

QUICK ON THE DRAW: LIQUIDITY RISK MITIGATION IN FAILING BANKS

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¹Views and opinions expressed in this presentation reflect those of the authors and do not necessarily reflect those of the FDIC or the United States.

Financial institutions offer liquidity to borrowers and depositors

- In turn, banks *require* liquidity to avoid selling the resulting relatively illiquid assets at a loss during crises to meet demands (Diamond and Rajan, 2001)
- Policymakers manage bank liquidity risk with central bank loans, deposit insurance, and reserve requirements
- Researchers have examined the effects of these policies

However, banks can also manage their own liquidity needs without these outside tools

- They can limit borrowers' ability to demand cash

We examine how banks manage their liquidity risks both before and during times of bank distress.

What is a Home Equity Line of Credit (HELOC)?


- Revolving lines of credit secured by the borrower's home.
- Buyers only pay interest on the draw period of 5-10 years
- After the draw period, the balance is converted to a term loan over 10-20 years
- Usually considered **unconditionally cancellable**

HELOCs fueled consumer spending and exploded in the run-up to the financial crisis

For example, IndyMac's Dynamic Line (a HELOC with a physical credit attached) advertised,

“It's my money, and I'll (action) if I want to.”

INDYMAC'S DYNAMIC LINE EXAMPLE



It's my money and I'll fry if I want to.

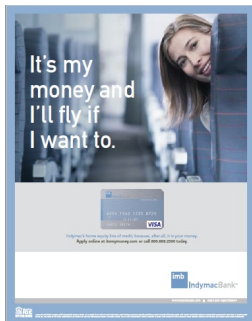
Five brand 'em, flush 12,000. No cast stainless steel main burners with rotary igniters, a 10" wide, brushed stainless steel grill and an eternity of perfectly broiled shrimp. After all, I've worked hard to buy my home and take care of it. And now that it has grown in value, I can make the most of that equity in my everyday life—from groceries to the Grand Caymans.

Indymac Bank's new home equity card has all the convenience of a credit card with the combined low interest and tax benefits of a home equity line.




Indymac's home equity line of credit, because, after all, it is your money.
Apply online at Indymac.com or call 800.669.2265 today.

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It's my money and I'll fly if I want to.




Indymac's home equity line of credit, because, after all, it is your money.
Apply online at Indymac.com or call 800.669.2265 today.

imb IndymacBank™
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Indymac Bank Dynamicline.

It's my money and I'll buy if I want to.



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Research Questions

- 1 Do banks actively manage their liquidity risk?
- 2 Does this management get more aggressive as their financial health declines and their incentives to strategically deploy capital are amplified?
- 3 Are borrowers more likely to draw down on their HELOCs as their banks approach failure?

Contribution

- 1 We show that banks approaching failure manage their own liquidity needs by revoking consumer credit lines, a previously unexplored area of liquidity risk management.
 - We build on studies showing policymakers and central bankers have long managed bank liquidity and researchers have analyzed the effects of liquidity risk on credit supply
- 2 We find banking relationships can be harmful to borrowers as bank failure approaches, revealing a novel dark side of banking relationships.
 - Many studies indicate a bright-side of firm-bank relationships during borrower distress, opposed to bank distress
 - Literature examining conditions under which corporate borrowers draw down on their lines of credit is limited and finds limited evidence of this phenomena
- 3 We are first to examine whether consumer borrowers draw more on credit lines leading up to bank failure

WHY SHOULD WE CARE ABOUT HELOCs?

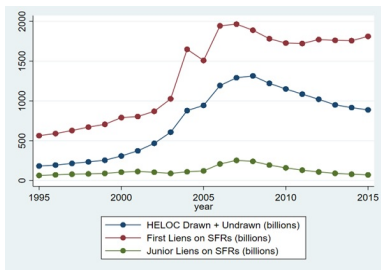


Figure 1a

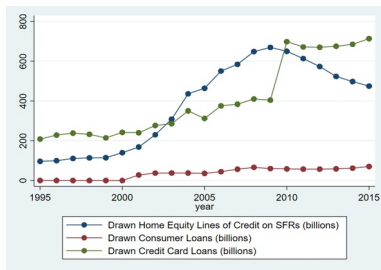


Figure 1b

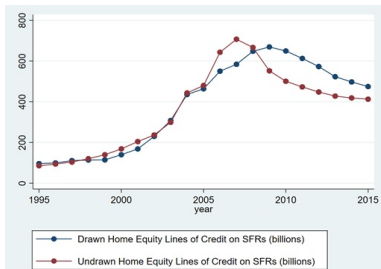


Figure 1c

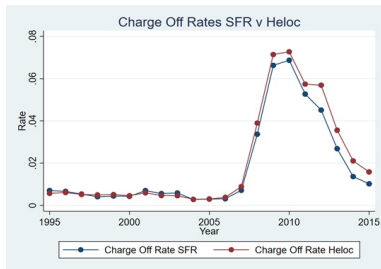


Figure 1d

LENDERS FREEZE/CANCEL CREDIT LINES

Los Angeles Times

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MONEY & COMPANY

Feds to freeze IndyMac's home-equity credit lines

JULY 13, 2008 6:43 PM PT

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Issue #1: America's Money THIS WEEK ON CNN [Full coverage](#)

When a HELOC freezes over

What to do if the bank tries to put your credit line on ice.

By Carolyn Riggs, Money Magazine writer-reporter
Last Updated: April 21, 2008 4:11 AM EDT

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The New York Times

U.S. lenders freeze home equity credit lines

 Give this article  

By Gretchen Morgenson

April 13, 2008

 REUTERS

JPMorgan not renewing First Republic customers' personal credit lines -source

 8

Jaiveer Shekhawat and Manya Saini

May 25, 2023 · 2 min read

Banks may not consider borrower characteristics when rationing credit

- Diamond (1984): If banks hold a diversified loan portfolio they can maintain diversification by cutting all loans equally

Alternatively, borrower characteristics (and behavior) may be important determinants

- With constant credit demand, a supply contraction leads to a price increase
- Banks could cut riskier and less profitable loans (Bernanke et. al., 1996)
- Norden and Weber (2010) find loans show “early warning signals” prior to default

Relationship banking literature shows that relationships are valuable because banks...

- Insure borrowers with stronger relationships against shocks (Berger and Udell, 1992, 1995; Berlin and Mester, 1999; Liberti and Sturgess, 2018)
- Have greater capabilities to monitor these loans (Holstrom and Tirole, 1997; Boot and Thakor, 2000).

However, not all banking relationships may matter equally.

FDIC's proprietary database assembled from nine banks that failed during the financial crisis

- Banks have staggered failure dates between 2008-2011
- Granular, transaction-level daily data pertaining to HELOCs aggregated to monthly-level
- We can observe when banks revoke credit lines
- We can also observe borrower drawdowns

We are unable to reveal the identities or any identifying information of the banks

VARIABLES OF INTEREST

Dependent Variables of Interest:

- Line Cut : Binary variable that takes a value of 100 on the first day the bank revokes the HELOC and 0 otherwise
- Used Proportion Change Past Month: Difference between used proportion of credit over the last month

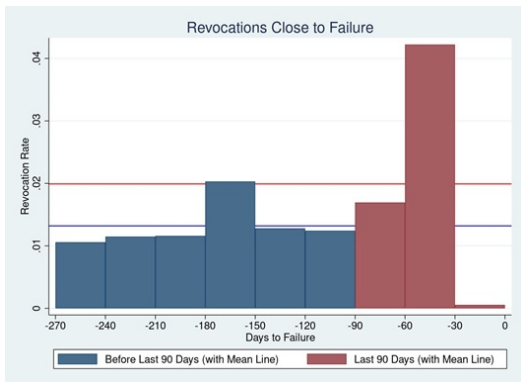
Loan origination characteristics and borrower actions:

- Loan origination variables: LTV, spread, amount
- Time-varying loan-level borrower variables: delinquency history, drawdowns, and relationships

Close To Fail: variable that is 1 during the three months before failure

REVOCATIONS CLOSE TO FAILURE

Revocations Close to Failure



Sample is 90,848 HELOCs and 1.37 million loan-month observations

- LoanChar: vector of time-invariant loan characteristics
- Var: vector of time-varying variables
- Close to Fail: indicator taking a value of 1 the three months before failure

$$\begin{aligned} \text{LineCut}_{hbt} = & \beta_1 \text{CloseToFail}_{bt} + & (1) \\ & \beta'_2 \text{CloseToFail}_{bt} \times \text{LoanChar}_{hb} \\ & + \delta_t + \xi_b + \epsilon_{hbt} \end{aligned}$$

$$\begin{aligned} \text{UsedProportionChange}_{hbt} = & \beta_1 \text{CloseToFail}_{bt} + & (2) \\ & \beta'_2 \text{CloseToFail}_{bt} \times \text{LoanChar}_{hb} \\ & + \delta_t + \xi_b + \epsilon_{hbt} \end{aligned}$$

- Include monthly fixed effects
- Include bank-level *OR* HELOC-level fixed effects

SUMMARY STATISTICS: FULL SAMPLE

| (1) Variable | (2) Mean | (3) SD | (4) N |
|------------------------------------|-------------|-----------|-----------|
| Original Loan Commitment Amount | 79,800 | 183,000 | 1,373,638 |
| Line Cut or Closed | 0.53 | 7.31 | 1,373,638 |
| Credit Score | 734.12 | 61.66 | 985,720 |
| LTV | 43.25 | 32.64 | 1,316,955 |
| Origination Spread | 2.33 | 2.06 | 1,319,247 |
| End of Month Principal | 43,000 | 119,000 | 1,373,638 |
| End of Month Line | 81,200 | 184,000 | 1,373,638 |
| Historic Delinquency | 0.04 | 0.19 | 1,373,638 |
| Recent Delinquency | 0 | 0.06 | 1,373,638 |
| Used Proportion. Past Month | 53.17 | 38.72 | 1,373,638 |
| Used Proportion. Past Month Change | 0.08 | 16.81 | 1,373,638 |
| Previous Line Increase | 0.02 | 0.14 | 1,373,638 |
| Deposit Account | 0.57 | 0.49 | 1,373,638 |
| Other Loan | 0.26 | 0.44 | 1,373,638 |
| Zillow Price Index Growth | -0.25 | 1.19 | 1,156,410 |
| Close to Fail | 0.08 | 0.27 | 1,373,638 |
| N | | | 1,373,638 |

SUMMARY STATISTICS: LOAN-LEVEL

| (1) Variable | (2) Mean | (3) SD | (4) N |
|------------------------------------|-------------|-----------|----------|
| Original Loan Commitment Amount | 88,800 | 129,000 | 90,848 |
| Line Cut or Closed | 17.69 | 38.16 | 90,848 |
| Credit Score | 717.3 | 66.78 | 78,060 |
| LTV | 46.03 | 29.57 | 86,760 |
| Origination Spread | 3.62 | 1.83 | 88,125 |
| End of Month Principal | 60,700 | 88,400 | 90,848 |
| End of Month Line | 89,100 | 130,000 | 90,848 |
| Historic Delinquency | 0.02 | 0.15 | 90,848 |
| Recent Delinquency | 0.02 | 0.14 | 90,848 |
| Used Proportion. Past Month | 70.71 | 36.54 | 90,848 |
| Used Proportion. Past Month Change | -0.22 | 11.97 | 90,848 |
| Previous Line Increase | 0.01 | 0.1 | 90,848 |
| Deposit Account | 0.2 | 0.4 | 90,848 |
| Other Loan | 0.44 | 0.5 | 90,848 |
| Zillow Price Index Growth | -1.38 | 1.31 | 86,007 |
| Close to Fail | 0.83 | 0.38 | 90,848 |
| N | | | 90,848 |

ARE BANKS MORE LIKELY TO REVOKE RISKY HELOCs?

Agarwal, Ambrose, Chomsisengphet, and Liu (2006) identify characteristics associated with HELOC default

- High Loan-to-value ratio (LTV)

Additional variables

- Interest rate spread: this may be a reflection of hard and soft information

Alternatively, banks may not consider borrower characteristics when rationing credit

RESULTS: LOAN ORIGINATION CHARACTERISTICS

| | (1) | (2) |
|------------------------------------|-----------------------|-----------------------|
| | Line Cut | Line Cut |
| LTV | 0.00727*** (26.62) | 0.00614*** (21.46) |
| Origination Spread | 0.0255*** (7.37) | 0.0166*** (5.11) |
| Close to Fail | | -0.146 (-1.46) |
| LTV * Close to Fail | | 0.0129*** (8.82) |
| Origination Spread * Close to Fail | | 0.106*** (5.95) |
| Zillow Price Index Growth | Yes | Yes |
| HELOC FE | No | No |
| Bank FE | Yes | Yes |
| Month FE | Yes | Yes |
| Zip 3 * Year FE | Yes | Yes |
| N | 1,055,087 | 1,055,087 |
| R-sq | 0.036 | 0.037 |

DO BANKS ACT ON BORROWER BEHAVIOR?

After loan initiation, borrowers exhibit different behaviors

Delinquency can lead to default

- Agarwal, Ambrose, Chomsisengphet, and Liu (2006)
- Norden and Weber (2010)

Abnormal drawdowns are related to future default: Norden and Weber (2010)

- Banks may interpret this as an “early warning signal”
- However, this also leaves banks with less credit to manage

The effect of increased drawdowns on bank HELOC management is ultimately an empirical question.

HELOCs ARE CUT WHEN BORROWERS ARE LATE

| | (1) Line Cut | (2) Line Cut |
|--------------------------------------|---------------------|---------------------|
| Recent Delinquency | 5.271*** (15.09) | 4.981*** (13.58) |
| Historic Delinquency | 0.944*** (9.93) | 0.912*** (9.40) |
| Close to Fail | | 1.713*** (10.11) |
| Recent Delinquency * Close to Fail | | 2.468** (2.17) |
| Historic Delinquency * Close to Fail | | 0.119 (0.49) |
| Zillow Price Index Growth | -0.0107 (-0.81) | -0.00816 (-0.62) |
| HELOC FE | Yes | Yes |
| Month FE | Yes | Yes |
| Zip 3 * Year FE | Yes | Yes |
| N | 1,156,410 | 1,156,410 |
| R-sq | 0.037 | 0.038 |

HELOCs ARE CUT WHEN LINES HAVE MORE CREDIT

| | (1) | (2) |
|---|-------------------------|-------------------------|
| | Line Cut | Line Cut |
| Used Proportion Past Month | -0.00842*** (-18.54) | -0.00764*** (-16.93) |
| Previous Line Increase | -0.605*** (-8.37) | -0.482*** (-6.73) |
| Used Proportion Change Past Month | -0.00353*** (-5.27) | -0.00290*** (-4.41) |
| Close to Fail | | 1.713*** (10.11) |
| Used Proportion Change Past Month * Close to Fail | | -0.0197*** (-2.83) |
| Previous Line Increase * Close to Fail | | -1.478*** (-10.69) |
| Used Proportion Change Past Month * Close to Fail | | -0.0197*** (-2.83) |
| Zillow Price Index Growth | Yes | Yes |
| HELOC FE | Yes | Yes |
| Month FE | Yes | Yes |
| Zip 3 * Year FE | Yes | Yes |
| N | 1,156,410 | 1,156,410 |
| R-sq | 0.037 | 0.038 |

DO RELATIONSHIPS MATTER?

There is an extensive literature dedicated to showing the benefits of relationships

- Borrowers are insured against shocks
- Banks have greater monitoring capabilities and realize more profits

However, all banking relationships may not be equally valuable

- Depositors are generally assumed to be valuable to banks
- Banks holding multiple loans with a borrower are more exposed to the borrower
- Relationships are sticky

The differential effect of relationships on bank HELOC management is ultimately an empirical question

DEPOSIT RELATIONSHIPS ARE VALUABLE

| | (1) Line Cut | (2) Line Cut |
|---------------------------------|----------------------|---------------------|
| Deposit Account | -0.154*** (-2.58) | -0.145** (-2.40) |
| Other Loan | 0.154** (2.10) | 0.0978 (1.34) |
| Close to Fail | | 0.299** (2.37) |
| Deposit Account * Close to Fail | | -0.0315 (-0.25) |
| Other Loan * Close to Fail | | 1.139*** (6.72) |
| Zillow Price Index Growth | Yes | Yes |
| HELOC FE | Yes | Yes |
| Bank FE | No | No |
| Month FE | Yes | Yes |
| Zip 3 * Year FE | Yes | Yes |
| SE Clustered at Loan Level | Yes | Yes |
| N | 1,156,410 | 1,156,410 |
| R-sq | 0.035 | 0.035 |

DO BORROWERS RUN ON THEIR HELOCs AS FAILURE APPROACHES?

One potential reason banks may cut lines is to preempt borrower runs

Borrowers may drawdown on credit lines analogous to the way depositors may run

- Kayshyap, Rajan, and Stein (2002)
- Empirically, there is limited evidence of this within the corporate sector

Certain borrowers may have a difficult time obtaining subsequent credit

- Risky borrowers
- Borrowers with a history of problems
- Some relationships may be severed as the failed bank is acquired

It is an empirical question whether borrowers run on their HELOCs.

ON AVERAGE, BORROWERS DO NOT RUN

| | (1) Used Proportion Change Past Month |
|------------------------------------|---|
| LTV | -0.00327*** (-7.02) |
| Origination Spread | 0.00987 (1.57) |
| Close to Fail | 0.0423 (0.36) |
| LTV * Close to Fail | 0.000837 (0.63) |
| Origination Spread * Close to Fail | -0.0295* (-1.71) |
| Zillow Price Index Growth | 0.0823*** (3.65) |
| HELOC FE | No |
| Bank FE | No |
| Month FE | Yes |
| Zip 3 * Year FE | Yes |
| SE Clustered at Loan Level | Yes |
| N | 1,055,087 |
| R-sq | 0.02 |

Even if...

- They exhibit more risky origination characteristics Origination Drawdown
- They have a history of delinquency Delinquency Drawdown
- They have available credit Available Credit Drawdown
- They have deposit relationships Relationship Drawdown
- They have other loans

Disentangling supply-side from demand-side effects is difficult

- Many features of the relationship between the borrower and bank are unobservable
- For example, borrowers may have income shocks that are known to the bank but are unobservable in the data

We add the bank earnings tax rate to regressions

- Bank tax rate affects the incentive for banks to cut HELOCs
- Banks receive larger tax benefits from charging off bad loans in states with higher marginal tax rates
- Bank tax rate does not influence behavior of borrowers

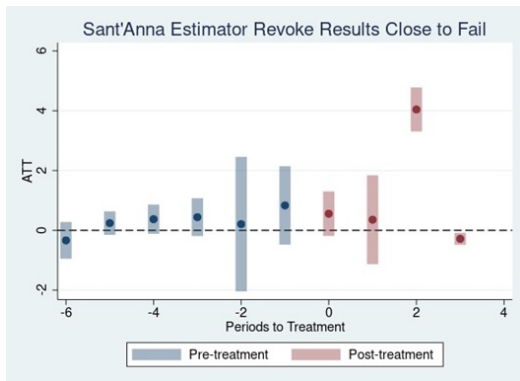
Bank incentives play a crucial role in HELOC cancellations under our definition of line terminations

TAX RATE AS A SOURCE OF EXOGENOUS VARIATION

| | (1) | (2) |
|----------------------------|---------------------|---------------------|
| | Line Cut | Line Cut |
| Tax Rate | -0.0709* (-3.77) | -0.114** (-4.19) |
| Close to Fail | | 0.101 (0.69) |
| Direct Effects | Yes | Yes |
| Close to Fail Interactions | No | Yes |
| HELOC FE | No | No |
| Bank FE | No | No |
| Month FE | Yes | Yes |
| Zip 3 | No | Yes |
| N | 1,052,917 | 1,052,917 |
| R-sq | 0.038 | 0.039 |

CALLAWAY AND SANT'ANNA (2021) ESTIMATOR

Banks provide less liquidity as they approach failure



1) We show that banks manage HELOCs

- Borrowers exhibiting certain “early warning signals” are more likely to be managed
- Relationships have differential effects

2) For the most part, this management becomes more aggressive approaching failure

- It's notable that banks revoke credit lines more aggressively for borrowers with multiple loans

3) On average, borrowers do not run on their HELOCs

Our paper has implications for understanding the

- Types of borrowers are harmed as bank financial health deteriorates
- Welfare trade-offs of HELOCs

Thank You!!



CREDIT SCORE AND LINE CUTS

| | (1) Line Cut | (2) Line Cut |
|-------------------------------------|----------------------|------------------------|
| Credit Score | -0.00015 (-1.34) | -0.000270** (-2.26) |
| Credit Score Exists | -0.240*** (-2.79) | -0.202** (-2.26) |
| Credit Score * Close to Fail | | 0.00160*** (3.46) |
| Credit Score Exists * Close to Fail | | -0.268 (-0.73) |
| Zillow Price Index Growth | Yes | Yes |
| LTV and Origination Spread | Yes | Yes |
| Close to Fail Interactions | No | Yes |
| HELOC FE | No | No |
| Bank FE | Yes | Yes |
| Month FE | Yes | Yes |
| Zip 3 * Year FE | Yes | Yes |
| N | 1,055,087 | 1,055,087 |
| R-sq | 0.037 | 0.037 |

CREDIT SCORE AND DRAWDOWNS

| | (1) |
|-------------------------------------|------------------------|
| | Used Proportion Change |
| | Last Month |
| Credit Score | -0.000539* |
| | (-2.14) |
| Credit Score Exists | 0.221 |
| | (1.18) |
| Credit Score * Close to Fail | 0.00231*** |
| | (4.28) |
| Credit Score Exists * Close to Fail | -1.357*** |
| | (-3.35) |
| Zillow Price Index Growth | Yes |
| LTV and Origination Spread | Yes |
| Close to Fail Interactions | Yes |
| HELOC FE | No |
| Bank FE | Yes |
| Month FE | Yes |
| Zip 3 * Year FE | Yes |
| N | 1,038,140 |
| R-sq | 0.02 |

...EVEN IF THEY HAVE A HISTORY OF DELINQUENCY

| | (1) Used Proportion Change Past Month |
|--------------------------------------|---|
| Recent Delinquency | 0.371 (1.62) |
| Historic Delinquency | 0.736*** (3.20) |
| Close to Fail | -0.750*** (-3.66) |
| Recent Delinquency * Close to Fail | 0.437 (0.77) |
| Historic Delinquency * Close to Fail | -1.153*** (-5.27) |
| Zillow Price Index Growth | 0.0708*** (2.61) |
| HELOC FE | Yes |
| Bank FE | No |
| Month FE | Yes |
| Zip 3 * Year FE | Yes |
| N | 1,1156,410 |
| R-sq | 0.197 |

...EVEN IF THEY HAVE AVAILABLE CREDIT

| | (1) Used Proportion Change Past Month |
|--|---|
| Used Proportion Past Month | -0.333*** (-77.72) |
| Previous Line Increase | 2.526*** (6.82) |
| Close to Fail | -0.750*** (-3.66) |
| Used Proportion Past Month * Close to Fail | 0.0203*** (8.55) |
| Previous Line Increase * Close to Fail | -0.232 (-0.80) |
| Zillow Price Index Growth | 0.0708*** (2.61) |
| HELOC FE | Yes |
| Bank FE | No |
| Month FE | Yes |
| Zip 3 * Year FE | Yes |
| N | 1,156,410 |
| R-sq | 0.197 |

...EVEN ONES WITH RELATIONSHIPS

| | (1) Used Proportion Change Past Month |
|---------------------------------|---|
| Deposit Account | 0.118 (1.35) |
| Other Loan | -0.479*** (-4.52) |
| Close to Fail | 0.0949 (0.70) |
| Deposit Account * Close to Fail | 0.0952 (0.88) |
| Other Loan * Close to Fail | -0.0883 (-0.54) |
| Zillow Price Index Growth | 0.0781*** (3.20) |
| HELOC FE | Yes |
| Bank FE | No |
| Month FE | Yes |
| Zip 3 * Year FE | Yes |
| N | 1,156,410 |
| R-sq | 0.016 |

RELATED LITERATURE AND CONTRIBUTIONS

1) Relationship banking literature

- Bright side of firm-bank relationships: Jiménez et al. (2012) Sette and Gobi (2015), Bolton et al. (2016), Beck, Degryse, DeHaas, and van Horen (2018), Liberti and Sturgess (2018)
- Dark side of firm-bank relationships during COVID-19: Berger, Bouwman, Norden, Roman, Udell, and Wang (2021)

2) We contribute to studies examining the conditions that cause banks to manage credit lines and those showing that deteriorations in bank financial health leads to credit supply contractions.

- We are the first study within the consumer market
- Kashyap and Stein (2000); Peek and Rosengren (2000); Lishan and Opiela (2000); Ashcraft (2006); Khwaja and Mian (2008); Paravisini (2008); Jimenez, Ongena, Peydro and Saurina (2012); Liberti and Sturgess (2018)

3) We contribute to a small body of literature understanding the conditions under which borrowers draw down on their credit lines (run).

- Parallels between deposit and LOC runs: Kashyap, Rajan, and Stein (2002)
- Empirical literature finds limited evidence of this phenomena pre-COVID

CALLAWAY AND SANT'ANNA (2021) ESTIMATOR

Borrowers do not increase drawdown rates

