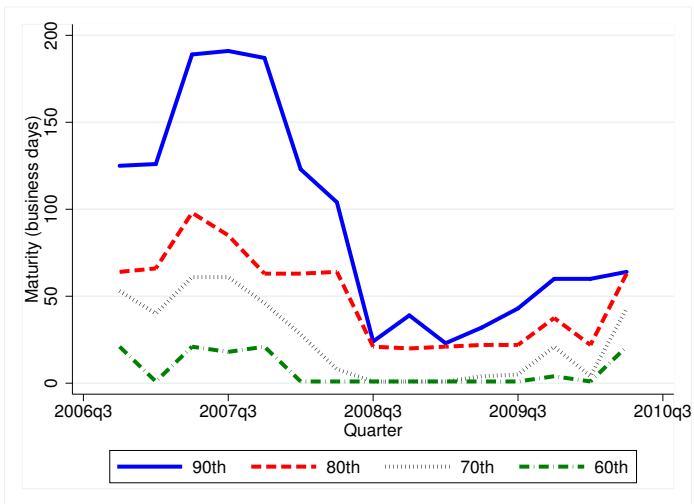
- Repo demand contraction: MMF and securities lenders refuse to lend against non-agency MBS/ABS collateral?
- Repo supply contraction: Hedge funds and dealer banks scale back investments in MBS/ABS and have lower MBS/ABS funding needs?
- Indication that largely demand driven
  - Quantity going to zero suggests demand effect
  - Price terms rise



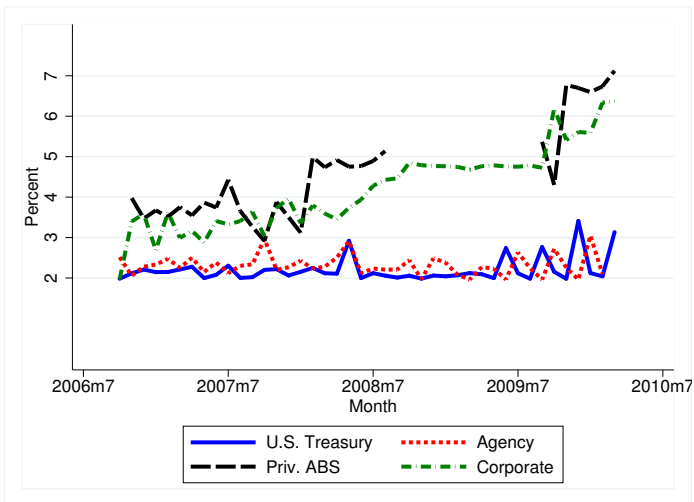
# Maturity Compression (vw.)



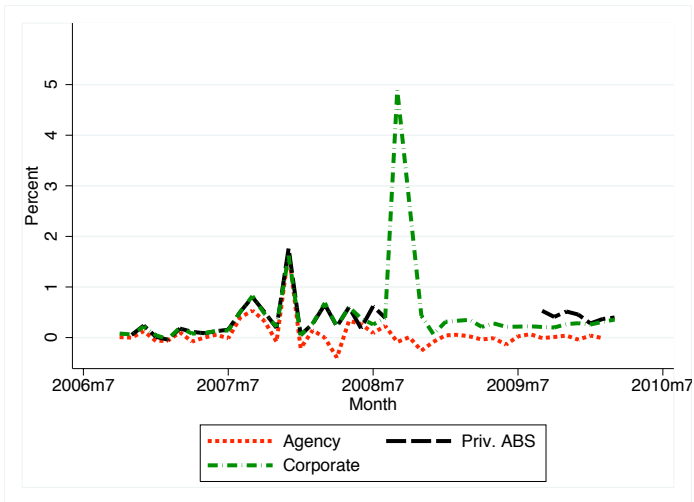
# Maturity Compression (ew.)



# Haircuts by Collateral Type (vw.)



# Average Overnight Repo Rate in Excess of Fed Funds/OIS Rate (vw.)

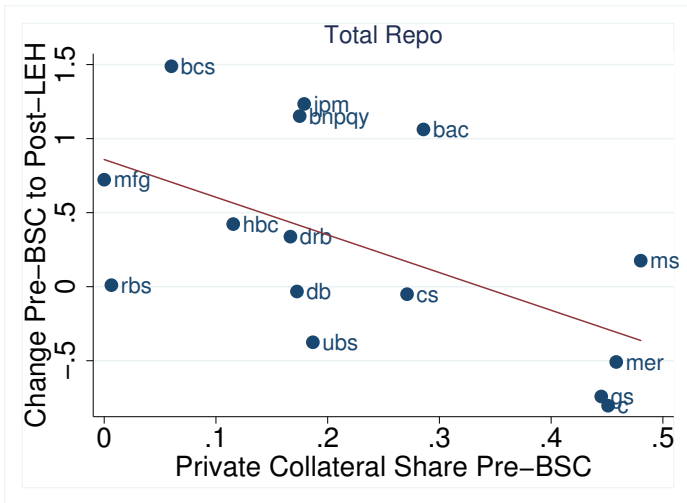


- Increase in price terms on non-agency MBS/ABS (repo rate, haircut, decrease in maturity) suggest “run on repo”.
- Haircuts for Treasury and agency always stayed between 2-3%.
- Tri-party repo haircuts increased much less during crisis than the bi-lateral repo haircuts reported in Gorton and Metrick (2011b)
  - Gorton and Metrick report haircuts  $> 50\%$  for several categories of corporate debt and securitized products
  - Why the difference?
    - Their data: dealer to hedge fund; dealer to dealer.
    - Credit crunch from dealers, given capital concerns? Defensive actions of dealers?

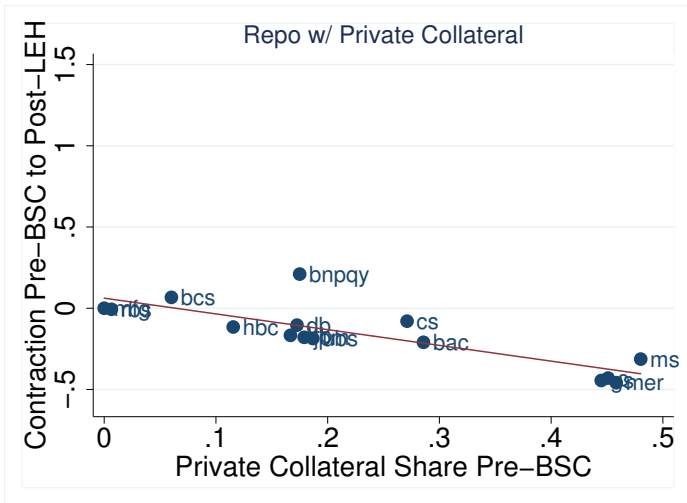
# Cross-Sectional Patterns by Repo Counterparty

- Evidence for “run” on repo with private collateral, especially non-agency MBS/ABS, but channel for collapse of shadow banking is unclear.
- We examine effects on dealer banks:
  - Dealer banks with higher exposure to private debt instruments?
  - “Run” on specific dealer banks irrespective of type of collateral offered?
- Analysis based on MMF repo data, focused on periods
  - Pre-Bear Stearns (BSC): Dec. '07 - Feb '08
  - Post-Lehman (LEH): Sep. '08 - Nov. '08

# Contraction/Expansion in Total MMF Repo

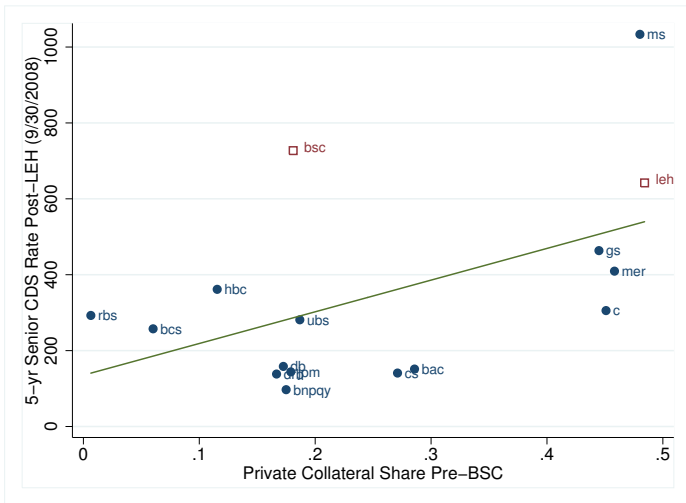


# Contraction/Expansion in MMF Repo w/ Private Collateral





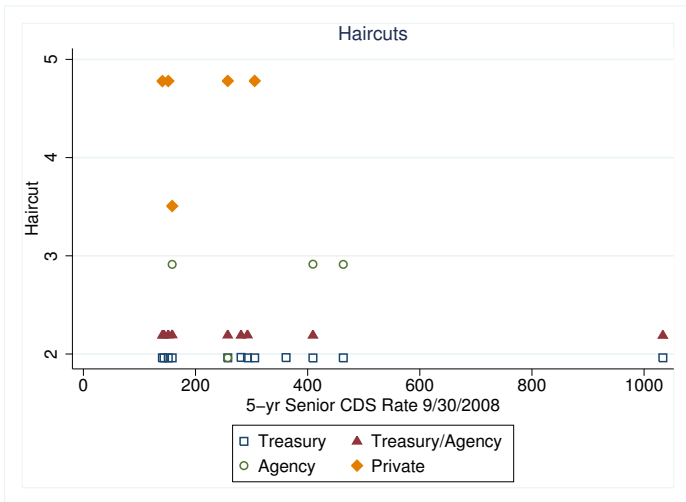
# Private Collateral Share and CDS Rates in Sep '08



Change from pre-BSC to post-LEH:

- Dealer banks with high private collateral shares:
  - GS = -32%
  - MS = -37%
  - MerLynch = -20%
  - Citi = -23%
- Dealer banks with low private collateral share:
  - JPM = +10%
  - BAC = -10%

# Haircuts by Counterparty



# Repo Rates by Counterparty



# Cross-Sectional Patterns by Repo Counterparty

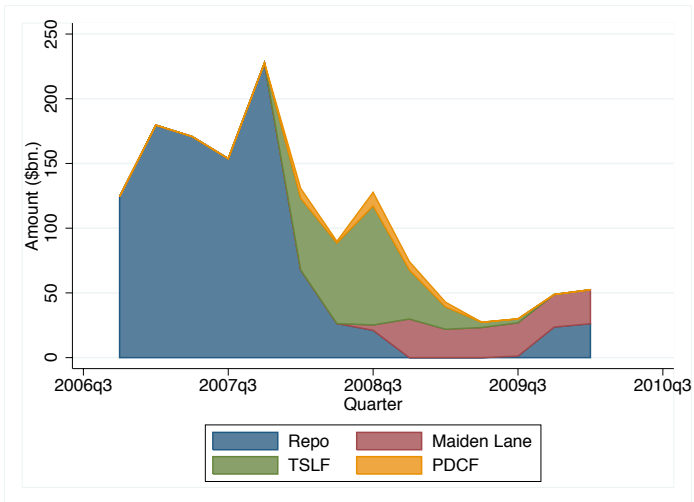
- Dealer banks with much higher private collateral funding needs appear to run into trouble.
- We do not see “runs” on high-risk dealer banks: financing with high-quality collateral still available at normal terms.
- But our data is not high frequency ...
  - Money market investors stopped rolling over Lehman Brothers repos, irrespective of collateral, only in the last few days before bankruptcy (Copeland, Martin, and Walker (2010))
  - Concern existed that tri-party agents (JPMC and BNYM) could cut off access to tri-party repo for high-risk dealer banks

# Federal Reserve Programs

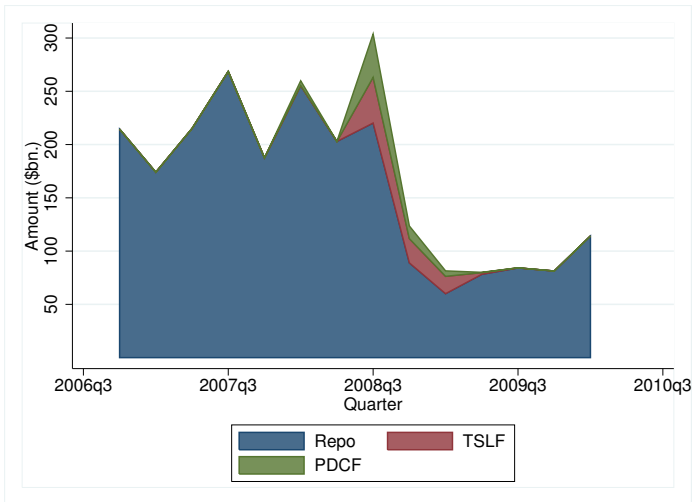
We focus on four principal programs:

- 1 PDCF (Primary Dealer Credit Facility), March 2008: Loan facility that provided funding to primary dealers in exchange for any tri-party-eligible collateral. Loans were overnight, and made at the primary credit discount rate.
- 2 TSLF (Term Securities Lending Facility), March 2008: Facility to loan Treasuries from the Fed's portfolio in exchange for any tri-party-eligible collateral. Loans were 28-day, and rates were set in an auction.
- 3 Maiden Lane, 2 facilities, various dates: Fed made loans to SPVs that held non-agency ABS. Facilities were set up in conjunction with interventions in Bear Stearns and AIG.
- 4 CFFF (Commercial Paper Funding Facility), October 2008: Fed made loans to an SPV to purchase 3-month ABCP.

# Repo and Federal Reserve Funding of Non-Agency MBS/ABS

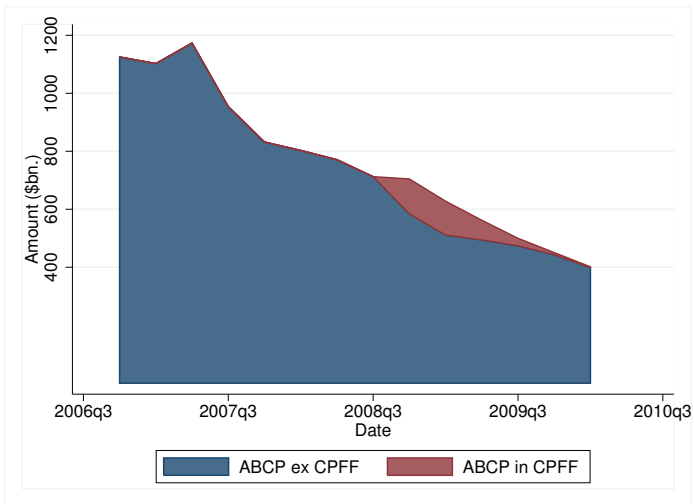


# Repo and Federal Reserve Funding of Corporate Debt Securities





# ABCP Outstanding (ex CPFF) and CPFF Funding



# Federal Reserve Programs: Terms

- We focus on Fed Program Utilization around Sep. 30, 2008
- TSLF looks attractive relative to market rates on Sep. 30, 2008
  - Schedule 2 auction on 10/1/08 yielded a (uniform) loan fee of 1.51%, compared private collateral repo rate spread to Treasury repo on 9/30/08 of 7%.
  - Schedule 1 auction on 10/1/08 yielded a (uniform) loan fee of 0.42%, which is lower than many observed agency repo spreads on 9/30/2008.
- PDCF funding rates attractive for private collateral (2.25% on 9/30/2008).
- Both must have carried stigma similar to discount window borrowing for commercial banks.

# Fed Program Utilization by Primary Dealers in Sep '08

	TSLF			PDCF
	maxout1 (1)	maxout2 (2)	Total (3)	Total (4)
Agency Share pre-BSC	1.56 (3.31)	0.69 (1.80)	43.84 (2.95)	2.66 (0.23)
Private Share pre-BSC	-0.12 (-0.26)	0.87 (2.29)	32.16 (2.21)	45.54 (4.00)
Observations	15	15	15	15
Adjusted $R^2$	0.394	0.375	0.510	0.516

# Discussion: Significance of “run on repo”

## Gorton-Metrick broadbrush picture

- Repo as the “deposit” in a shadow banking sector that holds non-Agency MBS/ABS
- Run of repo depositors created funding squeeze for shadow banking system (GM: haircuts from 0% to 20% w/ \$10 trillion repo  $\approx$  \$2 trillion funding shortfall)

## Evaluation based on our evidence

- Repo w/ non-Agency MBS/ABS collateral seems too small to fit that picture. ABCP and direct investments of short-term investors an order of magnitude bigger.
- Aside: ABCP hit commercial banks who turned out to have access to plenty of liquidity (deposit inflows, government facilities). Capital problems may have been more important than funding problems.

# Modified picture: Funding squeeze for some dealer banks

- Run by repo depositors confined to risky/illiquid collateral, and not driven by credit risk of the counterparty (caveat: we do not observe daily repo data).
- This “run” was relatively insignificant in terms of aggregate funding needs of shadow banking system, but it played a significant role for dealer banks with high risky/illiquid collateral funding needs. Many of these banks almost failed.
- Gorton-Metrick dealer-hedge fund repo haircut data indicates that dealer banks then raised cost of repo credit to hedge funds and/or to each other in interbank repo (“credit crunch”)