Deposit inflows and outflows in failing banks: The role of deposit insurance

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

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 academic 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 are these programs?
- Which depositors withdraw?
- How stable are different kinds of deposits?
- Do depositors discipline banks?
  - Is it effective?
- Focus tends to be on deposit outflows. Are deposit inflows material? If so, when?
- How suitable are the new liquidity regulations?

Literature - Runs

- 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.”
  - Distinguish behavior of existing vs. new depositors. – *Inflows* turn out to be very important.
  - Generalize this deposit mix change to other banks.
  - Measure effect of new, temporary deposit insurance programs.
  - Observe periods relating to general banking crises as well as bank-specific bad information.

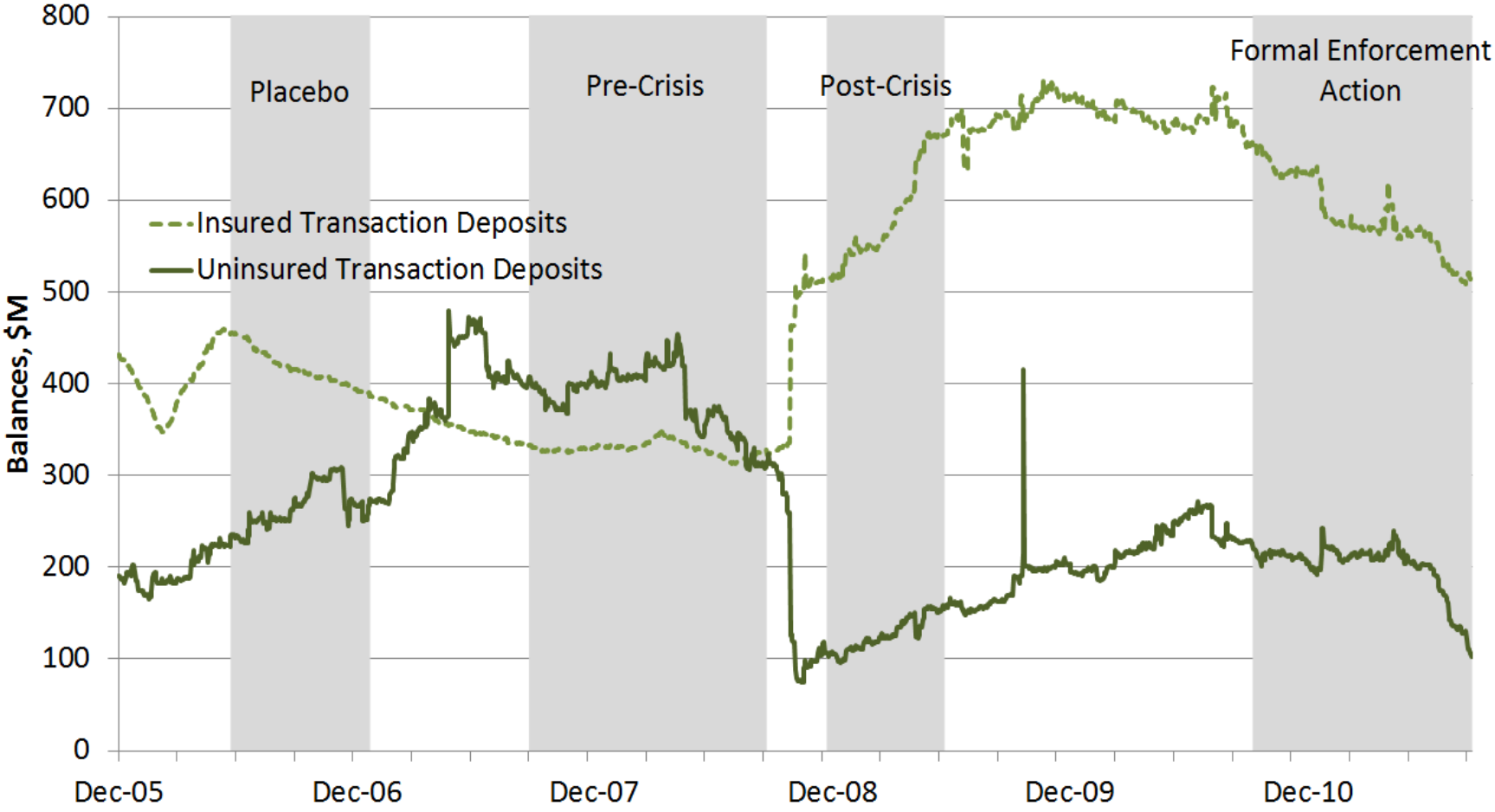
Data

- 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: S*tress 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 government rescue programs were launched.
  - *Placebo period:* Mid 2006, prior to major signs of distress.
- Cox proportional hazard, linear probability, and probit regressions
  - Dependent variable: Account liquidation dummy: Withdraw more than 50% of deposit balances at the start of the period, then stays that low or lower for 61+ days.
- Over four time periods discussed above for both CDs and transaction accounts

Transaction Balances



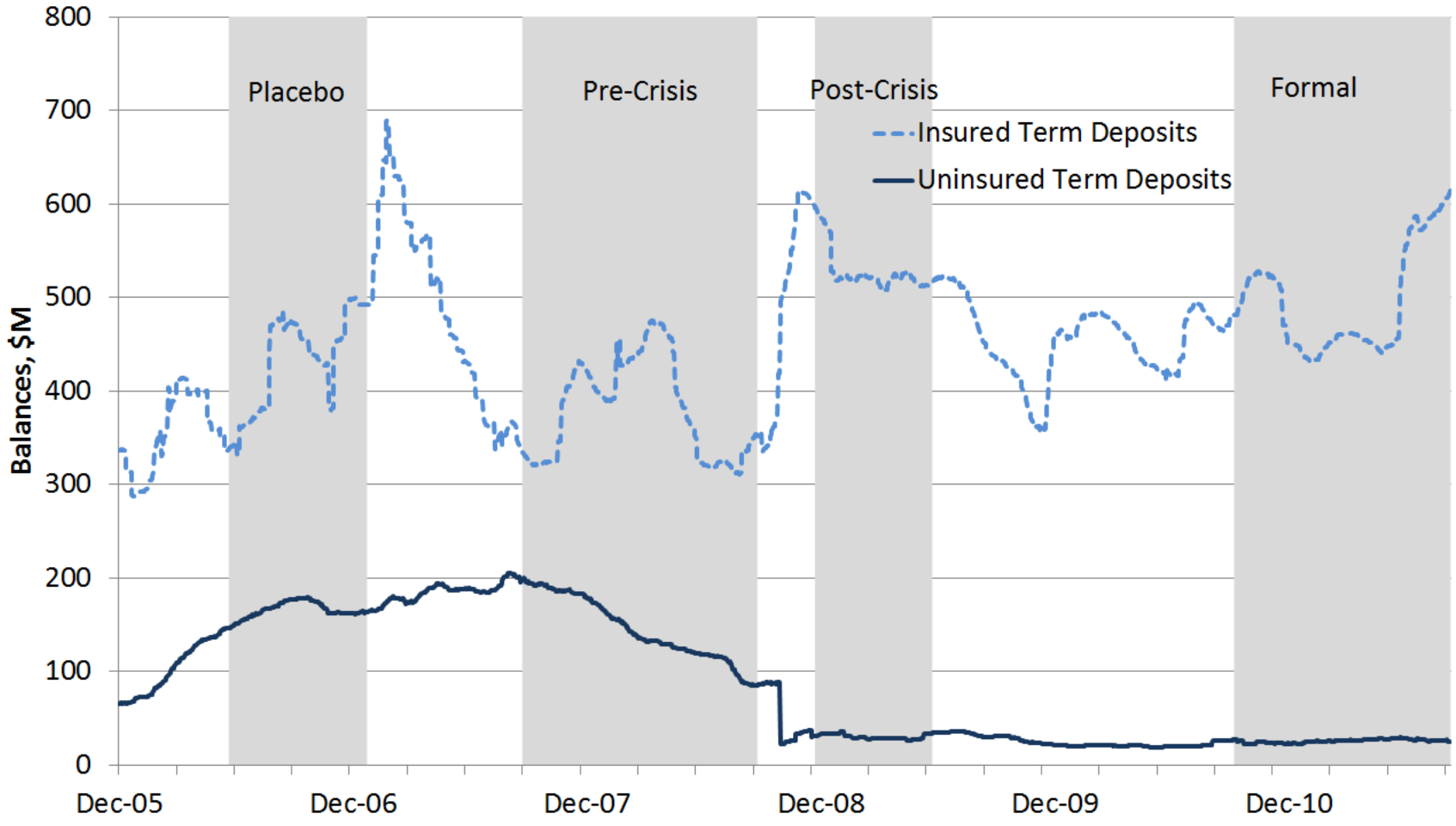
Who Withdraws? Transaction

- Depositors over the insurance limit always withdraw more, but this becomes much larger in magnitude post-crisis and even more when the bank is close to insolvency.
- TAG is as good at preventing withdraws as regular deposit insurance post-crisis in terms of economic significance.
- Checking accounts always withdraw less, consistent with Basel III, but this effect is slightly mitigated closer to insolvency.
- Account holders making direct deposit are less likely to liquidate their accounts.
- Older accounts are less likely to withdraw when the bank is close to insolvent.
- Inverted U shape with respect to transaction frequency and liquidation probability.

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 at the start of each of the four periods. Observe where those depositors end.
- During the formal period,
  - fewer accounts that end the period well above the limit,
  - many accounts below $1 (including closed) or between $2000 and $123,000, less than half the deposit insurance limit.
- Suggests
  - Uninsured most common response - draw down all or about half their account.
  - Even uninsured accounts draw down a significant portion of even insured deposits.

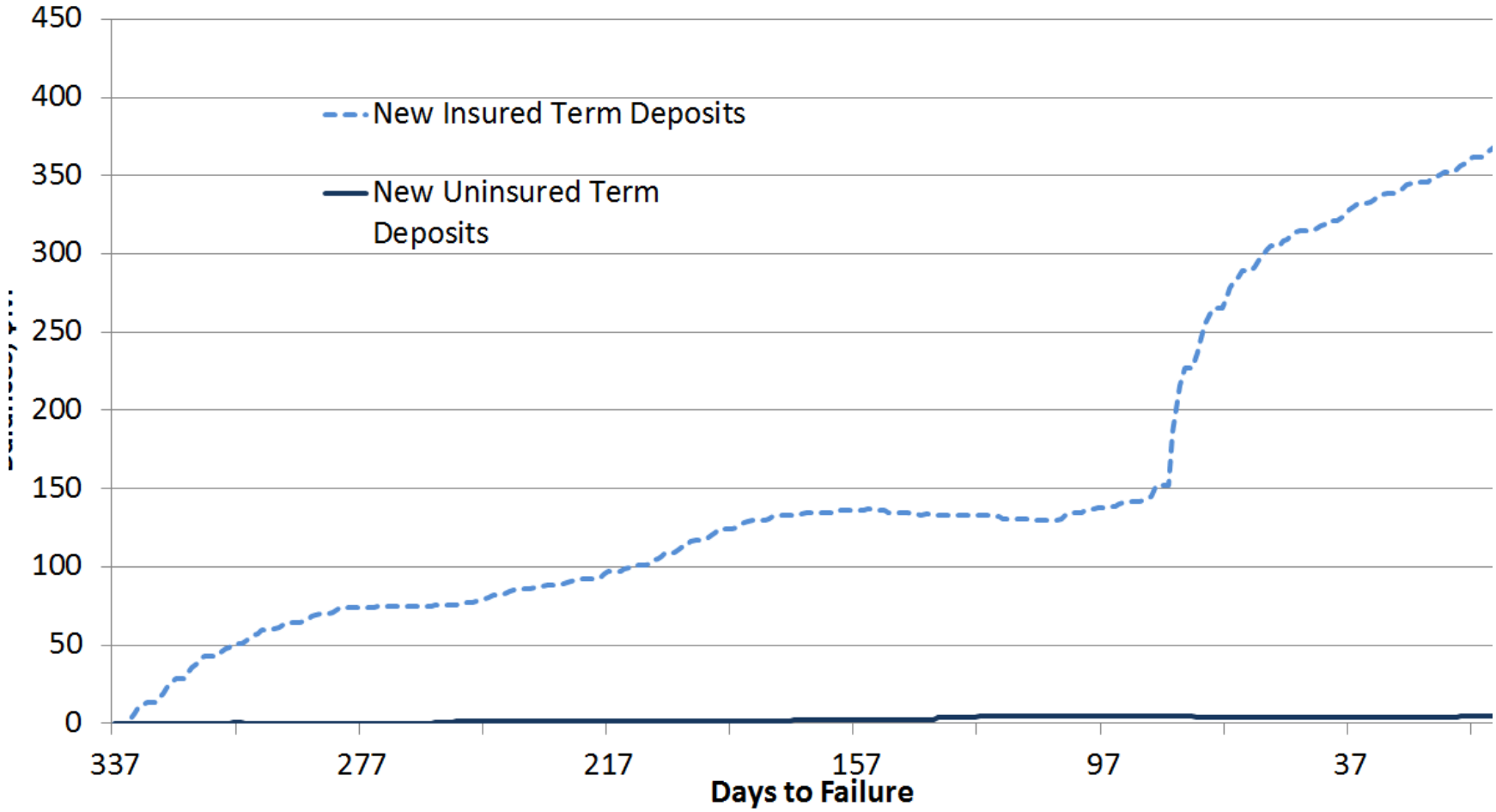
Term Deposit Balances



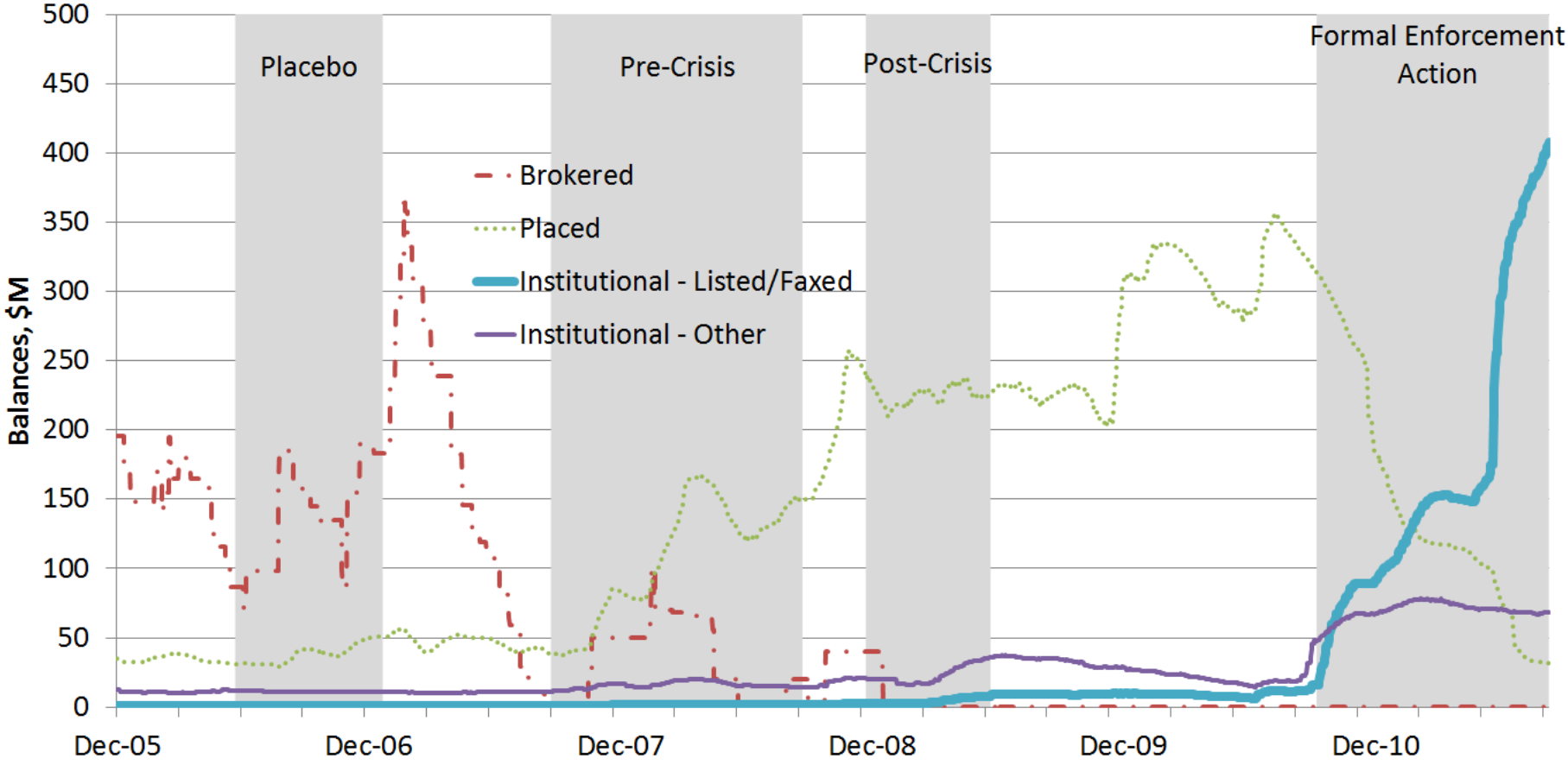
Comments on Term Accounts

- The runoff in term deposits during the pre-crisis period is even steeper than transaction accounts.
- Term deposits are actually less “sticky” than non-maturity
  - Depositor sophistication
  - Forward-looking nature of fixed maturity instrument
- Uninsured term accounts never return in any appreciable quantity following runoff and deposit insurance change.

Run-In: Deposit inflows in failing banks



Shift in CD Composition



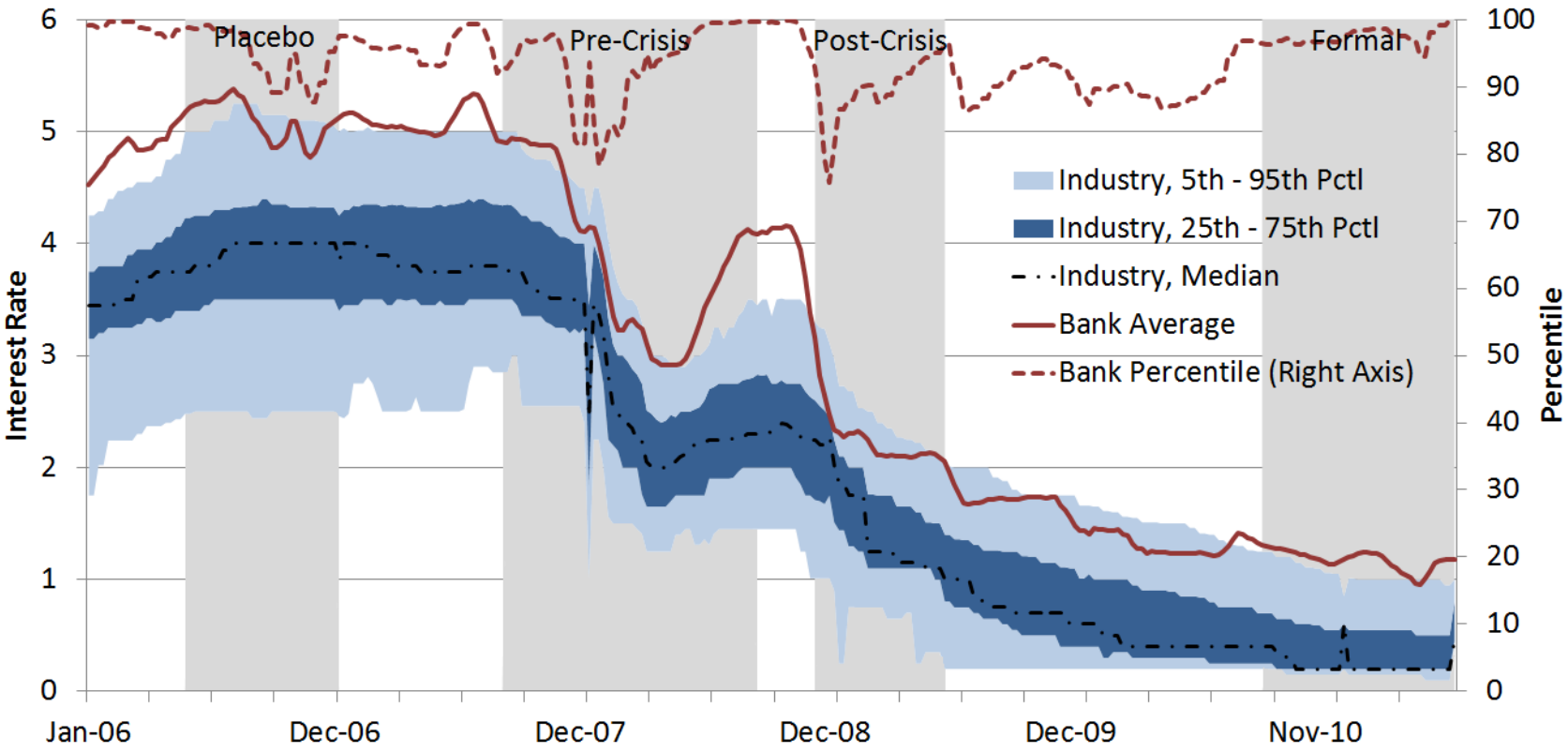
Comments on CD Composition

- 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

- 12 month CD is a very common deposit product and made up a large number of deposits at this bank.
- Bank consistently stayed near the top of the interest rate spectrum for this product and many other products for its entire lifetime while still complying with FDIC rate restrictions.
- Was above 95th percentile earlier in life when it attempted to grow its deposit base.
- Was well above the 95th percentile at end of life when it attracted a large number of listing service deposits.

Interest Rates



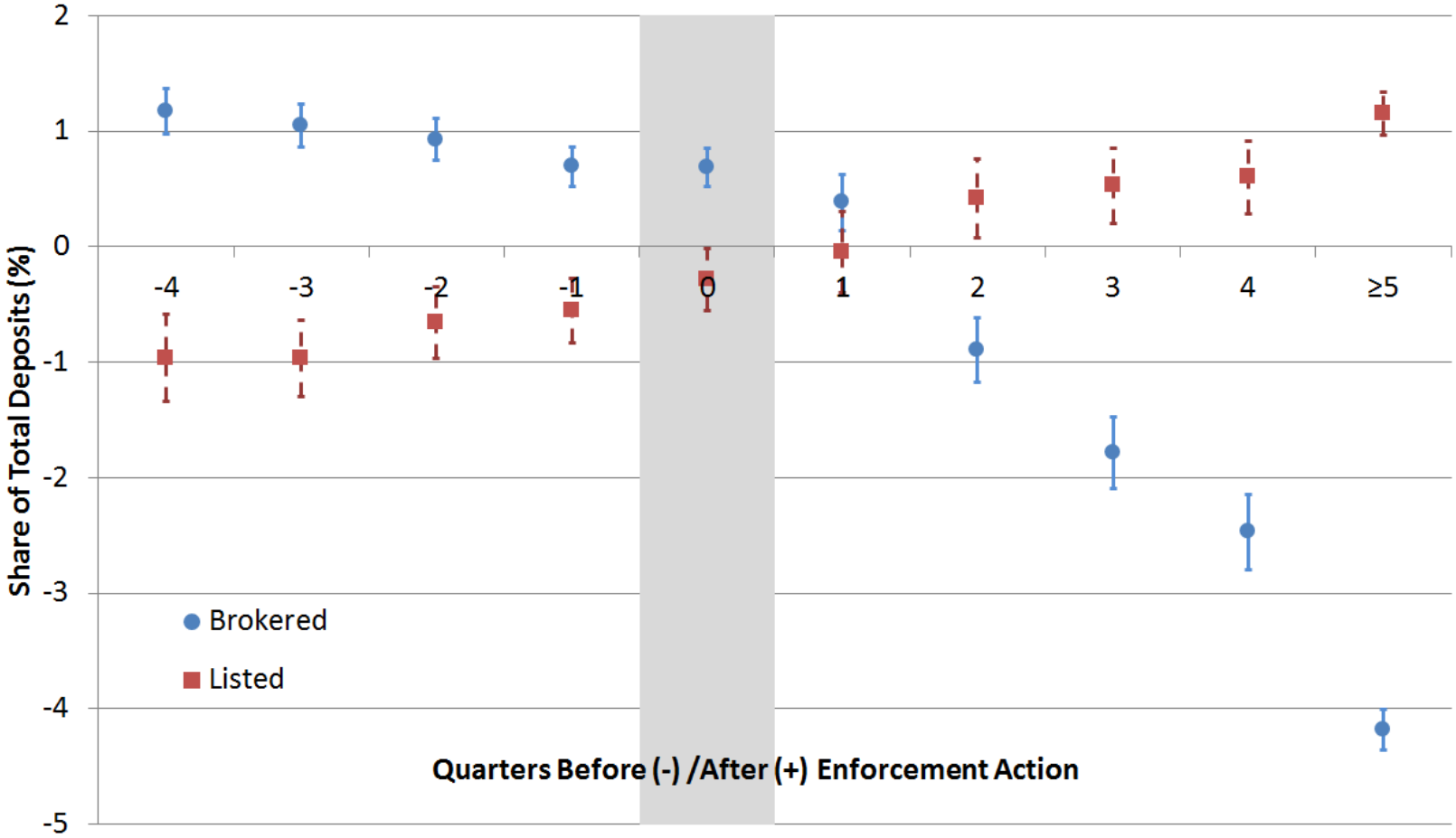
Key Findings on Inflows

- 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.

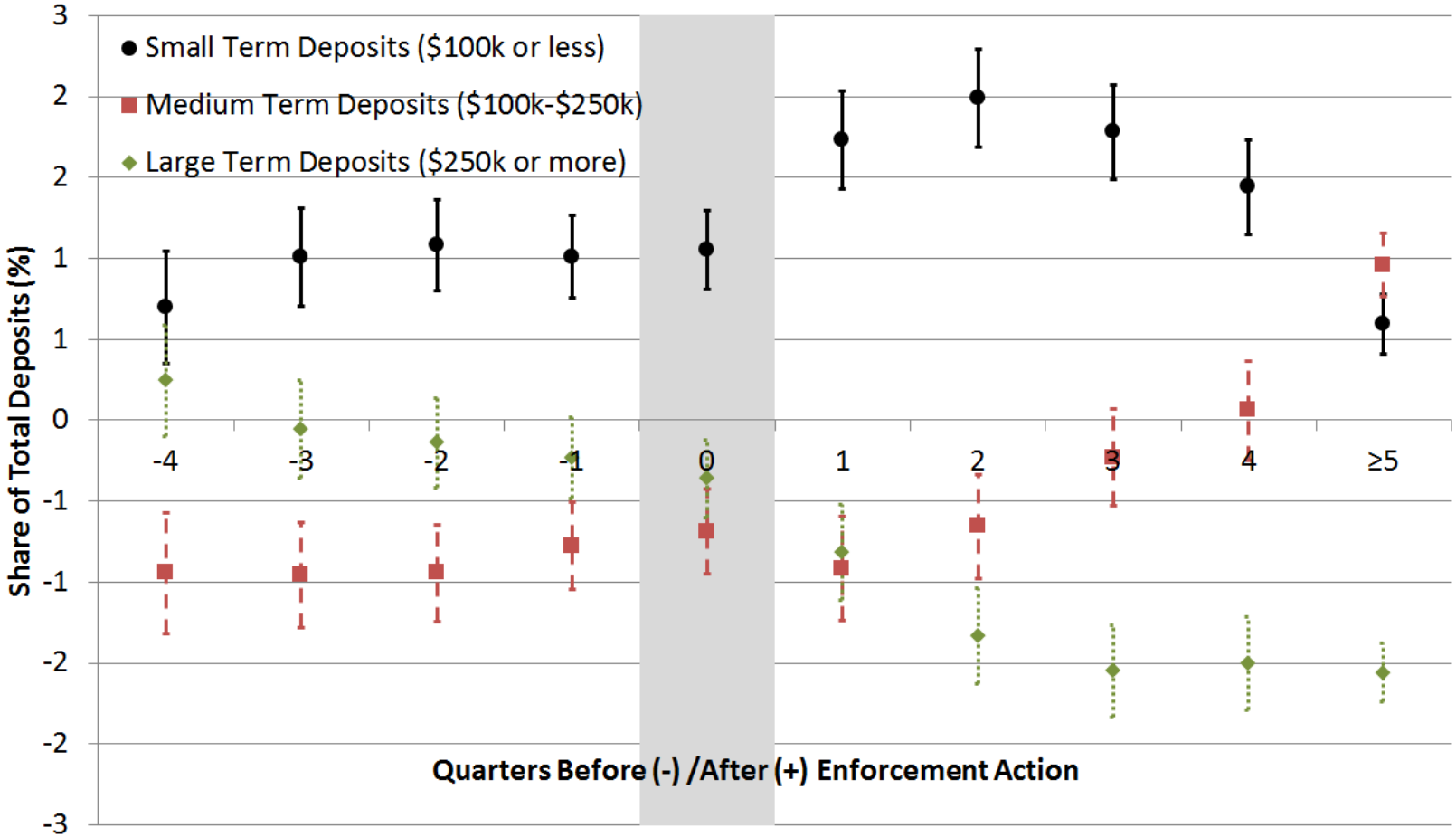
Generalization

- 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



Generalization



Generalization

- Conduct regressions
- Propensity score matching with controls for bank call report items, including non-performing loans that allow us to distinguish the effects of poor performance from regulatory action.
- Obtain similar results

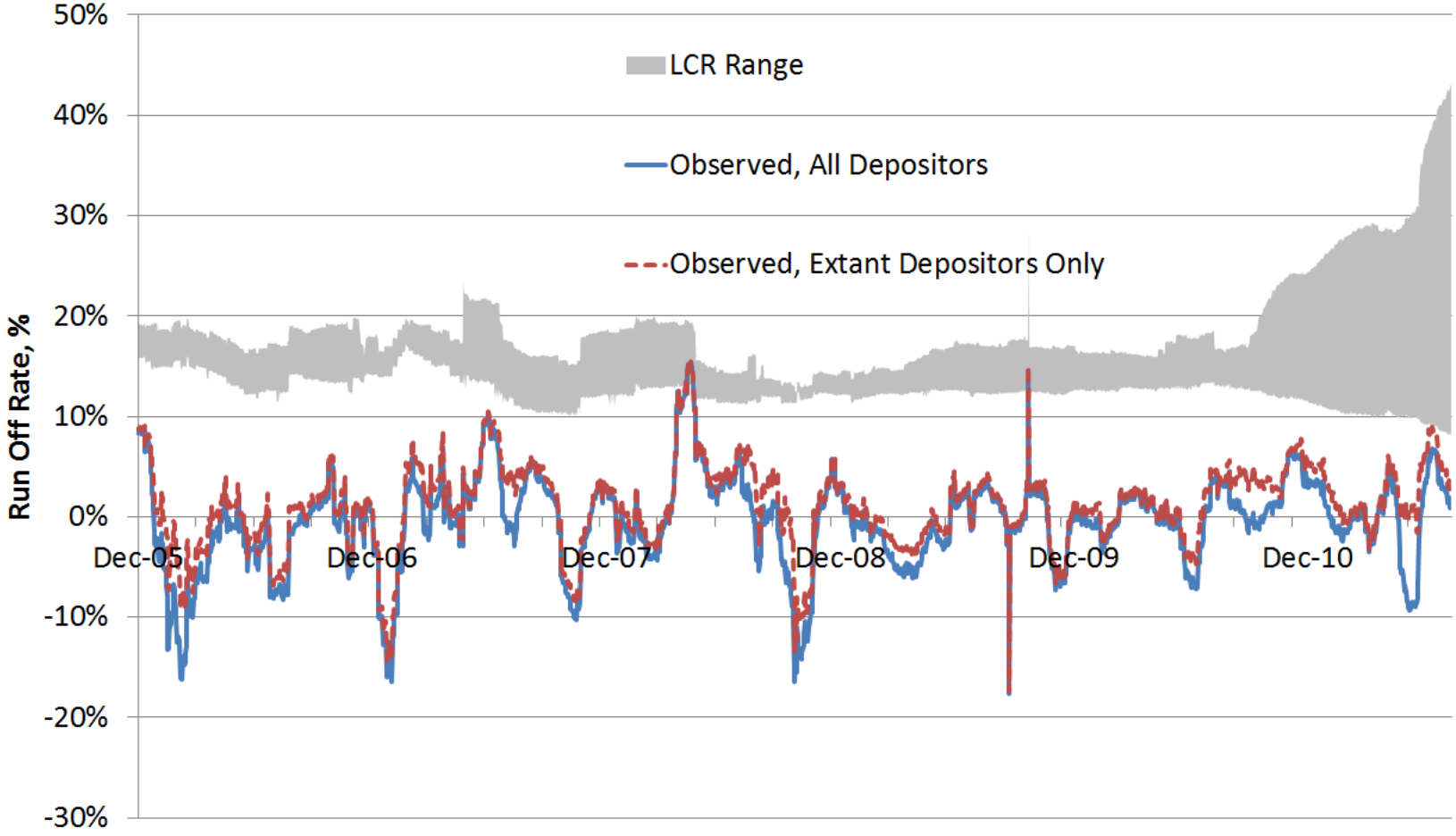
Background: LCR and NSFR

- Both rules require banks to hold “stability adjusted” funding consistent with “liquidity adjusted” assets to prevent the kind of 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 categories and apply standardized run-off rates to liabilities.
  - Identify the level of liquidity of assets.
  - Compare the liquidity ratios to see if banks have sufficient liquidity to survive a stress event.

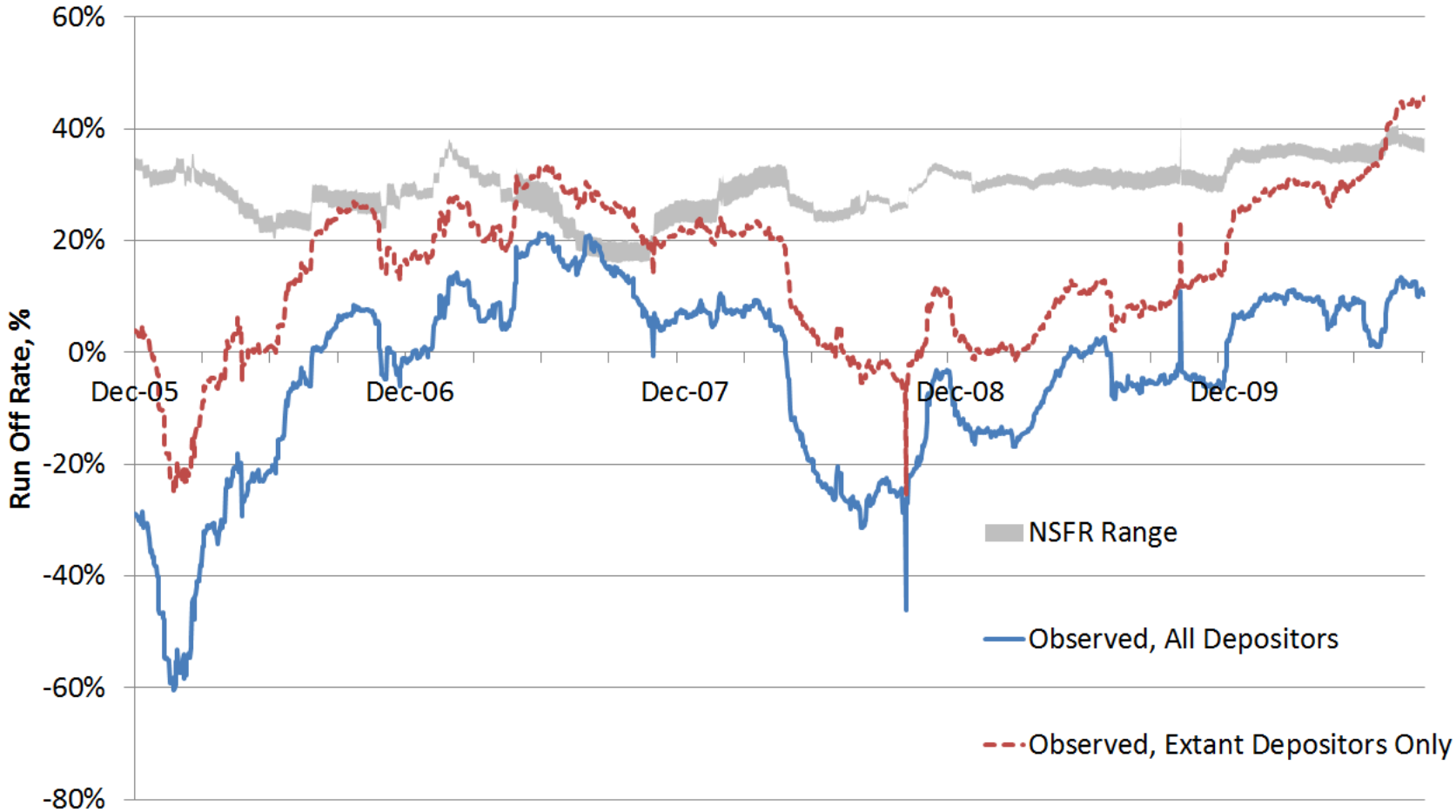
LCR and NSFR Additional Considerations

- Banks are allowed to classify business accounts as operational versus non-operational deposits with drastically different runoff rates, creating an opportunity for regulatory arbitrage.
  - This split does not have to be made at the account level so it is very hard to classify which dollars fall into which category.
  - Claiming deposits are 100% operational will result in banks having to keep fewer liquid assets as the runoff rate is assumed to be smaller.

30-day Run-Off and LCR



1-year Run Off and NSFR



LCR/NSFR Comments

- LCR range is never breached unambiguously.
- Depending on how one classifies operational versus non-operational deposits, the bank may breach the threshold in early 2008.
- NSFR unambiguously breached 2007-2008.
- NSFR was not necessarily developed to sustain periods of stress.
- NSFR and LCR both are targeted at larger banks with potentially smaller (or larger) run-off rates.

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 runoff rate is sufficiently high, but NSFR may not be.

Thanks!

- Questions? Comments?

Placebo

	Cox P.H.	*LPM*	*Probit*
	(1)	(2)	(3)
Uninsured	1.140**	0.0300**	0.0306**
	(2.27)	(2.21)	(2.16)
Checking & Uninsured	1.164	0.0210	0.0317
↪*Later Covered by TAG/DFA*	(1.07)	(0.64)	(0.91)
Checking	0.526***	−0.137***	−0.123***
	(−11.01)	(−11.99)	(−13.71)
Direct Deposit	0.648***	−0.104***	−0.0928***
	(−5.87)	(−6.45)	(−7.19)
Log(Age)	0.989	−0.00757***	−0.00565**
	(−1.00)	(−2.73)	(−2.09)
Prior Transactions	1.071***	0.0145***	0.0148***
	(23.40)	(22.71)	(22.55)
Prior Transactions^2	0.999***	−0.000186***	−0.000196***
	(−16.86)	(−19.28)	(−18.42)
Institutional - Any	0.874	−0.0203	−0.0248
	(−1.17)	(−0.81)	(−1.02)
Trust	0.966	−0.00207	−0.00429
	(−0.25)	(−0.07)	(−0.14)
Branch Controls	Yes	Yes	Yes
N	6125877	33973	33973
Log Likelihood	−91348.3	−19977.1	−19220.4
Model P-Value	< 0.001	< 0.001	< 0.001
No. of Liquidations	8920	8920	8920

Pre-Crisis

	Cox P.H. (1)	*LPM* (2)	*Probit* (3)	*Difference vs. Placebo* (4)
Uninsured	1.067	0.0283**	0.0282**	
	(1.53)	(2.18)	(2.14)	
Checking & Uninsured	1.152	0.0332	0.0416	
↪*Later Covered by TAG/DFA*	(1.36)	(1.07)	(1.30)	
Checking	0.591***	−0.152***	−0.145***	
	(−10.43)	(−11.46)	(−12.45)	
Direct Deposit	0.647***	−0.120***	−0.116***	
	(−7.14)	(−7.04)	(−7.62)	
Log(Age)	0.986	−0.00399	−0.00328	
	(−1.05)	(−0.94)	(−0.77)	
Prior Transactions	1.053***	0.0126***	0.0134***	†††
	(18.95)	(16.67)	(16.87)	
Prior Transactions^2	0.999***	−0.000169***	−0.000189***	††
	(−15.30)	(−15.36)	(−15.08)	
Institutional - Any	1.076	0.0234	0.0229	
	(0.88)	(0.98)	(0.92)	
Trust	1.014	0.0262	0.0273	
	(0.13)	(0.86)	(0.87)	
Branch Controls	Yes	Yes	Yes	
N	9897521	34476	34476	
Log Likelihood	−132171.2	−23717.7	−22606.0	
Model P-Value	< 0.001	< 0.001	< 0.001	
No. of Liquidations	12960	12960	12960	

Post-Crisis

	Cox P.H. (1)	*LPM* (2)	*Probit* (3)	*Difference vs. Placebo* (4)
Uninsured	1.444**	0.0770**	0.0710**	
	(2.41)	(2.37)	(1.99)	
Covered by TAG/DFA	0.708	−0.0791*	−0.0549	†
↪*Formerly*	(−1.45)	(−1.69)	(−1.53)	
Checking & Uninsured				
Checking	0.697***	−0.0612***	−0.0550***	†††
	(−5.40)	(−5.49)	(−5.80)	
Direct Deposit	0.502***	−0.112***	−0.0977***	††
	(−6.61)	(−7.09)	(−9.02)	
Log(Age)	0.990	−0.000270	0.000609	
	(−0.42)	(−0.07)	(0.15)	
Prior Transactions	1.052***	0.00818***	0.00837***	†††
	(13.14)	(12.61)	(12.65)	
Prior Transactions^2	0.999***	−0.000108***	−0.000117***	†††
	(−10.81)	(−11.59)	(−11.25)	
Institutional - Any	1.069	0.0122	0.00997	
	(0.71)	(0.70)	(0.57)	
Trust	0.739**	−0.0489**	−0.0485**	
	(−2.07)	(−2.13)	(−2.40)	
Branch Controls	Yes	Yes	Yes	
N	4835656	30112	30112	
Log Likelihood	−59487.6	−14680.5	−14703.3	
Model P-Value	< 0.001	< 0.001	< 0.001	
No. of Liquidations	5841	5841	5841	

Formal Enforcement Action

	Cox P.H. (1)	*LPM* (2)	*Probit* (3)	*Difference vs. Placebo* (4)
Uninsured	1.919***	0.230***	0.224***	†††
	(10.00)	(10.76)	(9.10)	
Covered by DFA	0.844	−0.0792*	−0.0577	
↪*Formerly*	(−1.11)	(−1.67)	(−1.44)	
Covered by TAG/DFA				
Checking	0.805***	−0.0625***	−0.0597***	†††
	(−4.38)	(−5.15)	(−5.37)	
Direct Deposit	0.735***	−0.0548***	−0.0579***	
	(−3.87)	(−3.14)	(−3.61)	
Log(Age)	0.936***	−0.0147***	−0.0139**	††
	(−3.11)	(−2.63)	(−2.53)	
Prior Transactions	1.013***	0.00448***	0.00467***	†††
	(3.95)	(5.77)	(5.85)	
Prior Transactions^2	1.000***	−0.0000698***	−0.0000752***	†††
	(−4.77)	(−6.48)	(−6.47)	
Institutional - Any	0.997	−0.00184	−0.00250	
	(−0.04)	(−0.11)	(−0.16)	
Trust	1.169**	0.0577***	0.0533**	
	(2.11)	(2.68)	(2.37)	
Branch Controls	Yes	Yes	Yes	
N	7032455	27145	27145	
Log Likelihood	−74902.1	−16439.4	−15786.8	
Model P-Value	< 0.001	< 0.001	< 0.001	
No. of Liquidations	7547	7547	7547	