

Overcoming Borrowing Stigma: The Design of Lending-of-Last-Resort Policies

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How to provide liquidity to banks during episodes of financial turmoil?
How to stop bank runs?

- Diamond and Dybvig (1983): lender of the last resort (LOLR)
- In the U.S: the discount window (DW)

In practice, LOLR was less effective than the theory's predicts

- Bagehot rule: illiquidity v.s. insolvency
- **Discount window stigma**: borrowing from the central bank is a signal of financial weakness (Furfine, 2001, 2003, 2005; Peristiani, 1998)

Discount Window in Summer 2007

- Summer 2007: liquidity shortage in the interbank market

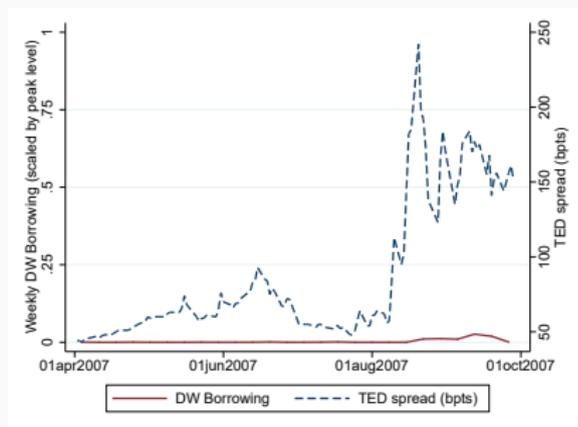


Figure 1: DW Borrowing and TED Spreads (TED spread approximates stress in the interbank market)

- Initial policy responses (largely ineffective)
 - Reducing discount rate; Extending loan maturity; Expanding acceptable collaterals; Encouraging “big boys”

DW Stigma and TAF

Term Auction Facility: nearly identical requirements on participants' eligibility, collaterals and maturity

- **Motivating Question 1:** why was TAF able to provide more liquidity?
 - A naive answer: TAF was cheaper

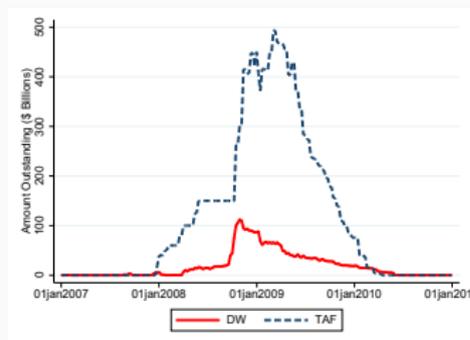


Figure 2: Total Borrowing from TAF v.s. DW Primary Credit

Bid, Stop-out Rate and Discount Rate

- **Motivating Question 2:** why were banks willing to pay more in TAF?

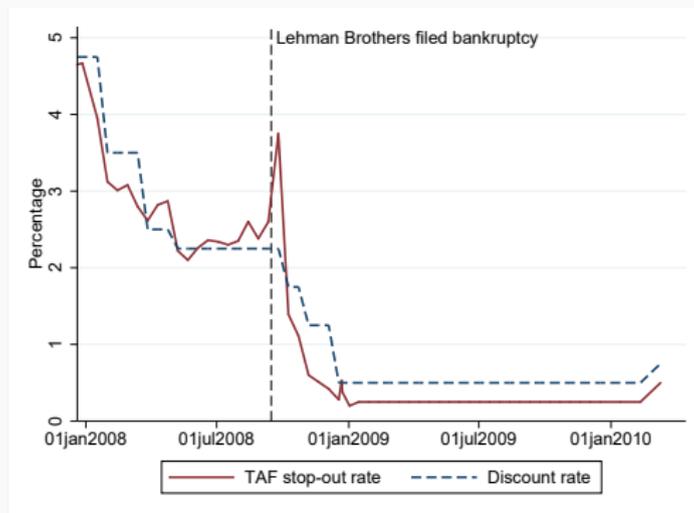


Figure 3: TAF Bid, Stop-out rate and DW Rates

Overview

Empirically, we compare banks that borrowed from the DW v.s. banks that borrowed from the TAF

1. DW banks were riskier (higher leverage, lower capital ratio)
2. DID: an exogenous improvement in bank's financial condition increased TAF borrowing but reduced DW borrowing
3. DW banks were more likely to fail subsequently than TAF banks
4. DW banks had higher CDS spreads than TAF banks prior to borrowing events

We provide a theory to rationalize these findings

1. TAF has a delay
2. TAF allows for banks to choose bids, which offers stronger banks an opportunity to borrow at low rates

Empirical Analysis

All analysis is conducted at the BHC level

- Section 23A of the Federal Reserve Act imposes legal limits on banks lending to affiliates within BHC.
- Temporary exemptions were granted during crisis

1. Some Basic Facts

Data source: Bloomberg

- Lawsuit by Bloomberg L.P. against Fed Board under FOIA
- Daily borrowing amount from DW and TAF and others
- Date range: Aug 1, 2007 ~ Apr 30, 2010

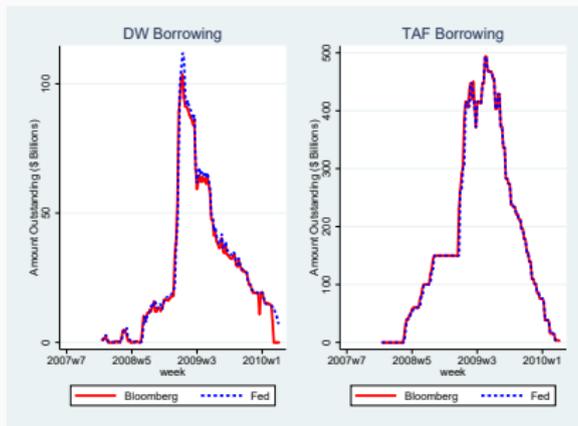


Figure 4: Comparison between Bloomberg Data and Fed Data

1. Some Basic Facts

	N	Mean	Max	Min	10 th	50 th	90 th
Borrowers	407						
Foreign Banks	92						
DW and TAF Borrowers	260						
# of DW Events		12	242	0	0	2	35
# of TAF Events		5	28	0	0	3	13
DW Amt (MM)		1529	190155	0	0	20	1809
TAF Amt (MM)		3174	100167	0	0	58	7250

- Key observation: highly-skewed borrowing behavior

2. Which banks borrow from DW/TAF/both/neither?

- FR Y-9C: U.S. BHCs with positive asset value
 - 135 out of 289 banks
 - 42.2% of DW borrowing, and 81.8% of TAF borrowing
- Proxies for banks' financial conditions
 - Capital ratio
 1. Tier-1 Capital/Risk-Weighted Assets
 2. Book Leverage
 - Asset liquidity
 1. Liquid Assets/Total Assets
 2. Private MBS/Total Assets
 - Funding stability
 1. Unused commitments/total assets
 2. Short-Term Wholesale Funding/Assets

Specification and Results

- Sample: BHCs borrowed from either DW or TAF
- No BHC fixed effects due to highly-skewed borrowing events
- Similar results with lagged financial conditions

$$\frac{DW_{it}}{DW_{it} + TAF_{it}} = \alpha + \beta \text{Fin Cond}_{it} + \Gamma \cdot [\text{Size}_{it}, \text{ROA}_{it}] + Q_t + \varepsilon_{it}$$

	T1RWA	Lev	%Liquid Asset	Priv. MBS/Asset	Unused Com/Asset	S.T. whole/Asset
Fin Cond	-2.008*	2.094*	0.244	1.714**	0.111	0.011
	(1.155)	(1.129)	(0.287)	(0.676)	(0.434)	(0.366)
Observations	578	578	578	381	556	578
Adjusted R^2	0.121	0.123	0.113	0.162	0.120	0.112

A Diff-in-Diff Setup

Background: in early October 2008, leaders from the G7 countries met and established a plan of action that aimed to stabilize financial markets, restore the flow of credit, and support global economic growth.

- Credit guarantee programs were established subsequently.
- Allow domestic institutions to issue debt that would be backed by a guarantee from the government in exchange for a guarantee fee.

DID: Canada v.s. U.S.

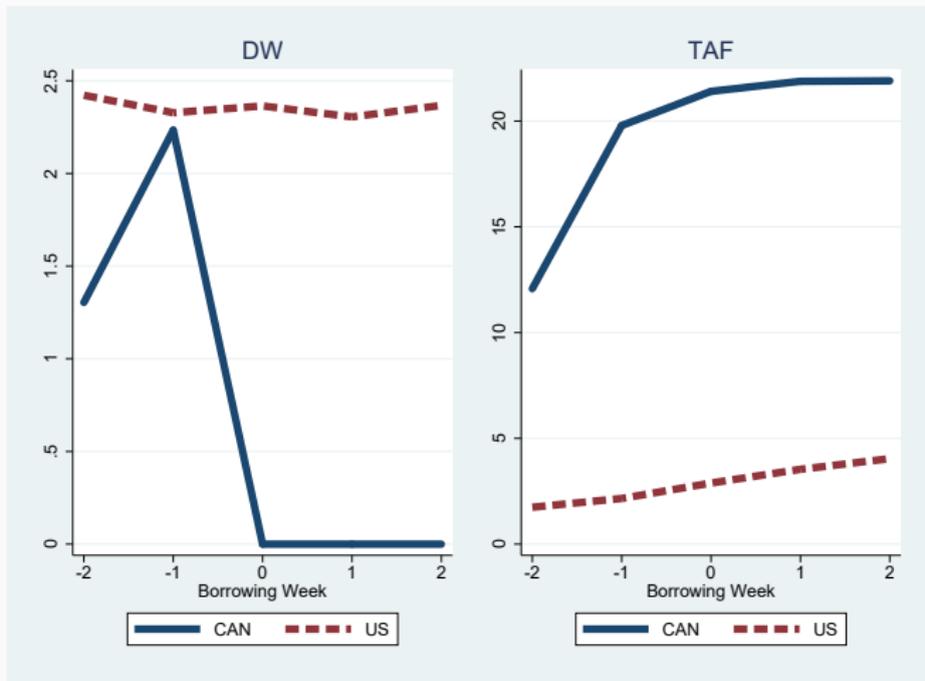


Figure 5: Logarithm of Borrowing Amount within two weeks

DID: Germany v.s. U.S.

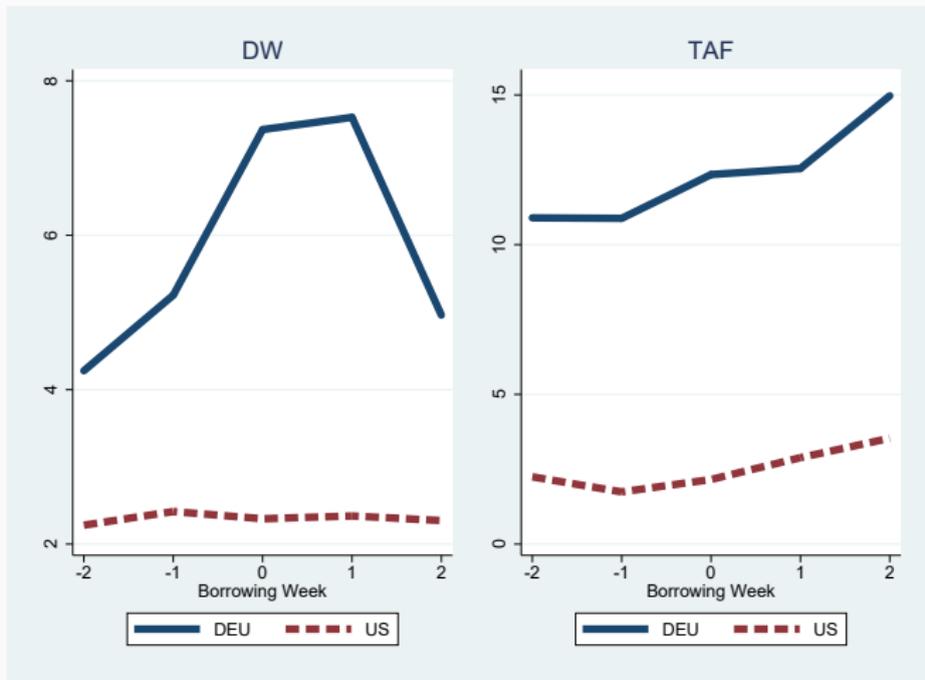


Figure 6: Logarithm of Borrowing Amount within two weeks

DID: France v.s. U.S.

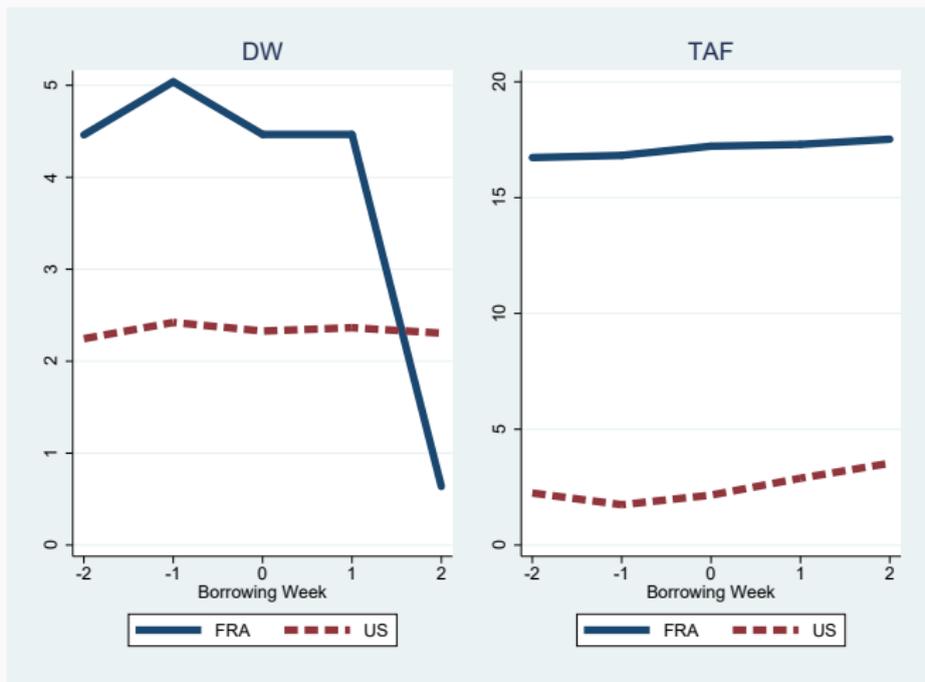


Figure 7: Logarithm of Borrowing Amount within two weeks

CDS Spreads

- Match Bloomberg data with CDS spreads in Markit
- We match 70 banks, which accounts for 24.8% of DW and 79.4% of TAF borrowing.

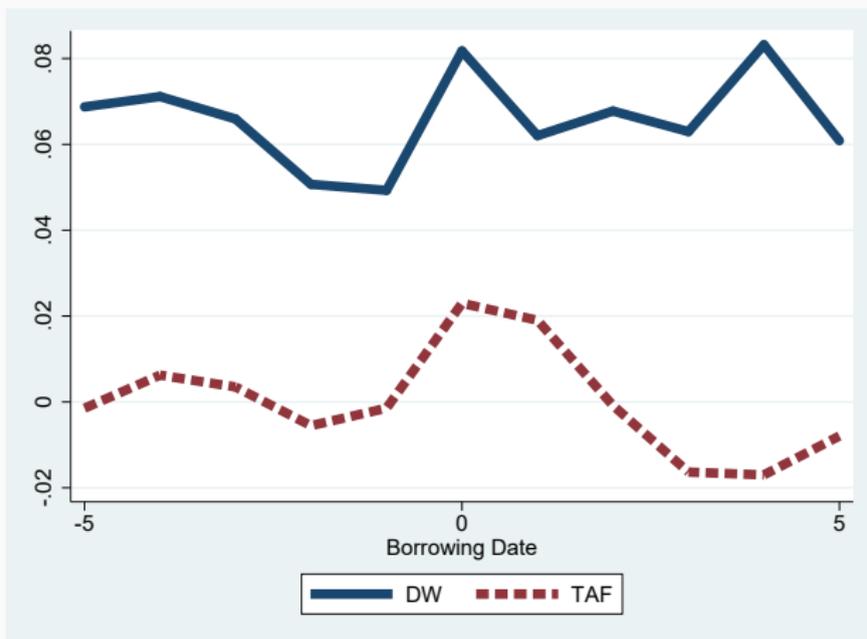


Figure 8: CDS Spreads around Borrowing Events

3. Bidding behaviors in TAF

Data source: TAF auctions

- Obtained through FOIA
- Information on all 60 auctions
 - Winners, losers, bidding rates, amounts, collateral pledged
 - Dec 17, 2007 ~ Mar 8, 2010
- Proxies for financial strengths
 - Share of collaterals with high haircuts:
non-agency MBS, ABS, and corporate market instruments
 - Probability of future bidding

Summary Statistics

	N	Mean	Max	Min	10 th	50 th	90 th
Banks	434						
Foreign Banks	82						
# of submitted bids							
all		13	95	1	1	8	35
Foreign Banks		25	95	1	4	23	50
Share of collaterals with high haircut							
All		0.19	1.00	0.00	0.00	0.00	0.79
Foreign Banks		0.40	1.00	0.00	0.00	0.34	0.93

- Among winners, borrowers who submitted high bids pledged a higher fraction of collaterals with high haircuts

	dependent var: share of high-haircut collaterals			
High-rate bidders	0.150*** (0.009)	0.122*** (0.009)	0.027*** (0.009)	0.110*** (0.009)
Constant	0.134*** (0.006)	0.202*** (0.053)	0.053 (0.047)	0.178*** (0.053)
auction FE	No	Yes	Yes	Yes
G-SIB FE	No	No	No	Yes
Foreign FE	No	No	Yes	No
N	4804	4804	4804	4804
R ²	0.051	0.087	0.343	0.112

- Compared to losers, winners were more likely to bid again in the next two auctions

	dependent var: prob of bidding in the next auction			
Winner	0.032** (0.016)	0.078*** (0.019)	0.060*** (0.019)	0.074*** (0.019)
Constant	0.822*** (0.015)	0.722*** (0.046)	0.693*** (0.046)	0.713*** (0.045)
auction FE	No	Yes	Yes	Yes
G-SIB FE	No	No	No	Yes
Foreign FE	No	No	Yes	No
N	4855	4855	4855	4855
R ²	0.001	0.085	0.094	0.088

- Among winners, high-rate bidders were also more likely to bid again and also submit higher rates.

4. LOLR and Bank Failure

We manually matched banks to the subsequent failures events by names

- Actual bank failure: Lehman
- Nationalization: AIG
- Acquisition: Merrill Lynch

	Fail this quarter	Fail during Crisis
dw_ratio	0.007* (0.004)	0.125** (0.050)
Constant	0.003 (0.002)	0.050*** (0.019)
Observations	1586	364
Adjusted R^2	0.001	0.020

Conclusion

“Stigmatized” Lender of the Last Resort

- Evidence that DW banks were weaker than TAF banks
 - Observable and unobservables
- A theory with endogenous participation

Thank you!