Adverse Selection in Central Bank Lending – An Empirical Analysis of the Federal Reserve's Primary Credit Program

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Disclaimer: The views expressed in this presentation are solely those of the authors. They do not necessarily reflect the views of the Federal Reserve Bank of Richmond or the Federal Reserve System.

An August 10, 2021 blog post by the Bank Policy Institute

quotes **a bank treasurer** who, at the beginning of his job,

> *"was told that if he borrowed from the Discount Window, there would be* **two phone calls***: one to the CEO* **from the New York Federal Reserve president** *asking why the bank borrowed, and one to him* **from Human Resources instructing him to clear out his desk.**"

A February 25, 2020 article in WSJ

"**banks**—*scarred from the public beating they took during the financial crisis*—**have all but abandoned the window in recent years** *to avoid even a whiff of a government bailout.*

[Silicon Valley Bank] **did not test its capacity to borrow at the discount window in 2022** *and did not have appropriate collateral and operational arrangements in place to obtain liquidity... While contingent funding may not have been able to prevent the failure of the bank after the historic run on the bank,* **the lack of preparedness may have contributed to how quickly it failed.**

—Federal Reserve Report on Silicon Valley Bank

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- Our 1^{st} objective is to examine the understand the extent of discount window borrowing, trends in borrowing, borrower profiles, loan types.
- As 2^{nd} objective, we examine common views about discount window borrowing, particularly, the issue of discount window stigma.

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- Since 2003, the primary credit program is the main type of DW lending program.
- The primary credit loans are easily accessible to generally sound institutions.

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- Consistent with this argument, the literature documents that there is a perceived stigma associated with borrowing from the discount window.

The Stigma Problem

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- Two factors contributed to Stigma according to the literature
  1. The perception that borrowers were facing financial difficulty.
  2. The identities of participants in some government programs revealed to the public (1930s).

- See for example Gorton and Metrick [2013]; Armantier et al. [2015]; Anbil [2018]; Vossmeyer [2019]; Armantier and Holt [2020]

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- Banks must be generally in sound financial condition based on supervisory ratings.
- The Fed adopted a "no question ask" policy with respect to DW borrowing.
- Moreover, the Fed's actions made it clear that the details on individual discount window loans would be kept confidential.

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- Despite the 2003 reforms, banks reluctance to borrow from DW persisted.
- Bernanke [2009] argues that the stigma particularly hindered central bank's ability to support banks during 2008–2010 crisis. Banks were concerned that *"... The perceived stigma of borrowing at the DW threatened to prevent the Federal Reserve from getting much-needed liquidity into the system."*

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- We have collected data to examine these channels.

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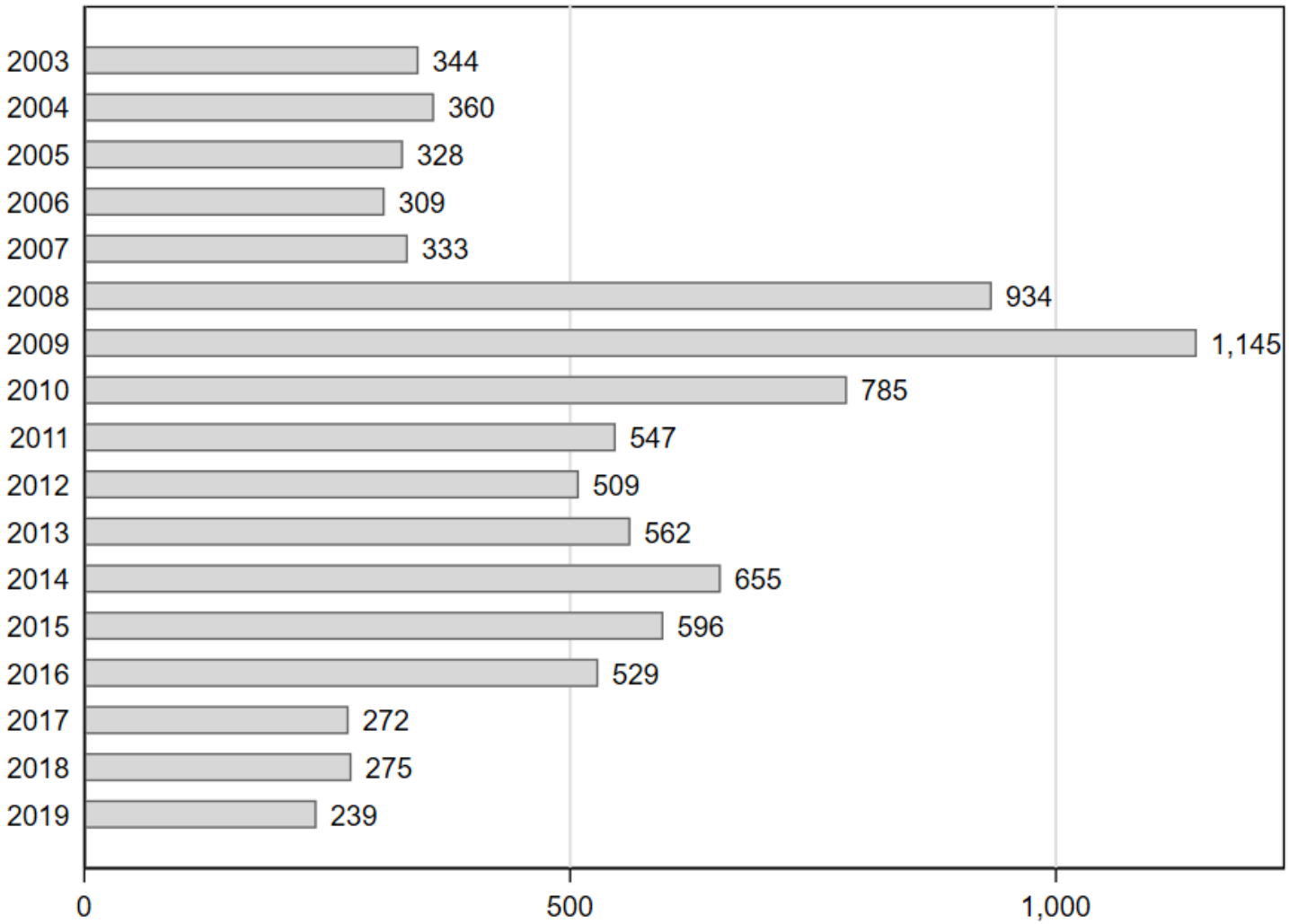
- No evidence of systematic information leakage/reactions by stakeholders to discount window borrowing.
- Despite these findings, we also find evidence that some banks abstained from borrowing due to stigma concerns.
- A plausible explanation for the persistence of stigma among some of these banks is the opacity surrounding the program (which is maintained for good reasons), which hinders banks' ability to verify that there are no adverse consequences associated with borrowing.

Number of Unique Borrowers (primary credit program)

- From 2003–2019, 2,958 unique institutions borrowed from PC.
- Note: we dropped loans less than $10,000 (test loans).



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  - Fed plays a dual role: it manages the discount window, and it does bank supervision.
  - It is possible that the discount window function passes the information to the supervision function.

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Are Supervisors More Likely to Downgrade Borrowers?

- Focus on safety soundness exams (typically once a year)

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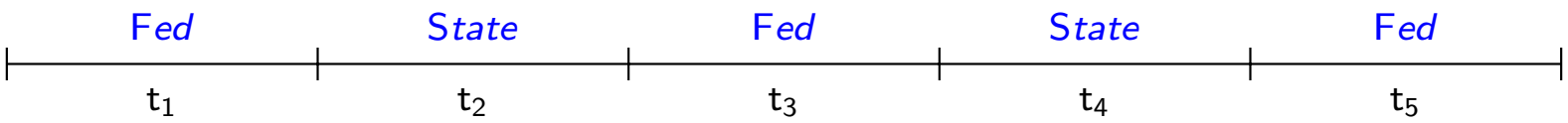
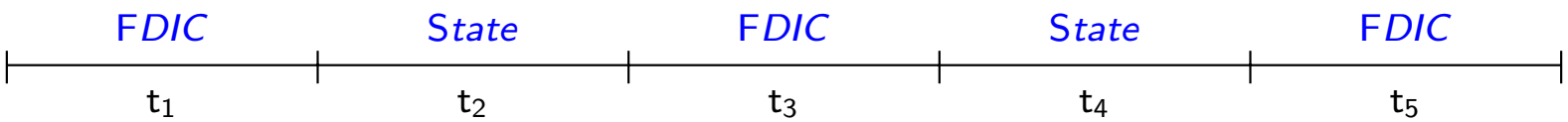


- State Non-Member Banks (NMBs):



- Our strategy expands on Agarwal et al. [2014]: Among SMB/NMB regulators only the Fed has a DW function.

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- A textual analysis of internal examination documents shows only 1% of borrowings are mentioned and not negatively.
- In sum, discount window borrowing does significantly not add to examiner's private information.

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- We find 13 banks that never participated in the primary creidt program, instead paid higher rates to borrow from TAF.
- We have the data. Banks do not. Maybe some banks avoid borrowing because they do not know what will happen.

Conclusion

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- We show that the Fed has been successful keeping loan information confidential.
- Despite this some banks avoided borrowing and were willing to pay higher rates elsewhere.
- Results suggest that a plausible explanation for reluctance to borrowing among some banks is that the opacity surrounding the program.
- Some might choose to abstain from borrowing simply because it is difficult for them to verify that there are not negative consequences for borrowers (data is highly confidential).
- Our study serves as an example of analysis that can address banks' concerns.

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Appendix: CAMELS Ratings

CAMELS ratings are confidential ratings based on bank examiner judgements and are revealed by banking supervisors only to senior management at the DI. They provide a measure of each DIs' condition, comprise six components:

1. Capital adequacy
2. Asset quality
3. Management
4. Earnings
5. Liquidity
6. Sensitivity to market risk

The components are given one of the following ratings: 1 – strong, 2 – satisfactory, 3 – less than satisfactory, 4 – deficient, and 5 - critically deficient.

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- FHLBs cannot fulfill the lender of last resort role like the Federal Reserve (Gissler et al. [2023]), as was the case for SVB.
- Moreover, if a bank chooses a cheaper contingency funding source, such as loans from the Federal Home Loan Banks (FHLBs), it does not necessarily indicate stigma. It is an efficient decision due to their lower interest rates.

What about loans from Federal Holding Loan Banks?

- A reason for the limited borrowing from the discount window is availability of a lower-cost alternative liquidity backstop, the FHLBs (e.g. Ashcraft et al. [2010]).
- FHLBs cannot fulfill the lender of last resort role like the Federal Reserve (Gissler et al. [2023]), as was the case for SVB.
- Moreover, if a bank chooses a cheaper contingency funding source, such as loans from the Federal Home Loan Banks (FHLBs), it does not necessarily indicate stigma. It is an efficient decision due to their lower interest rates.
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- Evidence of stigma arises when eligible banks actively avoid the discount window and secure funding from an alternative source at a higher rate.
- On its final day, SVB attempted to transfer collateral from the FHLB to the discount window but failed to borrow due to insufficient operational arrangement in place. See SVB Report [2023] page 60, first paragraph.

Back to the slide.

Term Auction Facility versus Primary Credit Program

- Auctions every 2 weeks between 12/17/2007, and 3/8/2010 (58 auctions).
- The allocated credit ranged from \$20 billion to \$150 billion.
- Rates were determined by the lowest accepted bid rate among the winning bidders.
- Minimum bid was \$10 million (later 5). Borrowing was limited to 10% of the total amount auctioned.

Dimension	Similar	PC has advantage	TAF has advantage
Eligibility to participate	X		
Collateral eligibility	X		
Collateral haircut	X		
Timing		X	
Minimum borrowing		X	
Maximum borrowing		X	
Loan term		X	
Settlement		X	
Prepayment		X	

Return to direct evidence.

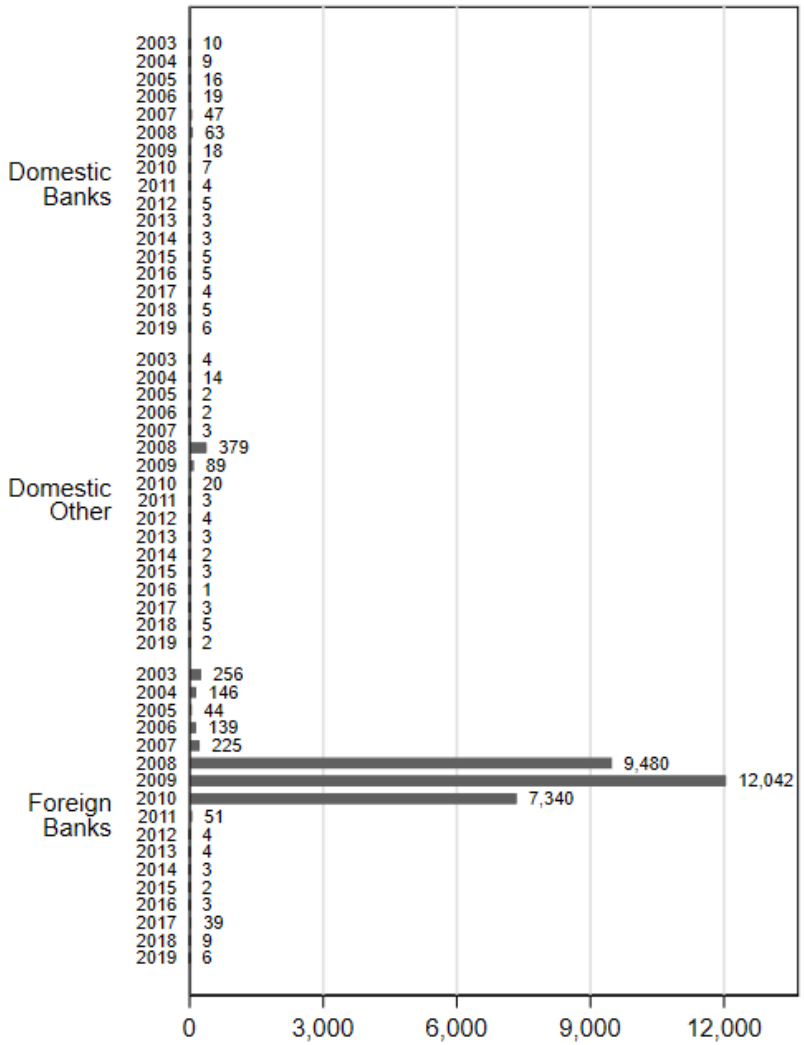
Basic Descriptive Statistics - Primary Credit Program

Table: Basic Descriptive Statistics - Primary Credit Program

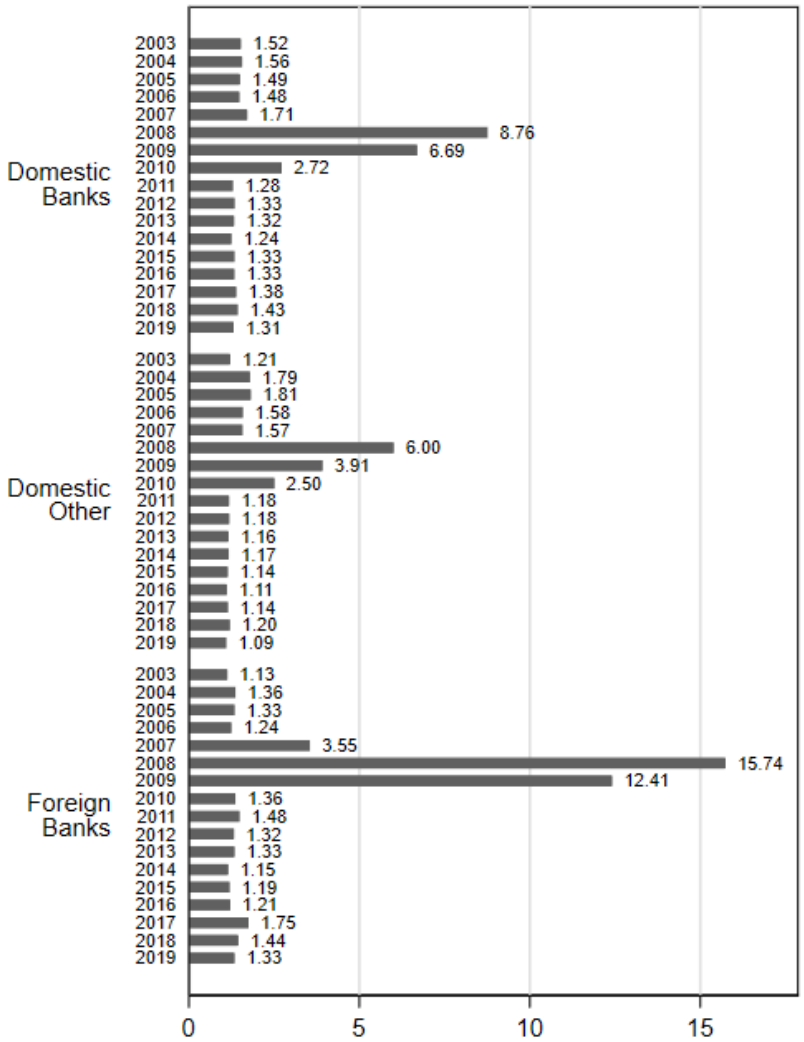
Characteristic	Value
Number of Unique Borrowers	2,958
Domestic Banks	2,336 (78.97%)
Domestic Non-Bank Depository Institutions	526 (17.78%)
Foreign Banking Organizations	92 (3.11%)
Number of Unique Loans	42,713
Median Size of a Loan	$3.13 million
Median Loan Term	1 day
Median Loan Interest Rate	0.75%

Back to number of loans by type.

Mean Loan Size ($million) by Borrower Type

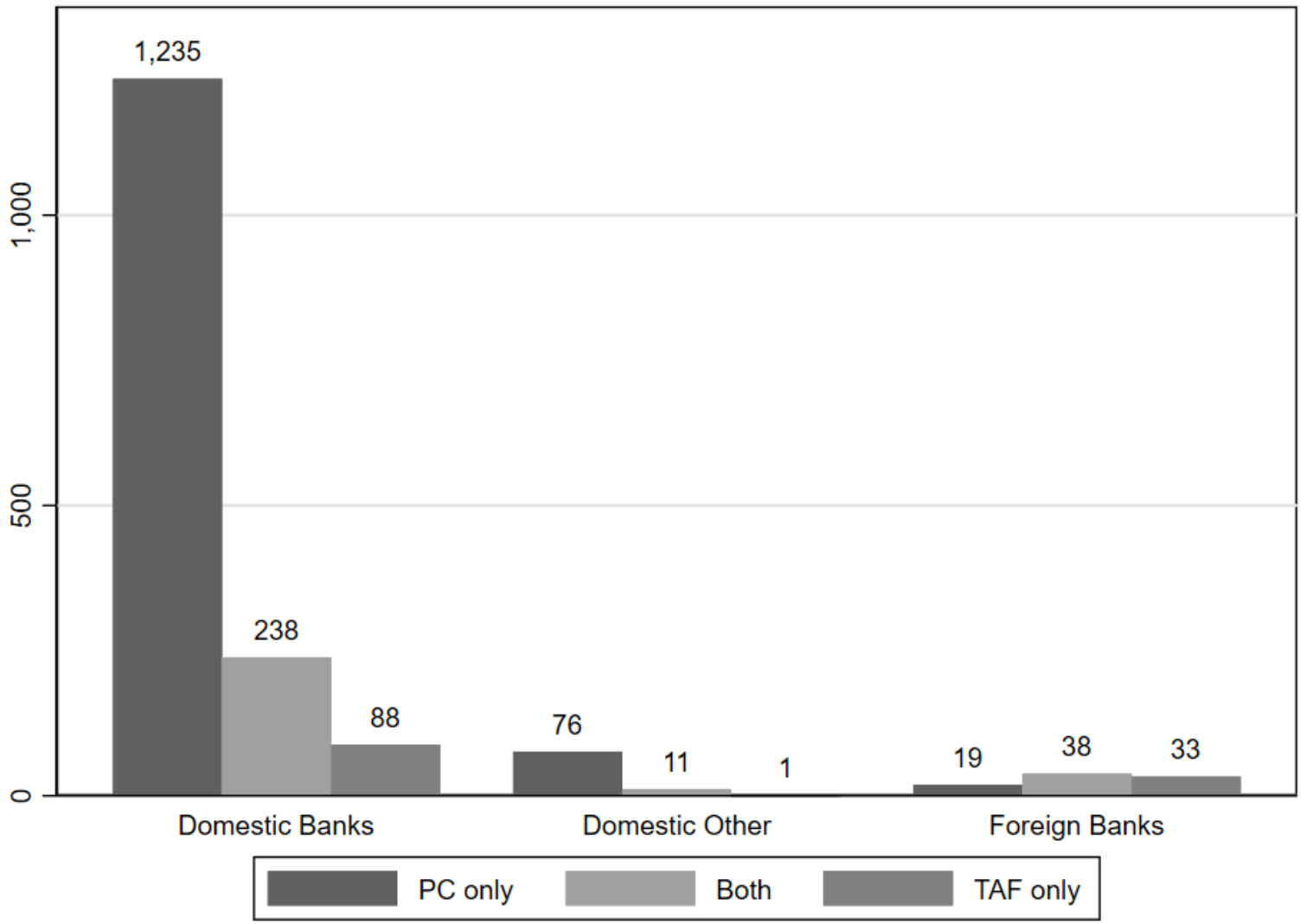


Mean Loan Term (Number of Days) by Borrower Type

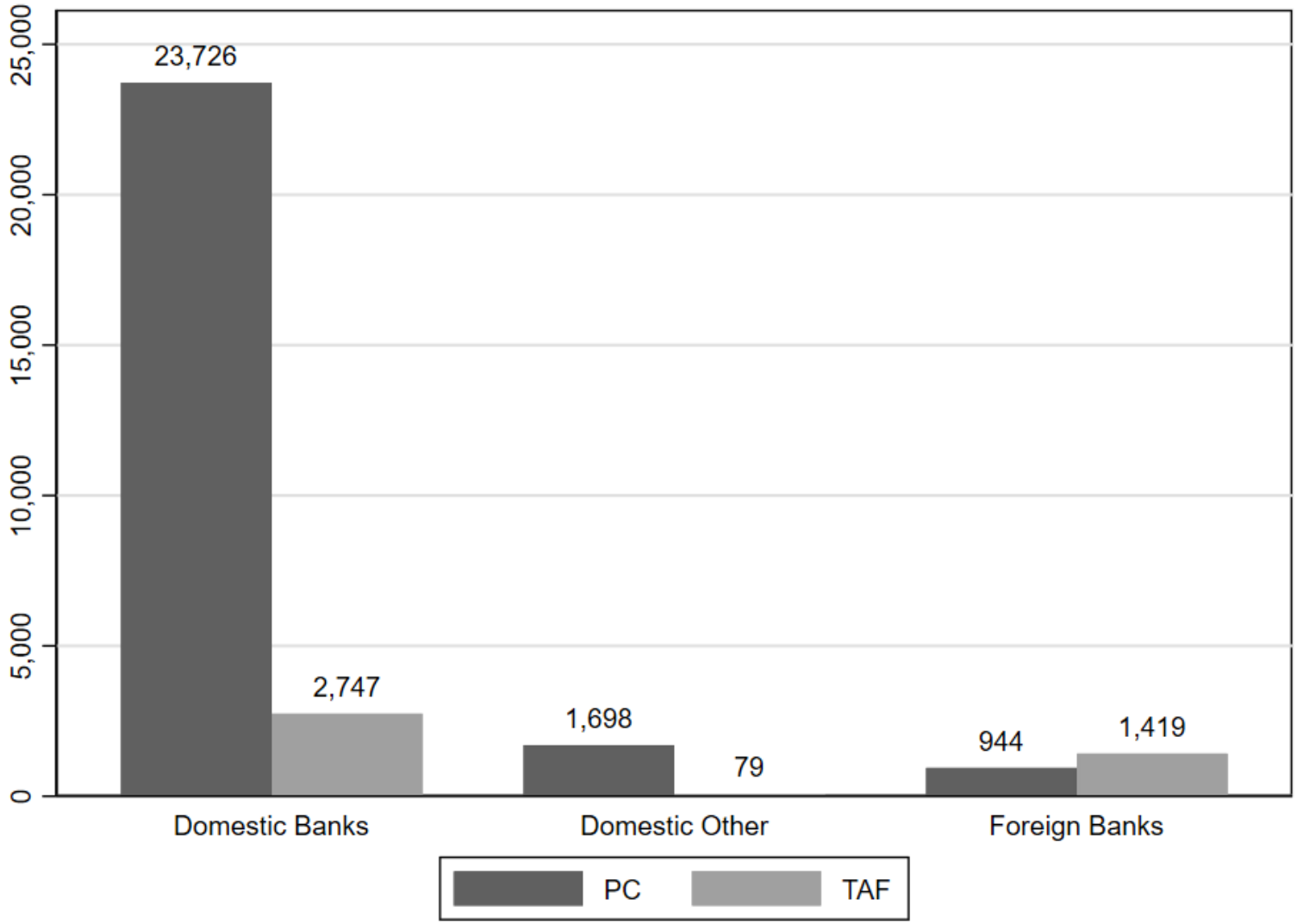


- Back to number of loans by type.

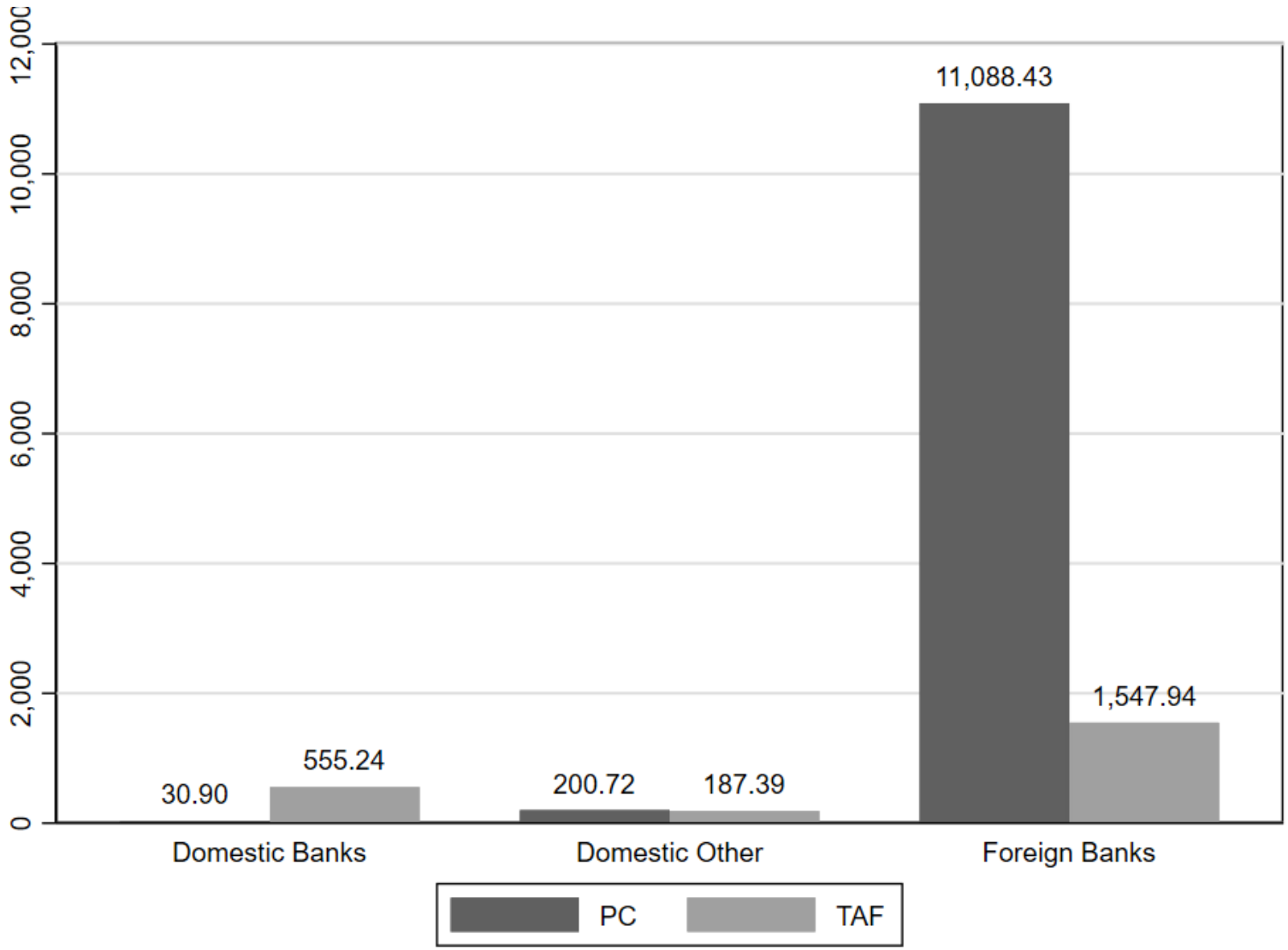
TAF vs. PC, Number of Unique Borrowers



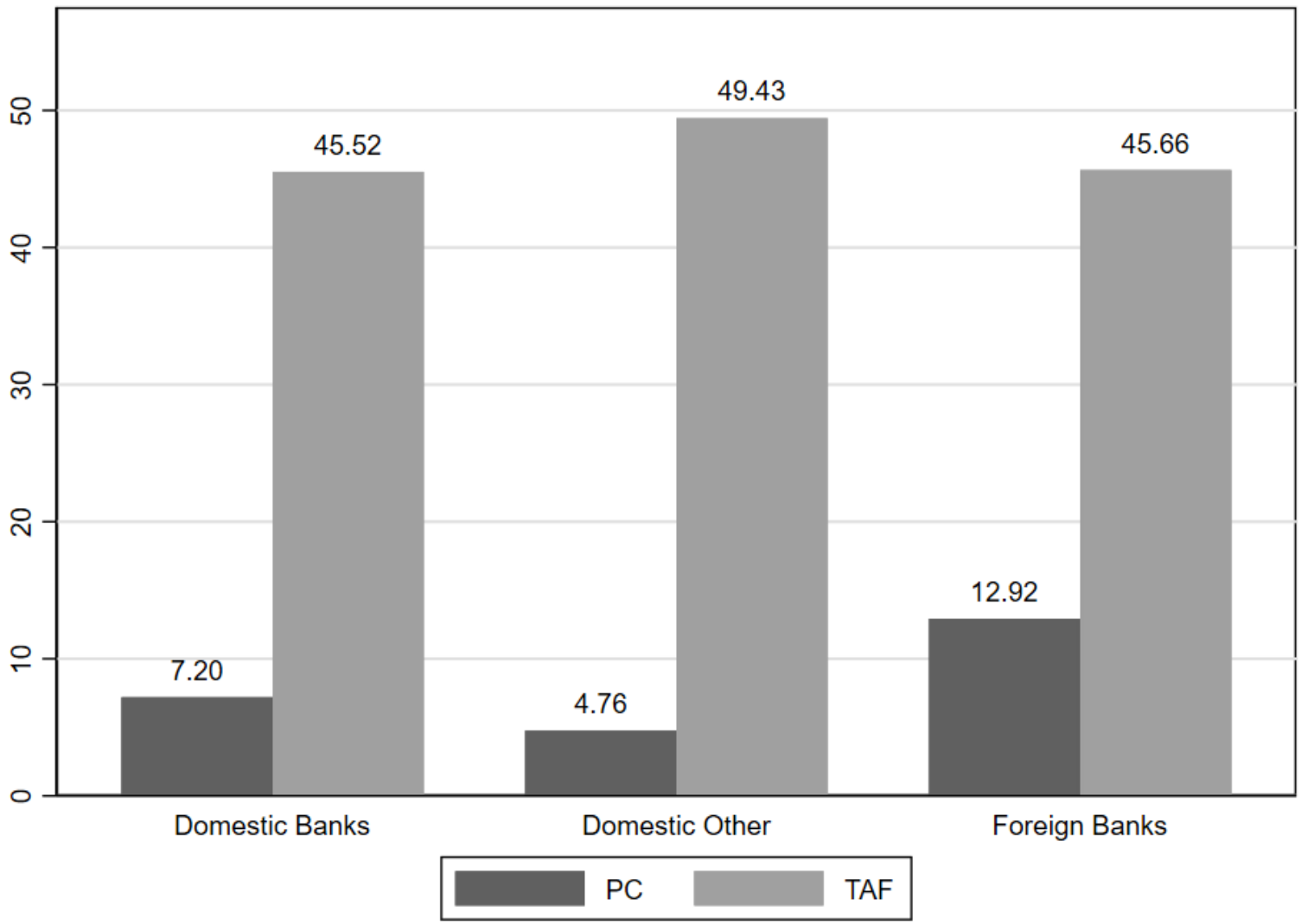
TAF vs. PC, Number of Loans



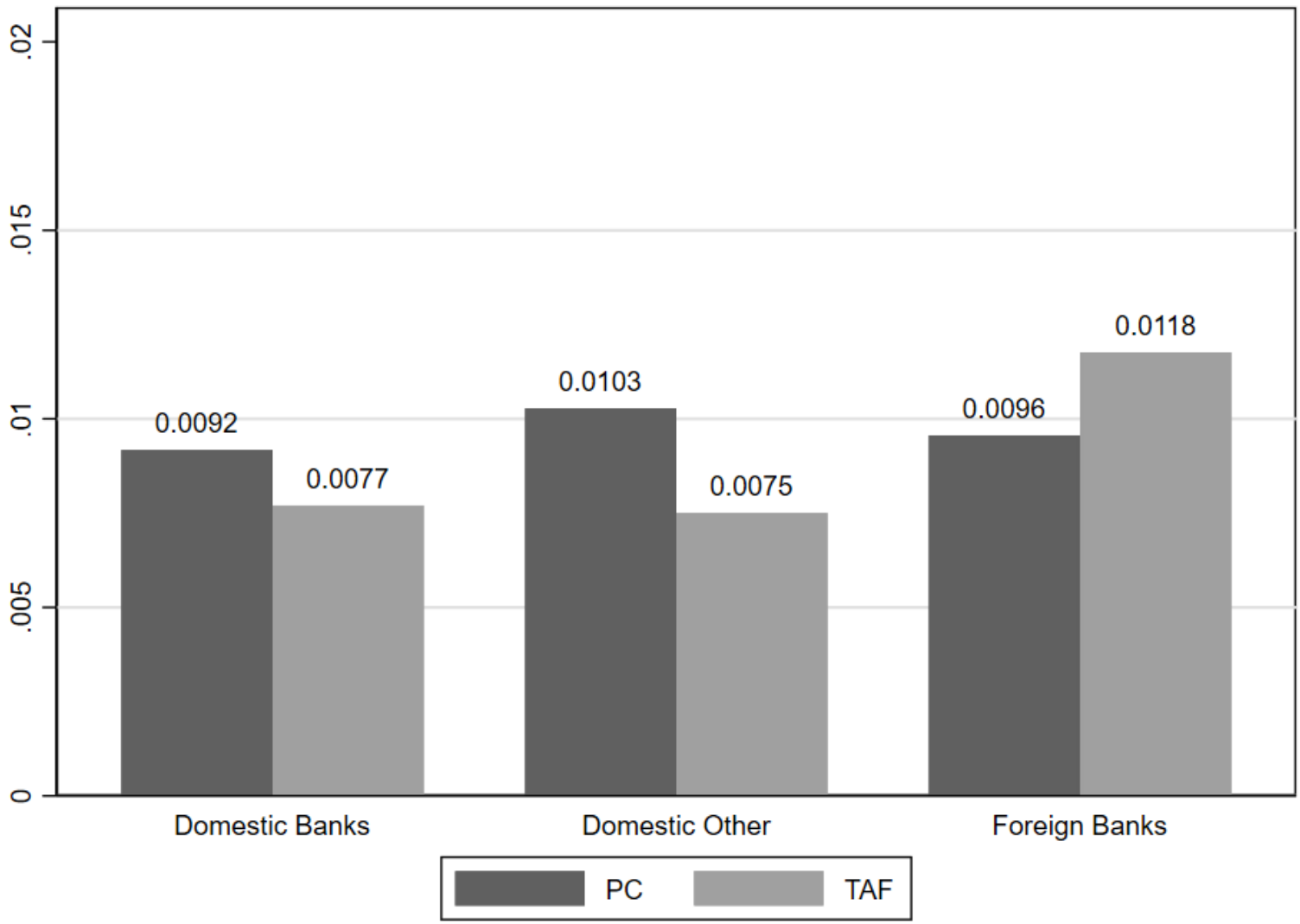
TAF vs. PC, Mean Loan Size ($million)



TAF vs. PC, Mean Loan Term (Number of Days)



TAF vs. PC, Mean Interest Rate By Borrower Type



Back

Summary Statistics

Table: **Summary Statistics of State-Chartered Banks**

33,919 state-chartered bank-supervisory cycle observations during 2003–2019.

Binary variables	$= 1$	Percentage
State member bank (SMB)	3,473	10.24
State non-member bank (NMB)	30,446	89.76
FRB	1,829	5.39
FDIC	13,478	39.74
STATE	18,612	54.87
PC borrowing	1,939	5.72
Occasional use of PC	1,256	3.70
Frequent use of PC	683	2.01
Bank failure	144	0.42
CAMELS composite rating downgrade	4,359	12.85
Capital rating downgrade	3,743	11.04
Asset rating downgrade	6,099	17.98
Management rating downgrade	5,229	15.42
Earnings rating downgrade	5,045	14.87
Liquidity rating downgrade	3,863	11.39
Sensitivity rating downgrade	3,971	11.71
CAMELS composite rating upgrade	2,179	6.42

methodology

Heterogeneity in the Organizational Structure of 12 FRBs

FRB	0.144^{***}	0.145^{***}
	(0.023)	(0.024)
PC borrowing	0.019	
	(0.033)	
Occasional use of PC		−0.030
		(0.029)
Frequent use of PC		0.110^{*}
		(0.056)
FRB × PC borrowing	−0.034	
	(0.069)	
FRB × Occasional use of PC		0.039
		(0.063)
FRB × Frequent use of PC		−0.157
		(0.103)
FRB × One department	−0.007	−0.008
	(0.029)	(0.029)
FRB × One department × PC borrowing	−0.023	
	(0.074)	
FRB × One department × Occasional use of PC		−0.093
		(0.082)
FRB × One department × Frequent use of PC		0.096
		(0.101)
Control for financials	YES	YES
Bank,Quarter FE	YES	YES
Observations	22,103	22,103
Adj. R2	0.22	0.22

Back

Sample Federal Reserve H.4.1 Statistical Release Table

Back to Table

FEDERAL RESERVE statistical release

H.4.1

Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks

December 27, 2018

1. Factors Affecting Reserve Balances of Depository Institutions

Millions of dollars

Reserve Bank credit, related items, and reserve balances of depository institutions at Federal Reserve Banks	Averages of daily figures			Wednesday Dec 26, 2018
	Week ended Dec 26, 2018	Change from week ended		
		Dec 19, 2018	Dec 27, 2017	
Reserve Bank credit	4,043,982	- 4,123	- 373,734	4,036,348
Securities held outright[1]	3,886,608	- 7,855	- 344,510	3,880,249
U.S. Treasury securities	2,240,698	+ 57	- 213,526	2,240,717
Bills[2]	0	0	0	0
Notes and bonds, nominal[2]	2,101,796	0	- 222,608	2,101,796
Notes and bonds, inflation-indexed[2]	116,545	0	+ 6,411	116,545
Inflation compensation[3]	22,357	+ 57	+ 2,671	22,376
Federal agency debt securities[2]	2,409	0	- 1,982	2,409
Mortgage-backed securities[4]	1,643,501	- 7,912	- 129,002	1,637,123
Unamortized premiums on securities held outright[5]	140,525	- 526	- 18,711	140,257
Unamortized discounts on securities held outright[5]	-13,459	+ 32	+ 673	-13,448
Repurchase agreements[6]	0	0	0	0
Loans	102	+ 28	+ 40	77
Primary credit	38	+ 29	+ 8	12
Secondary credit	0	0	0	0

Examples of discount window mentioned for contingency planning

Example 1	Liquid assets total . . . and are comprised primarily of commercial paper and interest-bearing balances. In addition, contingent funding sources include secured borrowing availability of . . . from the FHLB and . . . from the **discount window** along with unsecured correspondent lines totaling . . . . The liquidity position has continued to tighten over the past year as loan growth has outpaced deposit generation.
Example 2	The reliance on wholesale funding has decreased since the prior examination as management grew deposits and nearly eliminated the use of brokered deposits. Management maintains strategic focus and investing in resources to grow low cost, core deposits. Contingent sources of funding are acceptable, including . . . in secured borrowing availability with the **discount window** and . . . million with the FHLB. Additional secondary funding sources include availability in unsecured Federal funds facilities totaling . . . .

Back to Textual Analysis.

Cases of actual discount window borrowing mentioned

Case 1	The cost of funds has historically been above the peer median due to the highly competitive nature of most of Bank . . . deposit markets. In an effort to control the cost of funds, senior management has increased the use of borrowings and brokered deposits as funding sources. Of the . . . in asset growth, . . . was funded by an increase in borrowings from the FHLB of . . . and the Federal Reserve **discount window**, and an additional . . . was funded by an increase in brokered deposits. The remainder was funded largely by an increase in core deposits. . . . These funding concentrations have developed inasmuch as the bank actively seeks the lowest funding costs available without unduly increasing interest rate risk exposure. . . . The funding concentrations are not regarded as a matter of significant regulatory concern at this time.
Case 2	Liquidity is less than satisfactory as the institution's weak financial condition has restricted its access to secondary and contingent sources of funds. All borrowings are on a secured basis. An appreciable percentage of the balance sheet is funded by . . . in FHLB advances with an additional . . . in capacity. Borrowings from the Reserve Bank's **discount window** are limited to a secondary credit facility of about . . . . Remaining unpledged collateral of . . . is used to satisfy the Payment Systems Risk requirement that is in place for institutions in troubled financial condition.

Back to Textual Analysis.

Maybe Discount Window borrowing does not have information value to start with?

- It does.
- Controlling for bank observables as well as bank and time fixed effects, we show that borrowers are more likely to default relative to peers. Results here.
- Also borrowers are more likely to be downgraded relative to peers. Results here.

Back to slide.

PC Borrowing - ex post failure

Table: Note: Primary Credit (PC) facility is the main form of DW lending

	ex post bank failure		
	(1)	(2)	(3)
PC borrowing	0.006***	0.007***	0.006**
	(0.002)	(0.003)	(0.002)
Tier1 capital ratio			−0.020*
			(0.010)
Leverage ratio			−0.032
			(0.039)
Expense ratio			−0.013**
			(0.005)
ROA			−0.533***
			(0.169)
Delinquency rate			−0.077
			(0.061)
Nonperforming to loans			0.227***
			(0.080)
Loan growth rate			−0.015**
			(0.007)
Bank FE		YES	YES
Quarter FE		YES	YES
Observations	244,915	244,911	238,429
Adj. R2	0.00	0.39	0.41

Back to slide.

PC Borrowing - CAMELS ratings downgrades

	Combined CAMELS			Capital	Asset	Management	Earnings	Liquidity	Sensitivity
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
PC borrowing	0.034***	0.037**	0.030**	0.035***	0.057***	0.025*	0.026*	0.027**	0.013
	(0.012)	(0.014)	(0.013)	(0.012)	(0.014)	(0.013)	(0.013)	(0.012)	(0.012)
Bank Control		YES	YES	YES	YES	YES	YES	YES	YES
Bank FE			YES	YES	YES	YES	YES	YES	YES
Quarter FE		YES	YES	YES	YES	YES	YES	YES	YES
Observations	244,915	244,911	238,429	238,429	238,429	238,429	238,429	238,429	238,429
Adj. R2	0.00	0.19	0.21	0.23	0.23	0.18	0.21	0.18	0.16

Back to slide.

Impact of Supervisor Identity on CAMELS Rating Revisions Following PC Borrowing

	CAMELS rating downgrade				CAMELS rating upgrade			
	SMBs		NMBs		SMBs		NMBs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FRB	0.137***	0.140***			-0.081***	-0.083***		
	(0.012)	(0.012)			(0.012)	(0.012)		
FDIC			0.069***	0.069***			-0.019***	-0.020***
			(0.010)	(0.010)			(0.006)	(0.006)
PC borrowing		0.019		0.036**		-0.045		-0.012
		(0.033)		(0.014)		(0.027)		(0.012)
FRB×PC borrowing		-0.047				0.040		
		(0.046)				(0.030)		
FDIC×PC borrowing				-0.002				0.013
				(0.017)				(0.014)
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	22,103	22,103	216,326	216,326	22,103	22,103	216,326	216,326
Adj. R2	0.22	0.22	0.22	0.23	0.15	0.15	0.14	0.14

Impact of Supervisor Identity on CAMELS Rating Revisions Following PC Borrowing

	CAMELS rating downgrade				CAMELS rating upgrade			
	SMBs		NMBs		SMBs		NMBs	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
FRB	0.137***	0.140***			-0.081***	-0.083***		
	(0.012)	(0.012)			(0.012)	(0.012)		
FDIC			0.069***	0.069***			-0.019***	-0.020***
			(0.010)	(0.010)			(0.006)	(0.006)
PC borrowing		0.019		0.036**		-0.045		-0.012
		(0.033)		(0.014)		(0.027)		(0.012)
FRB×PC borrowing		-0.047				0.040		
		(0.046)				(0.030)		
FDIC×PC borrowing				-0.002				0.013
				(0.017)				(0.014)
Bank Controls	YES	YES	YES	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES	YES	YES	YES
Quarter FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	22,103	22,103	216,326	216,326	22,103	22,103	216,326	216,326
Adj. R2	0.22	0.22	0.22	0.23	0.15	0.15	0.14	0.14