

The Federal Reserve's Discount Window and TAF Programs: "Pushing on a String?"

Allen N. Berger

University of South Carolina, Wharton Financial Institutions Center, and European Banking Center

Lamont K. Black

DePaul University

Christa H.S. Bouwman

Case Western Reserve University and Wharton Financial Institutions Center

Jennifer Dlugosz

Washington University

Background

- During the recent financial crisis, the Federal Reserve provided an unprecedented amount of liquidity to the banking sector in several ways, including through the Discount Window (DW) and the Term Auction Facility (TAF).
 - Extended over 30,000 (DW + TAF) loans with a par value of \$15 trillion during the crisis.
- The Federal Reserve envisioned that these liquidity facilities would encourage bank lending:
 - *“Together these actions should encourage term lending across a range of financial markets in a manner that eases pressures and promotes the ability of firms and households to obtain credit.”* (Federal Reserve Press Release announcing expansion of TAF auctions, Oct. 6, 2008.)
- It is not clear ex ante if a central bank can increase lending during a financial crisis or whether it is merely “pushing on a string.”

Background (cont'd)

- We ask three questions:
 - Q1: Which banks used funds from the Federal Reserve during the crisis?
 - Q2: Did these funds substitute for or complement other funding sources?
 - Q3: Did banks use these funds to increase their lending?
- We address these questions separately for small banks (\leq \$1 billion in Gross Total Assets) and large banks (GTA $>$ \$1 billion).
- Such questions could not normally be addressed because identities of banks receiving funds from the Federal Reserve traditionally have not been revealed (concern: information could cause a liquidity flight.)
- However, after the crisis, the Federal Reserve was required to disclose formerly-confidential data:
 - DW data released under Freedom of Information Act requests by Bloomberg News and Fox Business Network on Mar. 31, 2011.
 - TAF data released under the Dodd-Frank Act on Dec. 1, 2010.(see also Armantier, Ghysels, Sarkar, and Shrader 2011, Benmelech 2012, Boyson, Helwege, and Jindra 2013, Kleyменова 2013 for use of these data)

Overview of Facilities

- Discount window: Backup source of short-term funds for depository institutions in sound financial condition.
 - Historically overnight, no-questions-asked funds at “above market” rates.
 - Despite DW’s sound condition requirement and confidentiality, DW usage is often thought to be associated with a stigma (fear: regulators, creditors, or other banks may assume the worst if it becomes known the bank used DW).
- In response to the crisis, the Federal Reserve:
 - Made DW funds available on a term basis and reduced their cost:
 - Aug. 17, 2007: up to 30 days, ↓ from 100 to 50 basis points over target fed funds rate.
 - Mar. 16, 2008: up to 90 days, ↓ from 50 to 25 basis points over target fed funds rate.
 - Announced TAF on Dec. 12, 2007.
 - Bi-weekly auctions of 28-day or 84-day funds to depository institutions in generally sound financial condition.
 - TAF carried the same eligibility and collateral requirements as DW.
 - Designed to reduce stigma associated with DW usage.
 - Supporting evidence: some banks used TAF even when it was more costly than DW, and TAF did not come with prepayment privileges (unlike DW funds) (see Armantier, Ghysels, Sarkar, and Shrader 2011).

Key Findings

- Q1: Which banks used funds from the Federal Reserve during the crisis?
 - Usage was widespread: 20% of small banks; 62% of large banks.
 - Maximum outstanding relative to assets on a given day was 48%.
 - Maximum outstanding by one bank on one day was \$60 billion.
 - Small bank users were generally weaker, large bank users were not.
- Q2: Did these funds substitute for or complement other funding sources?
 - The funds substituted to a limited degree for other funds.

Key Findings (cont'd)

- Q3: Did banks use these funds to increase their lending?
 - For both small and large banks, an increase in DW and TAF usage is associated with significantly increased lending.
 - Results holds for most types of lending.
 - Results hold when using IV to account for possible endogeneity.
 - The funds both enhanced the lending of expanding banks and reduced the decline at contracting banks.
 - DW and TAF usage resulted in significant lending increases to smaller firms at small banks and larger firms at large banks.
 - DW and TAF usage is associated with safer loans for small banks and no significant effect on loan quality for large banks, and both groups of banks left loan contract terms unchanged.
 - These funds increased lending by more than the actual aggregate increase in lending by the U.S. banking sector, essentially reversing what would have otherwise been a decline in overall lending.

Data Description

- Institution-level data on daily DW and TAF outstandings
 - Available: August 20, 2007 – March 11, 2010
 - Define the crisis period: August 20, 2007 – December 31, 2009
 - In early 2010, the Fed began rolling back expansions to the discount window and concluded the TAF auctions.
- Quarterly Call Report
 - Data on bank lending, other activities, and condition.
 - For Q1, Q2, and Q3, we had to drop a number of DWTAFF users that did not fill out Call Reports, mostly agencies and branches of foreign banks, who received substantial amounts of DWTAFF funds.
- Data on Troubled Asset Relief Program (TARP), Federal Home Loan Bank (FHLB) borrowing, state income growth

Q1: Which banks used funds from the Federal Reserve?

(Table 3 Panel A – part)

	<i>Dependent var: = 1 if bank used DWTAFF during quarter</i>	
	Small banks	Large banks
log(GTA)	0.019***	0.080***
EQRAT	-0.076***	0.167
Stddev ROA	0.346	-9.561**
CRE / GTA	0.033***	0.311***
MBS / GTA	0.048***	0.395***
ROE	0.004	-0.038
Illiquidity	0.009	0.019*
BHC dummy	0.004*	0.005
Listed dummy	0.002	0.035
Foreign own dummy	-0.015**	0.005
OCC dummy	-0.002	0.004
FDIC dummy	-0.009***	-0.029
Income growth	0.101	1.351*
Observations	63301	5101
Pseudo R2	0.16	0.13

Coefficients of Federal Reserve districts and time FE are not shown for brevity

- Small bank users tended to have less capital and higher portfolio risk, consistent with greater need.
- Large bank users were generally not weaker.
 - May be due to: greater stigma for large banks, greater reliance on funding from disrupted capital markets, possibly better screening of weak large banks by the Federal Reserve, encouragement of healthy large banks to use the funds, or a preference for term funds instead of overnight federal funds. 8

Q2: Did the funds substitute for or complement other funding sources? *(Table 5 – part)*

<i>Dependent var :</i>	$\Delta(\text{DWTAF}) / \text{GTA}$		$\Delta(\text{DW}) / \text{GTA}$		$\Delta(\text{TAF}) / \text{GTA}$	
	Small banks	Large banks	Small banks	Large banks	Small banks	Large banks
$\Delta(\text{Core Deposits})/\text{GTA}$	-0.007***	-0.007	-0.003**	-0.002	0.000	0.000
$\Delta(\text{Fed Funds})/\text{GTA}$	-0.010	-0.011	-0.003	-0.003	0.000	-0.001
$\Delta(\text{Repos})/\text{GTA}$	-0.019	-0.031	0.000	-0.009	0.000	-0.002
$\Delta(\text{Other Hot Money})/\text{GTA}$	-0.010**	-0.032***	-0.005***	0.000	0.000	0.000
$\Delta(\text{FHLB})/\text{GTA}$	-0.004	-0.022**	0.001	-0.001	0.000	0.000
$\Delta(\text{TARP})/\text{GTA}$	-0.048	0.036	-0.025**	0.008	0.000	0.000
Observations	4249	1396	4055	1096	311	290
R2	0.28	0.33	0.24	0.21	0.52	0.65

Coefficients of bank condition, economic environment, bank FE, and time FE are not shown for brevity

- Not causal; just to establish how DWTAF moves with other funding sources.
- Small banks:
 - DW substituted for some other funding sources (core deposits and other hot money).
- Large banks:
 - DW substituted for some other funding sources (other hot money and FHLB advances).
- Caveat: statistical significance, no economic significance (small coefficients).

Q3: Did banks use the funds to increase lending?

(Table 6 Panel A – part and Panel B)

<i>Dependent var:</i>	$\Delta(\text{LOANS})$ /GTA	$\Delta(\text{ST_LOANS})$ /GTA	$\Delta(\text{LT_LOANS})$ /GTA	$\Delta(\text{CI_LNS})$ /GTA	$\Delta(\text{CRE_LNS})$ /GTA	$\Delta(\text{RRE_LNS})$ /GTA	$\Delta(\text{OTHER_LNS})$ /GTA
Small banks:							
$\Delta(\text{DWTAF})/\text{GTA}$	0.919***	0.599***	0.344***	0.153***	0.386***	0.028	0.230***
Observations	56011	56011	56011	56011	56011	56011	56011
R2	0.447	0.147	0.237	0.207	0.400	0.311	0.152
Large banks:							
$\Delta(\text{DWTAF})/\text{GTA}$	0.941***	0.349**	0.643***	0.155**	0.276***	0.092*	0.186***
Observations	4255	4255	4255	4255	4255	4255	4255
R2	0.486	0.208	0.282	0.263	0.512	0.354	0.207

Coefficients of changes in other funding sources, bank condition, economic environment, bank FE, and time FE are not shown for brevity

- For both small and large banks, an increase in DWTAF usage is associated with increased lending.
 - Holds for both short-term and long-term loans.
 - Holds for commercial and industrial (C&I) loans, commercial real estate (CRE) loans, and other loans, and is weak for residential real estate (RRE) loans.
- Results are confirmed using instrumental variables (IV).

Q3: Did banks use the funds to increase lending? (cont'd)

(Tables 8 and 9)

- Did the programs lead to higher loan growth for banks that were increasing their loans or less loan contraction for those that were reducing their lending, or both?
 - Both! (Bigger effect for the former.)
- Robustness:
 - Large bank findings robust to excluding too-big-to-fail banks.
 - Banks with GTA > \$50 billion or the 19 largest banks each quarter.
 - Results seem to be driven by privately-held (instead of listed) banks.
 - Listed banks generally have better access to other funding sources and may not need DWTA as much to increase lending.

Q3: Did banks use the funds to increase lending? (cont'd)

(Table 10)

- Effects on lending to small and large firms:
 - Imperfectly comparable to main results: June Call Reports provide data by loan (*not* firm) size; examine annual change June 08 – June 09 (*not* quarterly throughout the crisis).
 - Find: at small banks, loans with smaller sizes went up:

Dependent var:	$\Delta(\text{CI_LOANS})/\text{GTA}$	$\Delta(\text{CI_LOANS})/\text{GTA}$	$\Delta(\text{CI_LOANS})/\text{GTA}$	$\Delta(\text{CI_LOANS})/\text{GTA}$
Loan size class:	< \$100K	\$100K - \$250K	\$250K - \$1 million	> \$1 million
$\Delta(\text{DWTAF}) / \text{GTA}$	0.028	0.035*	0.110**	0.027
Observations	6096	5494	5494	5494
R2	0.03	0.05	0.06	0.06

... while at large banks, loans with larger sizes increased:

Dependent var:	$\Delta(\text{CI_LOANS})/\text{GTA}$	$\Delta(\text{CI_LOANS})/\text{GTA}$	$\Delta(\text{CI_LOANS})/\text{GTA}$	$\Delta(\text{CI_LOANS})/\text{GTA}$
Loan size class:	< \$100K	\$100K - \$250K	\$250K - \$1 million	> \$1 million
$\Delta(\text{DWTAF}) / \text{GTA}$	0.003	-0.011	-0.011	0.215**
Observations	486	483	483	483
R2	0.12	0.25	0.23	0.25

- Suggests: DW and TAF resulted in increased lending primarily to smaller firms (not the very smallest) at small banks and larger firms at large banks.

Q3: Did banks use the funds to increase lending? (cont'd)

(Part of Table 11)

- Effects on the credit quality of loans and loan contract terms?
 - Use Federal Reserve's Survey of Terms of Bank Lending (STBL), which has information on individual bank loans, their risk ratings, and contract terms.
 - Collect:
 - Loan risk ratings: range from 1 (minimal risk) to 5 (special mention or classified asset)
 - Interest rate and maturity to create the interest rate premium
 - Collateral status
 - For each bank in every quarter, we calculate the quarterly change in the dollar-year weighted average values of the three variables.

Q3: Did banks use the funds to increase lending? (cont'd)

(Part of Table 11)

<i>Dependent var:</i>	Small banks:			Large banks:		
	$\Delta(\text{WA credit rating})$	$\Delta(\text{WA interest rate premium})$	$\Delta(\text{WA collateral status})$	$\Delta(\text{WA credit rating})$	$\Delta(\text{WA interest rate premium})$	$\Delta(\text{WA collateral status})$
$\Delta(\text{DWTAF}) / \text{GTA}$	-28.673**	1.936	-1.957	4.439	-0.832	-2.115
Observations	955	955	955	1013	1013	1013
R2	0.1	0.07	0.16	0.1	0.08	0.18

- Are banks receiving DW and TAF funds reaching into a safer or riskier pool of borrowers?
 - Find: DW and TAF usage is associated with safer loans (lower rating) for small banks; does not seem to affect riskiness of loans for large banks.
- What are the effects on loan contract terms?
 - Find: DW and TAF usage does not significantly affect the interest rate premium or collateral status.
 - Small-bank result is perhaps surprising: while they shift into safer borrowers, they do not give these borrowers better contract terms.

Q3: Did banks use DWTAf to liquefy their balance sheets?

(Table 12)

- The popular press often voiced a concern that banks were hoarding liquidity during the crisis, and some research supports this view (Berrospide, 2012).
 - We established: banks used DWTAf to increase lending.
 - Now address: did they use part of the funds to liquefy their balance sheets?
 - Find: small banks: yes (increased securities holdings, not cash holdings).
Large banks: no.

<i>Dependent var:</i>	Small banks:		Large banks:	
	$\Delta(\text{CASH}) / \text{GTA}$	$\Delta(\text{SECURITIES}) / \text{GTA}$	$\Delta(\text{CASH}) / \text{GTA}$	$\Delta(\text{SECURITIES}) / \text{GTA}$
$\Delta(\text{DWTAf}) / \text{GTA}$	0.115	0.279**	0.213	0.055
Observations	56011	56011	4255	4255
R2	0.18	0.22	0.24	0.27

Subsample analyses

- Collapse of Lehman Brothers on Sept. 15, 2008: critical event during the crisis that started a period of unprecedented turmoil.
 - Interesting to check if answers to Q1, Q2, and Q3 differ during different periods.
- Height of the crisis (approximately quarter right after Lehman Brothers collapsed)
 - Q1: Among both small and large banks, the weaker ones were more likely to obtain DWTAFF during this period:
 - Small banks: consistent with overall crisis result.
 - Large banks: need became an important determinant of usage during this period.
 - Q2: Similar substitution for small banks, stronger substitution for large banks.
 - Q3: Both small and large banks used the funds for lending during the height of the crisis.
- First and second half of the crisis (approximately before and after Lehman)
 - Q1: Weakness seemed to have become a more important determinant of DWTAFF during the second half of the crisis for both small and large banks.
 - Q2: Substitution effects driven by second half for both small and large banks.
 - Q3: DWTAFF usage seemed to have had similar effects on lending for both small and large banks in both periods.

Summary and Conclusion

- Q1: Which banks used funds from the Federal Reserve during the crisis?
 - DW and TAF use was widespread for both small and large banks.
 - Small-bank users were generally weaker, while large-bank users were not.
- Q2: Did these funds substitute for or complement other funding sources?
 - Some substitution and no complementarity for small and large banks.
 - Results driven by DW, not TAF.
 - Statistical significance, no economic significance.
- Q3: Did banks use these funds to increase their lending?
 - For both small and large banks, DW and TAF usage is associated with increased lending (preventing a loan contraction).
 - This is consistent with one of the main goals of the programs.
 - Results suggest that the Federal Reserve was not pushing on a string.

Policy Implications

- Our findings suggest that the Federal Reserve went beyond the traditional role of Lender of Last Resort (LOLR) by:
 - Providing liquidity to healthier banks, not just weak banks.
 - Setting an additional goal of increasing the flow of credit to firms and households through bank lending, and our findings suggest that the Federal Reserve was successful in achieving this goal.