Deposit Inflows and Outflows in Failing Banks

Christopher Martin; FDIC
Manju Puri; Duke University, FDIC & NBER
Alexander Ufier; FDIC

CBDSS Conference, November 3rd, 2017

Disclaimer

- The analysis, conclusions, and opinions set forth here are those of the author(s) alone and do not necessarily reflect the views of the Federal Deposit Insurance Corporation.

Motivation

- Financial institutions' inability to maintain stable funding was central to the financial crisis.
- Regulators responded in a variety of ways:
  - Higher deposit insurance limits
  - Temporary expansion of insurance
    - Transaction Account Guarantee (TAG) program
    - Dodd Frank Act (DFA) deposit guarantees
- Many other forms of emergency liquidity support
- New post-crisis liquidity regulations have a first-order effect on the ability of banks to make loans while maintaining capital adequacy.
  - Liquidity coverage ratio (LCR)
  - Net stable funding ratio (NSFR)
- Little empirical evidence on these measures of liquidity, what kind of deposits are “stable”, and what is appropriate regulation for funding stability.

Big Picture Questions

- How effective were these crisis-era programs?
- Which depositors withdraw?
- Do depositors discipline banks?
- Are deposit inflows material?
- How suitable are the new liquidity regulations?

Literature

- This paper: Not a bank run (Diamond-Dybvig 1983, Calomiris and Mason 1997), but rather accelerated drawdowns among certain depositors as bank health deteriorated.
- Studies using aggregate data suggest:
  - Banks with worse fundamentals experienced withdrawals (Gorton, 1988; Saunders and Wilson, 1996; Calomiris and Mason, 1997)
  - Uninsured deposits dry up and depositors demand above market rates in risky banks (Egan et al 2016, Martinez-Peria and Schmukler 1999, Park and Peristiani 1998)
- Few papers with individual account level data; mainly use data from other countries, surveys, or have only limited snapshots.
  - Iyer at al (2016a) employ Danish tax data
  - Iyer and Puri (2012) and Iyer, Puri and Ryan (2016b) consider runs using Indian bank data
  - Brown et al (2014) use Swiss survey data
  - Davenport and McDill (2006) have snapshots of a failed US bank

Literature

- We contribute to the literature over previous papers:
  - Go beyond aggregate data with a long, detailed micro panel from a failed US bank and do not have to rely on Call Report categories.
  - Examine account- and depositor-level characteristics to say which accounts are “stable.”
  - Measure effect of new, temporary deposit insurance programs.
  - Observe periods relating to general banking crises as well as bank-specific bad information.
  - Distinguish behavior of existing vs. new depositors. – *Inflows* turn out to be very important.
  - Generalize this deposit mix change to other banks.
  - Evaluate new liquidity regulations.

Data

- Data from a failed bank collected by FDIC shortly after the bank was closed following the financial crisis.
  - Roughly $2 billion in assets, funded mostly by deposits.
  - Looked healthy before crisis, deteriorated thereafter.
  - Failed mainly due to concentration in exotic residential mortgage products and poor management of related risks according to regulatory reports.
- Able to construct daily deposit balances by account for over 5 years.
- Can determine account and depositor characteristics.
- Validated against Call Report data.

Empirical Design

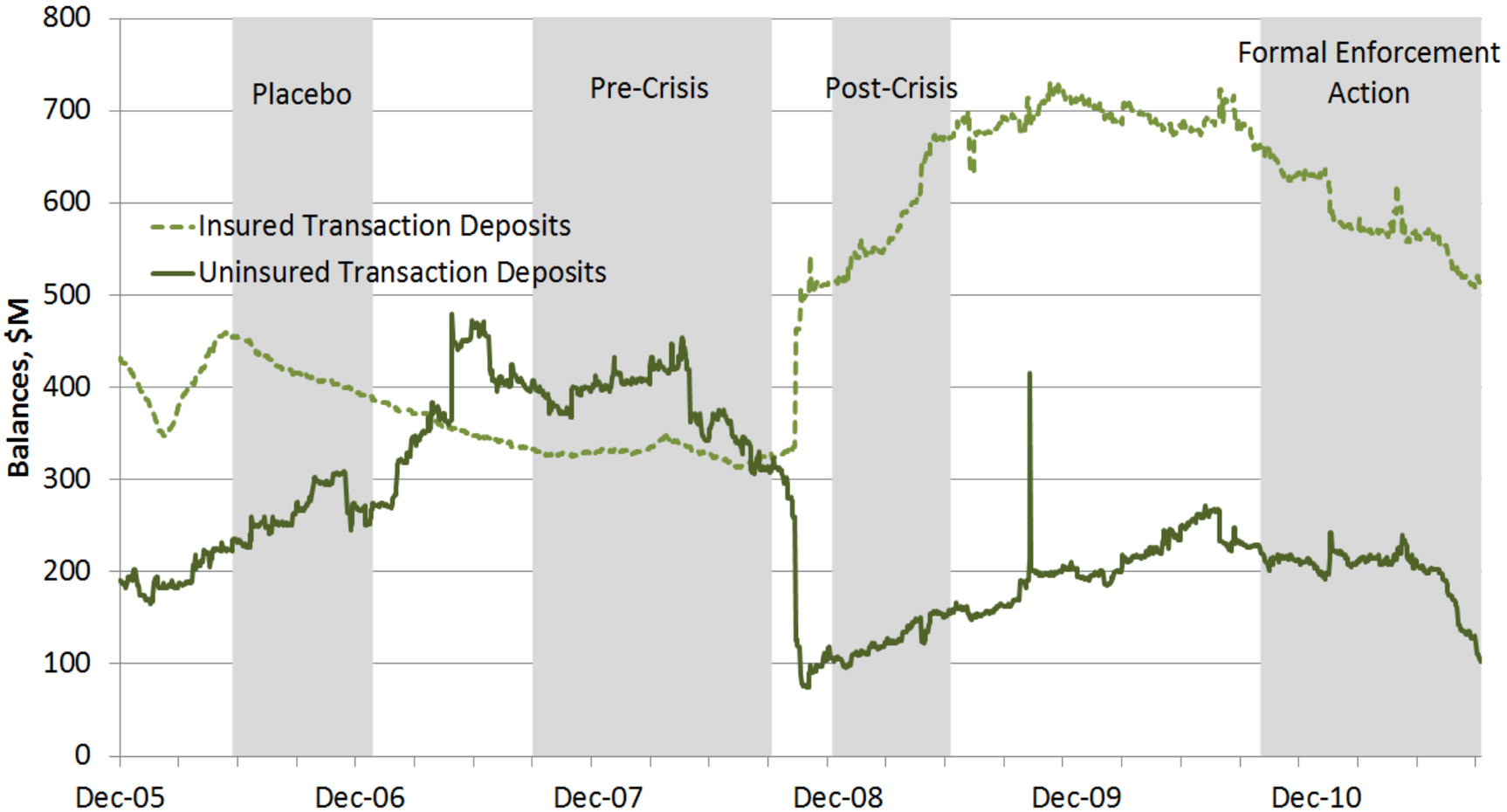
We want to study depositor behavior in stressed versus normal times. Hence, define the following periods:

- *Formal Enforcement Action period:* A period of slightly over a year during which the bank is under regulatory scrutiny due to poor performance. Interest rates and deposit taking are restricted. The bank is closed at the end of this period.
- *Post-Crisis period:* General stress period for all banks, though there is no specific bad information about this bank. We use six months prior to the end of the recession, 31 May 2009.
- *Pre-Crisis period:* One year prior to September 2008, a period in which some bank failures occurred but generally few massive government rescue programs were launched.
- *Placebo period:* Mid 2006, prior to major signs of distress either in the economy or at the bank.

Regressions to Explain Liquidation

- Run Cox proportional hazard (shown), linear probability, and probit regressions
  - Dependent variable: Account liquidation dummy
    - Liquidation: Withdraw more than 50% of deposit balances measured at the start of the period, then stays that low or lower for 61 or more days.
  - Explanatory variables:
    - Standard FDIC insurance coverage
    - Emergency liquidity coverage measures
    - Account type- checking or savings
    - Receiving paychecks or other direct deposit to that account
    - Relationship age
    - Frequency of use of account
    - Entity owning account is person or non-person
    - Days until maturity, if CD
    - CD placed by a placement service
    - CD opened via listing service or facsimile order
    - Account held in trust
- Over four time periods discussed above for both CDs and transaction accounts

Transaction Balances



Who Withdraws? Transaction

	Placebo	*Pre-Crisis*	*Post-Crisis*	*Formal*
	(1)	(2)	(3)	(4)
Uninsured	1.140**	1.067	1.444**	1.919***
	(2.27)	(1.53)	(2.41)	(10.00)
Checking & Uninsured	1.164	1.152	0.708	0.844
↪*Later Covered by TAG/DFA*	(1.07)	(1.36)	(−1.45)	(−1.11)
Checking	0.526***	0.591***	0.697***	0.805***
	(−11.01)	(−10.43)	(−5.40)	(−4.38)
Direct Deposit	0.648***	0.647***	0.502***	0.735***
	(−5.87)	(−7.14)	(−6.61)	(−3.87)
Log(Age)	0.989	0.986	0.990	0.936***
	(−1.00)	(−1.05)	(−0.42)	(−3.11)
Prior Transactions	1.071***	1.053***	1.052***	1.013***
	(23.40)	(18.95)	(13.14)	(3.95)
Prior Transactions^2	0.999***	0.999***	0.999***	1.000***
	(−16.86)	(−15.30)	(−10.81)	(−4.77)
Institutional - Any	0.874	1.076	1.069	0.997
	(−1.17)	(0.88)	(0.71)	(−0.04)
Trust	0.966	1.014	0.739**	1.169**
	(−0.25)	(0.13)	(−2.07)	(2.11)
Branch Controls	Yes	Yes	Yes	Yes
N	6125877	9897521	4835656	7032455
Log Likelihood	−91348.3	−132171.2	−59487.6	−74902.1
Model P-Value	< 0.001	< 0.001	< 0.001	< 0.001
No. of Liquidations	8920	12960	5841	7547

How much do uninsured accounts leave behind?

- Uninsured depositors are more likely to liquidate than insured depositors.
- Do they draw down to the limit or do they go well below it?
- Take the set of all transaction accounts at, near, or above the insurance limit (near being $2000 here) at the start of each of the four periods.
- Observe where those same depositors end the period.
- Insurance limit is $100,000 in the placebo and pre-crisis period and $250,000 in the post-crisis and formal periods.

Migration of Uninsured Accounts-Table

Deposit Insurance Limit = $100,000

Bin Range	*<$1*	*$1 - 2,000*	*$2,000-48,000*	*$48,000-98,000*	*$98,000-102,000*	*>$102,000*
Placebo	5.8%	8.2%	11.4%	10.3%	11.7%	52.6%
Pre-Crisis	9.0%	8.1%	9.9%	15.5%	16.2%	41.3%

Deposit Insurance Limit = $250,000

Bin Range	*<$1*	*$1 - 2,000*	*$2,000-123,000*	*$123,000-248,000*	*$248,000-252,000*	*>$252,000*
Post-Crisis	2.1%	6.0%	14.5%	12.0%	1.7%	63.7%
Formal	21.7%	6.4%	21.9%	14.4%	7.8%	27.6%

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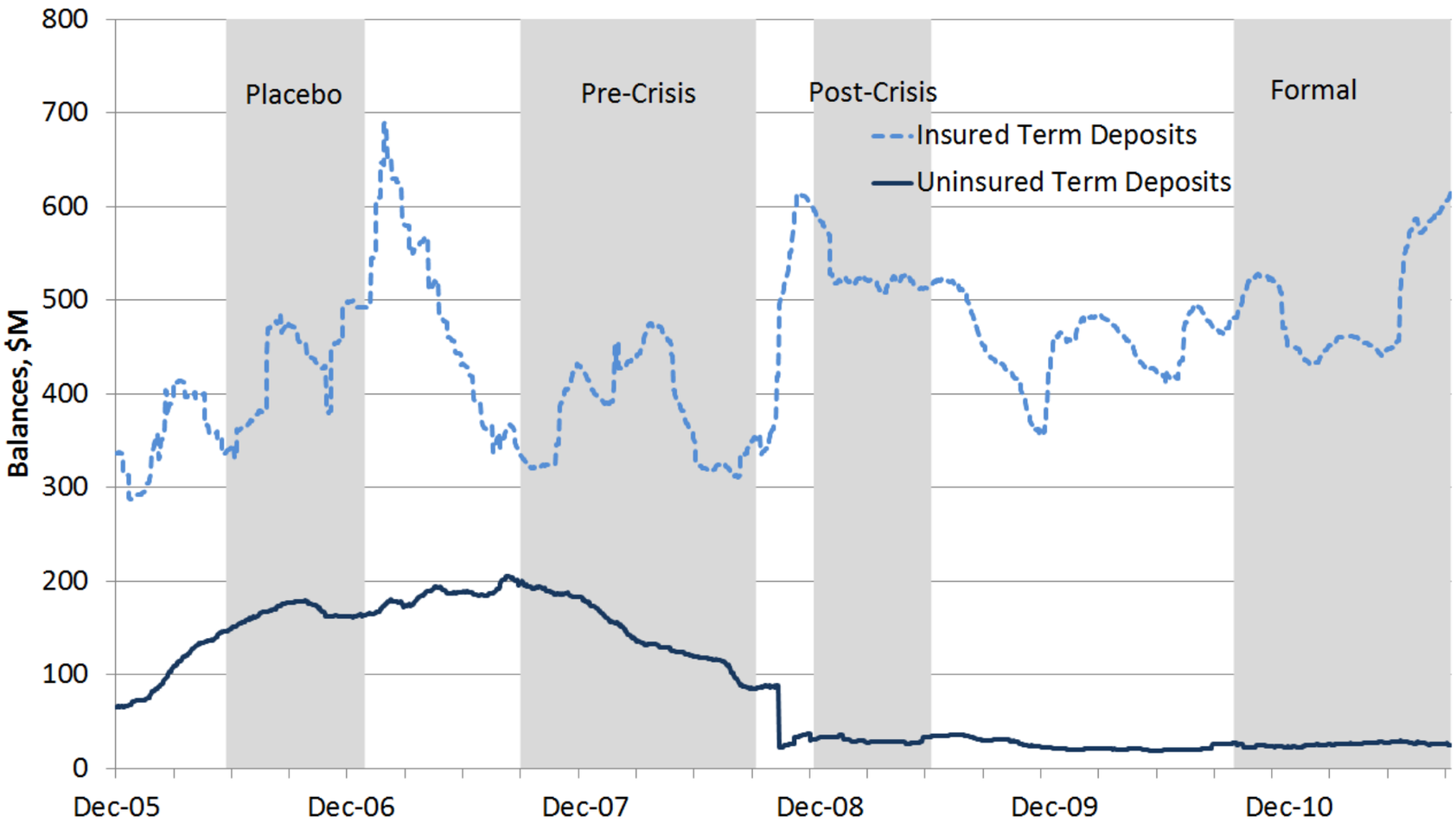
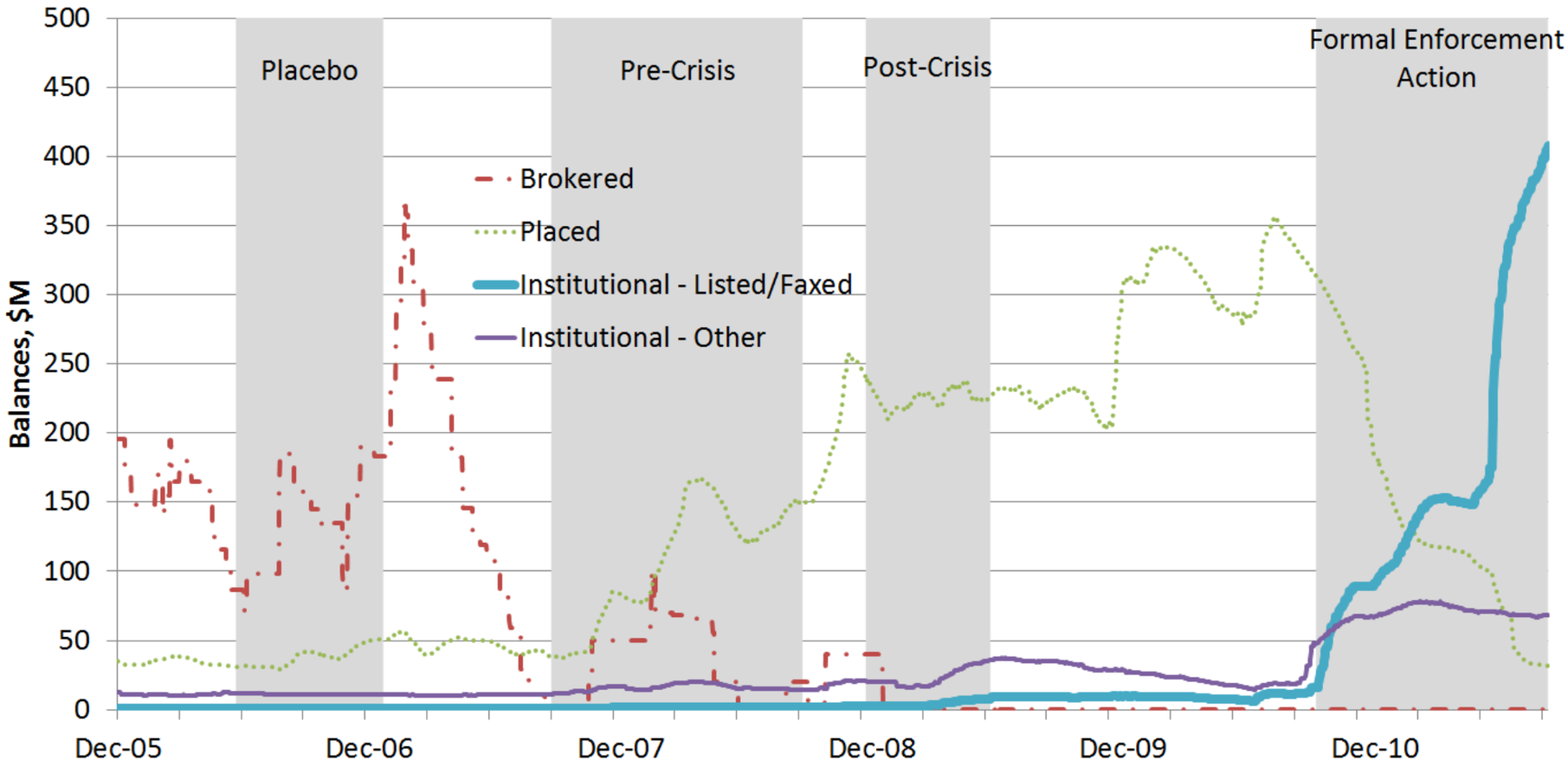
Term Deposit Balances



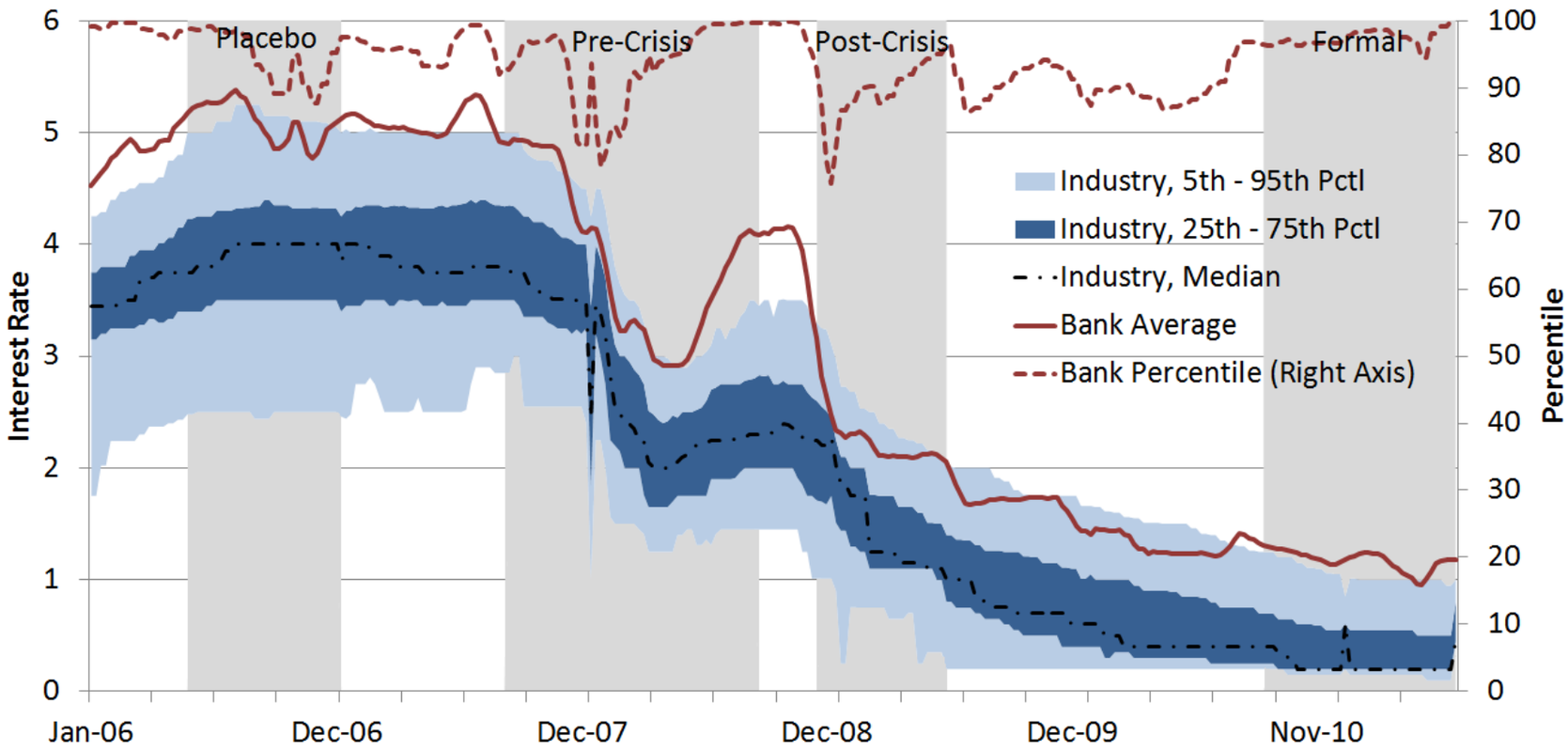
Shift in CD Composition



Comments on CD Composition

- Early in the bank's life, it used brokered deposits, marked as such in their records.
- Later, it relied on deposit placement services that were not brokered deposits and not commented on by examiners as brokered but allowed the bank to raise funds quickly. (e.g., Freedonian Investment Services acting as a fiduciary for others)
- Around the start of the formal period, the bank switched to sourcing CDs exactly at the deposit insurance limit from corporations and financial institutions ("institutional") using slightly above market rates. (e.g., Freedonian Correctional Officers Federal Credit Union)

Interest Rates



New Depositors over Time

	Placebo	Pre-Crisis	Post-Crisis	Formal
Number of New Accounts	2858	1872	813	2199
New Depositors Per Day	13.355	5.128	4.492	6.525
Over FDIC Limit at Start of Account	0.040	0.024	0.010	0.006
Starting Balance	28111	33482	66207	168262
CD	0.446	0.498	0.406	0.869
Savings	0.504	0.386	0.424	0.070
Checking	0.049	0.116	0.170	0.061
Checking & Over FDIC Limit	0.009	0.006	0.005	0.000
↪ *(TAG/DFA-covered accounts)*				
Starting Interest Rate	4.698	3.468	1.552	1.191
Starting Interest Spread to Market	2.883	1.919	0.877	0.693
Types of Account At Bank	1.097	1.076	1.084	1.016
Institutional - Listed	0.000	0.002	0.004	0.574
Institutional - Faxed	0.000	0.005	0.028	0.178
Institutional - Other	0.028	0.222	0.225	0.066
Placed	0.001	0.029	0.181	0.009
Trust	0.037	0.031	0.082	0.037

New Depositor Volume

	(1)	(2)	(3)
Time Period Dummies:			
Pre-Placebo	0.000509***	0.000139	0.000142
	(2.68)	(1.50)	(1.58)
Placebo to Pre-Crisis	0.000179*	0.000141**	0.000150**
	(1.77)	(2.03)	(2.19)
Pre-Crisis	−0.000159***	0.0000226	0.0000323
	(−2.94)	(0.16)	(0.24)
Crisis	0.000000299	0.000200	0.000191
	(0.00)	(0.86)	(0.86)
Post-Crisis	−0.0000613	0.000214	0.000215
	(−0.96)	(0.80)	(0.84)
Post-Crisis to Formal	−0.000134**	0.000114	0.000106
	(−2.37)	(0.48)	(0.47)
Formal	0.000535***	0.000570**	0.000578**
	(2.58)	(2.16)	(2.27)
Macro Controls:			
Log(VIX)		0.000225***	0.000224***
		(2.71)	(2.74)
GDP Growth		0.0000246***	0.0000266***
		(2.60)	(2.67)
Housing Starts		0.000000325	0.000000314
		(1.46)	(1.47)
Daily S&P500 Return		0.00240*	0.00221*
		(1.78)	(1.68)
Daily Deposit Growth			0.0146
			(1.64)
AR(1)		0.448***	0.436***
		(13.63)	(12.88)
Constant	0.000295***	−0.000993**	−0.000980**
	(5.94)	(−2.21)	(−2.25)
N	2079	2078	2078
Model P-Value	< 0.001	< 0.001	< 0.001

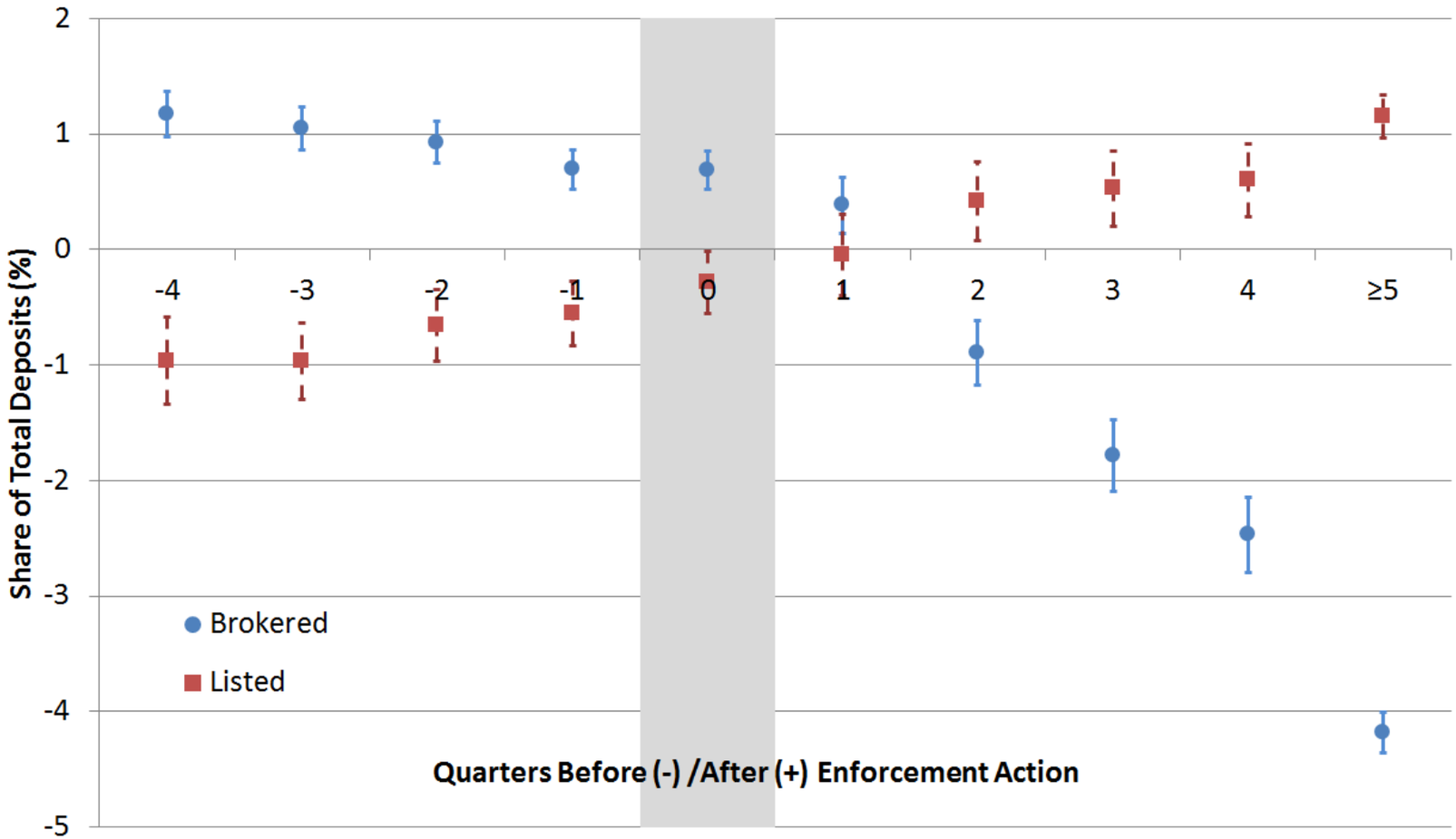
Key Findings on Inflows

- Bank attracted huge volume of insured, institutional CDs near failure, especially in the last 90 days when it is critically undercapitalized.
  - Offset effectively all fleeing deposits.
  - Bank replaced 1/3rd of its total deposits in the last year, mostly in last 90 days of its life.
  - Suggests depositor discipline is limited.
  - Deposit rate restrictions look ineffective as slightly above market rates are still enough to attract cash.
  - Is this good? “Gambling for Resurrection” vs. “Preventing Liquidity Failure.”
  - Risk shifting to FDIC.

Generalization

- Results for this one bank generalize well to banks experiencing similar regulatory action.
- Using FDIC data on brokered deposit restrictions associated with enforcement actions we find:
  - Brokered deposits and time deposits over $250K fall in the year following the action.
  - Listing service deposits, time deposits under $100K, and especially time deposits $100k-250K increase in the year following the action.
- These results hold in regressions as well as propensity score matching setting with controls for bank call report items, including non-performing loans that allow us to distinguish the effects of poor performance from regulatory action.

Generalization



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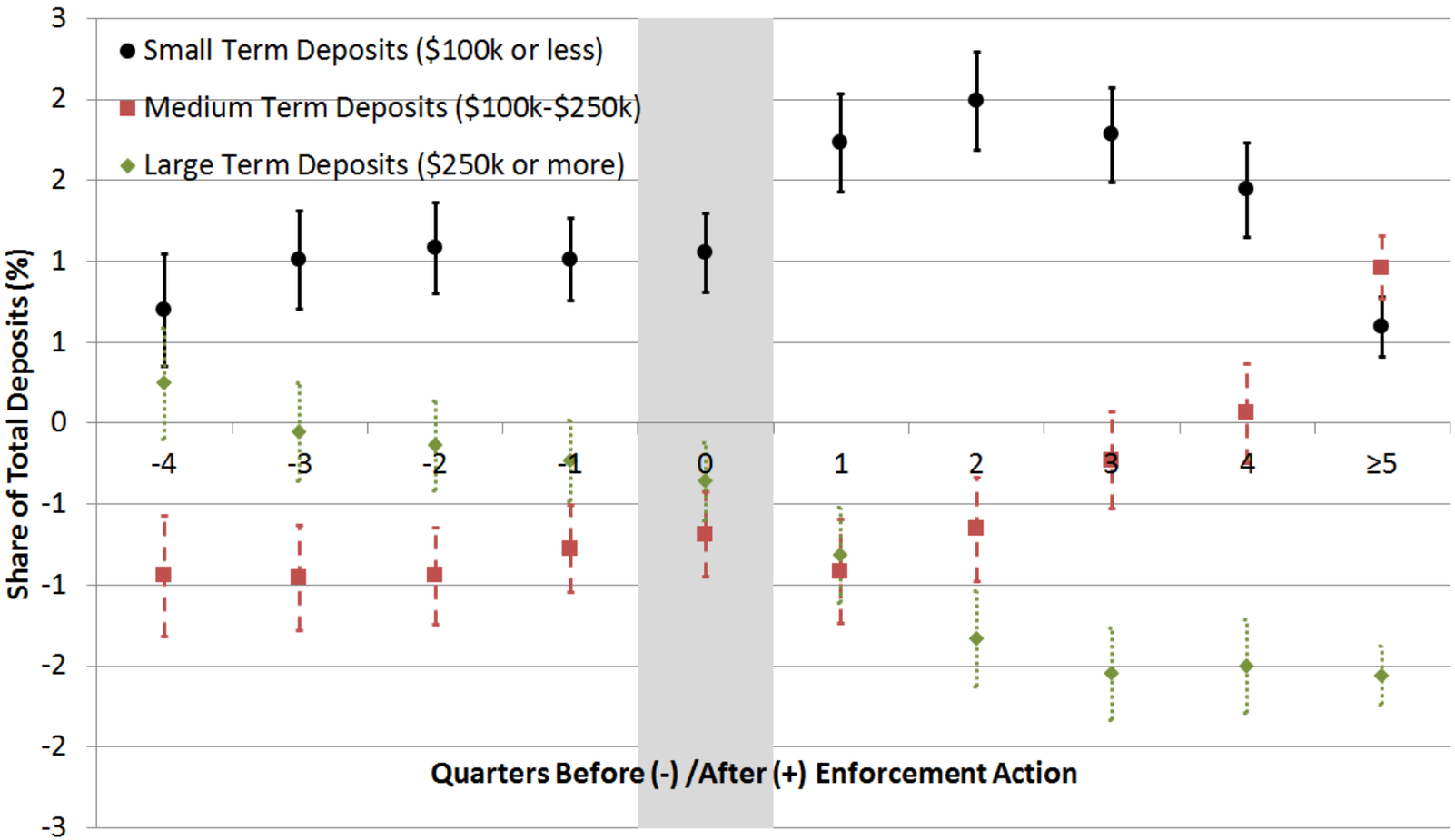
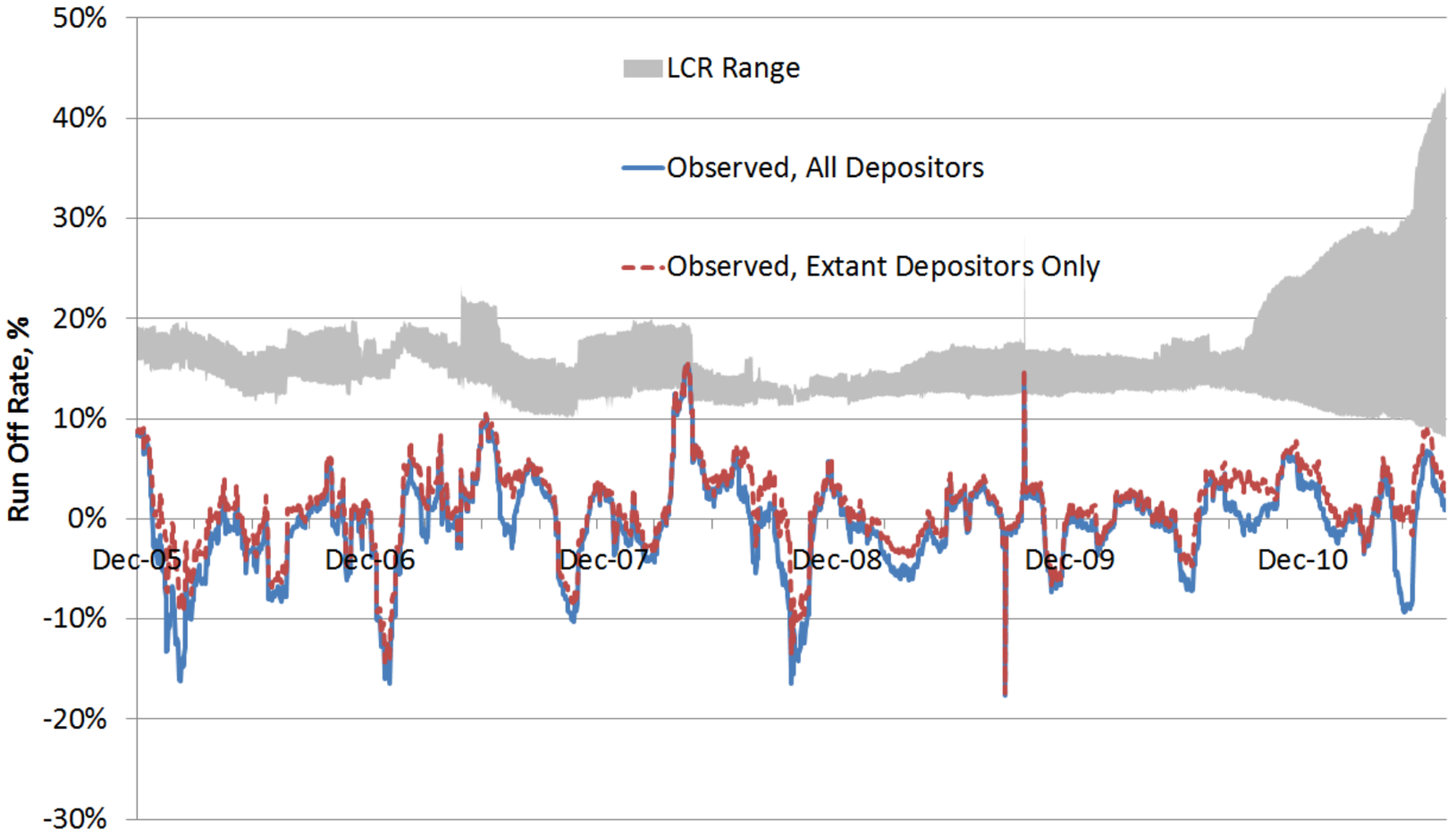


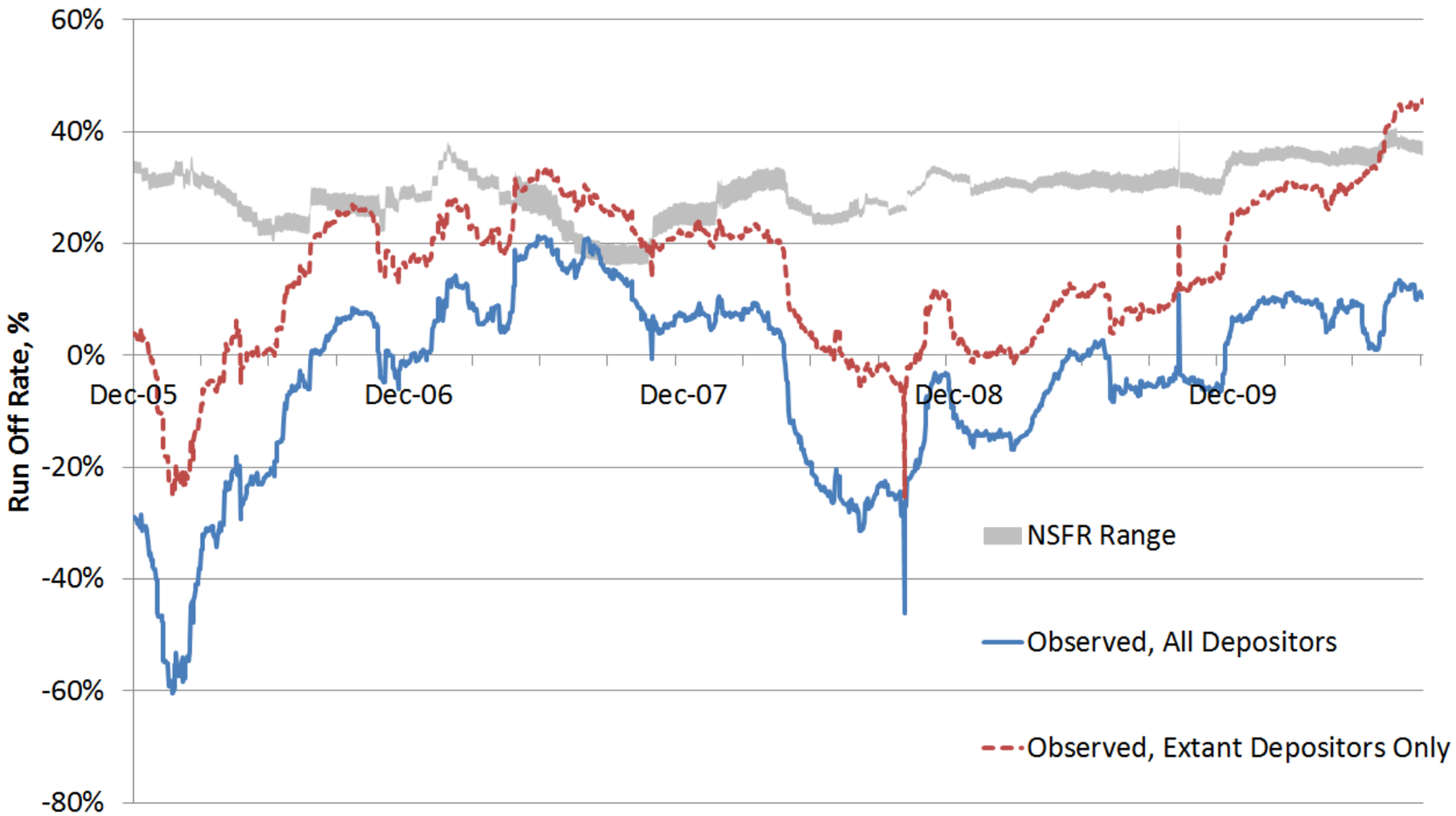
Background: LCR and NSFR

- Both rules require banks to hold “stability adjusted” funding consistent with “liquidity adjusted” assets to prevent the kind of liquidity and funding stress seen in the crisis.
- LCR: 30-day severe stress event
- NSFR: 1-year horizon without explicit stress judgment
- Process, in brief:
  - Classify liabilities into liquidity categories and apply standardized run-off rates to liabilities.
  - Identify the level of liquidity of assets (not leveraged here).
  - Compare the liquidity ratios to see if banks have sufficient liquidity to survive a stress event.

30-day Run-Off and LCR



1-year Run Off and NSFR



Conclusion

- Used novel, rich dataset to examine deposit funding stability in a failing bank.
- Characterized the changes in deposit composition as the bank failed.
  - Found banks are able to attract large quantities of insured deposits even as they are failing; raises concerns about market discipline.
  - Perhaps surprisingly, CDs are less sticky than demandable deposits.
  - Results generalize to other banks experiencing similar conditions.
- Identified some drivers of deposit liquidation behavior.
  - Deposit insurance is effective, as was TAG.
  - Checking accounts and older accounts are more stable.
- Provided evidence that LCR is appropriately conservative, but NSFR may not be.

Thanks!

- Questions? Comments?