# The Effects of Information on Credit Market Competition: Evidence from Credit Cards

Fritz Foley (Harvard) Agustin Hurtado (Booth)
Andres Liberman (NYU) Alberto Sepulveda (SBIF)

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# Lender competition and public information

- Without public information: less competition
  - Lenders acquire private information about their own borrowers
  - In the presence of asymmetric information, they hold an informational rent over their good borrowers
  - May allow lending to riskier populations ex ante
- With public information: more competition
  - Better outcomes for good borrowers who look safer (ex ante)
  - No informational rents ex post: riskier populations may be excluded
- Unclear welfare effects of public information:
  - Cross country evidence suggests more competition improves outcomes in countries with weaker institutions (e.g., Beck, Demirguc-Kunt, and Maksimovic 2004)

# This paper

- We study the effects of sharing credit information on lender competition
- Setting: credit cards in Chile issued by banks ("full information") and retailers ("partial info", some market power over good types)
- Data: credit registry containing universe of credit card borrowers at the individual-lender-month level, for banks and retailers
- Three parts:
  - Empirical test 1: cross section of contracts for new borrowers across retailer and banks
  - Empirical test 2: exploit natural experiment: in 2015 a retailer sold its credit card business to a bank; changes information, and thus, competitive environment
  - Framework: credit limits are main margin of adjustment in credit cards; adverse selection induces market power under no credit information

# Results

1. Retailers lend lower amounts that grow faster (conditional on remaining with lender) to riskier borrowers
2. Natural experiment:
   - Incumbent borrowers: receive larger credit lines from other banks
   - New borrowers: safer, larger limits
3. Rationalized with model
   3.1 Missing: total welfare effects

# Agenda

Summary of framework

Empirical setting and data

New retail and bank borrowers

Natural experiment

Conclusion

# Summary of framework

# Framework

- In paper we develop a simple model of a market for credit cards in the presence of adverse selection
- Rates given conditional on observables
- Lenders compete on credit lines
  - Lots of evidence that limits are primary margin of adjustment in consumer credit (see e.g. Agarwal et al 2017)
  - We show some in the paper as well
- Framework rationalizes positive effects of competition for incumbent borrowers, possible negative effects for new borrowers from riskier populations

# Takeaways

- With credit bureau:
  - Observably safer populations get credit
  - Safer conditional on observables
  - Initial limits are larger, grow less over time
- Without credit bureau:
  - Riskier populations also get credit
  - Lower initial limits, grow more conditional on remaining as a client

# Empirical setting and data

# Credit cards in Chile

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  - Regulated in terms of information disclosure: individual x bank x month level information on balances and repayment collected and made available to banks
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- Retailers: 6 in our data, 14.7 million active credit cards, $5bn balance
  - Disclose information on past defaults to private credit bureaus; observable by all other lenders

# Information setting

- Lenders operate in different information environments
  - Banks operate under a full credt registry setting, full competition ex post
  - Retailers hold information rent over "good" borrowers, who repay their debt ex-post
- We exploit this heterogeneity, but...

# Information setting

- Lenders operate in different information environments
  - Banks operate under a full credt registry setting, full competition ex post
  - Retailers hold information rent over "good" borrowers, who repay their debt ex-post
- We exploit this heterogeneity, but...
- ... other differences between banks and retailers? Sure: e.g., funding (deposits versus commercial paper), management style, regulation
  - Keep in mind

# Data

- Regulatory dataset collected by SBIF (Chilean banking regulator)
- Micro-level data on universe of credit card borrowers in Chile (8 million individuals)
- Individual by month by bank data on credit card limit, usage, delinquency
- Our primary analysis is conducted using a 10% random sample

# Summary stats individual level

| | (1) All | (2) Bank | (3) Retail |
|---|---|---|---|
| *Panel A: Credit Card Characteristics* | | | |
| Credit Card Limit | 1,437,031 | 2,371,160 | 699,395 |
| Credit Card Usage | 373,283 | 523,107 | 254,975 |
| Credit Card Balance/Limit | 0.3310 | 0.2548 | 0.3912 |
| Number Lenders | 2.0777 | 2.0231 | 2.1208 |
| Number Lenders with Balance | 1.3182 | 1.1160 | 1.4778 |
| Credit Card Default | 0.0218 | 0.0103 | 0.0309 |
| *Panel B: Borrower Characteristics* | | | |
| Monthly income bin | 1.64 | 1.85 | 1.47 |
| Fraction in income bin 1 | 0.60 | 0.52 | 0.67 |
| Female | 0.5304 | 0.4907 | 0.5617 |
| Married | 0.6582 | 0.6486 | 0.6658 |
| Age | 47.35 | 46.49 | 48.02 |
| Individuals | 657,856 | 434,276 | 521,904 |

# New retail and bank borrowers

# Empirical analysis 1

- Study new credit card borrowers across both types of lenders
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  - Retailers lend to riskier individuals
  - Retailers lend lower initial limits
  - Retailers increase credit limits more over time to borrowers who do not default

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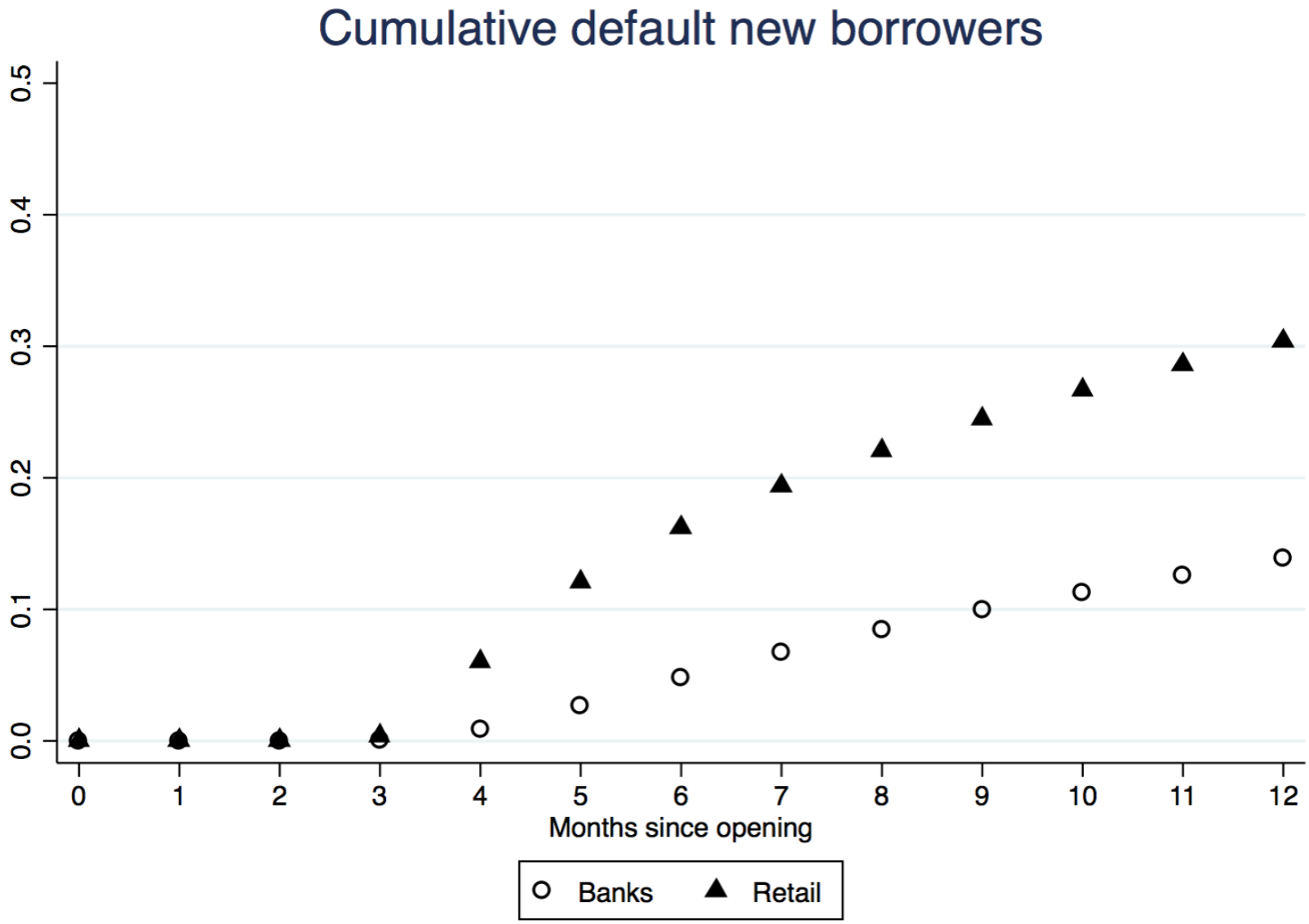
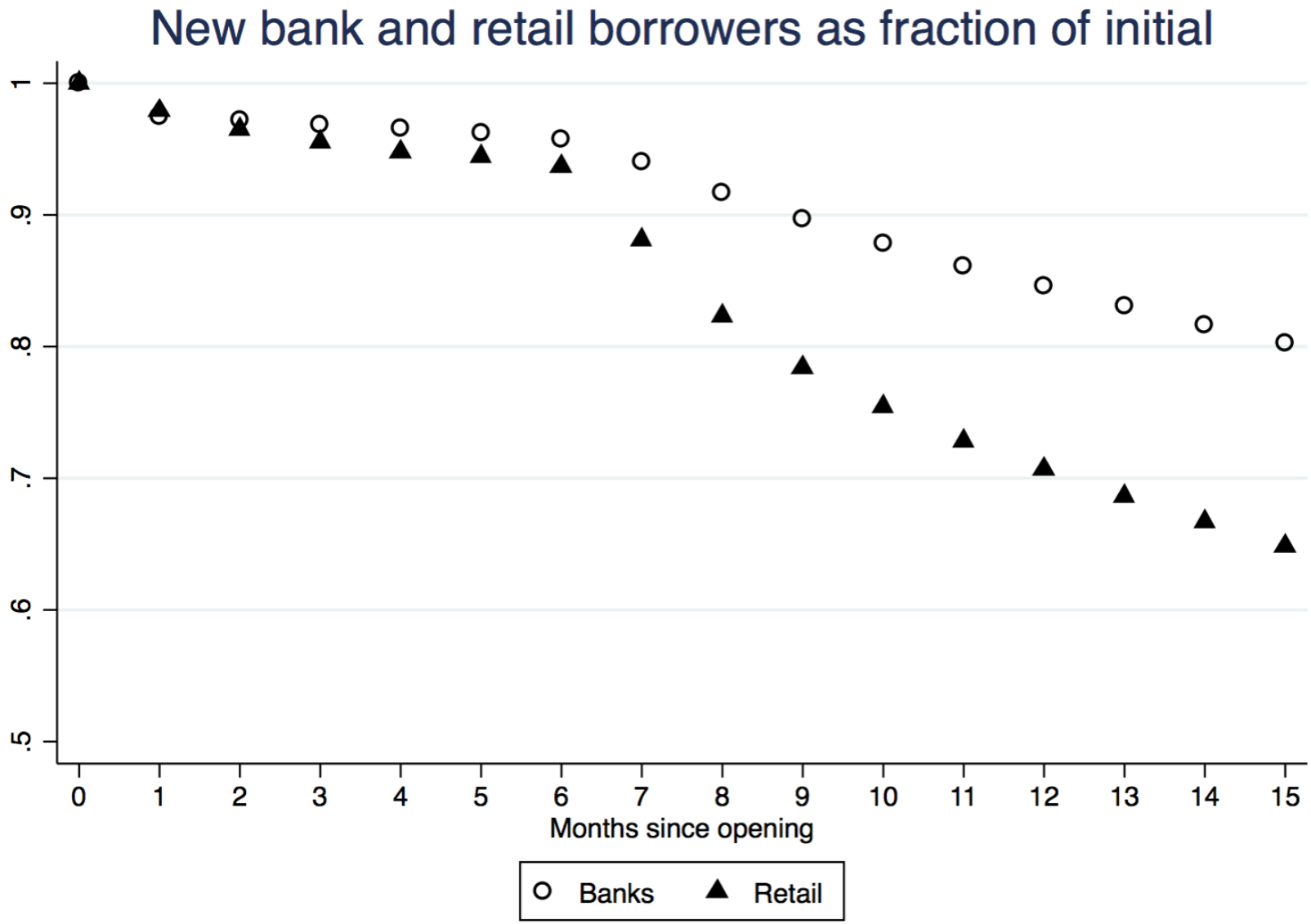
  - Retailers lend to riskier individuals
  - Retailers lend lower initial limits
  - Retailers increase credit limits more over time to borrowers who do not default
  - Later: retail borrowers who become bank borrowers will receive a higher limit from other banks

# Retail borrowers default more...



# ...and are more likely to have their account closed



# Retailers lend to poorer, older individuals...

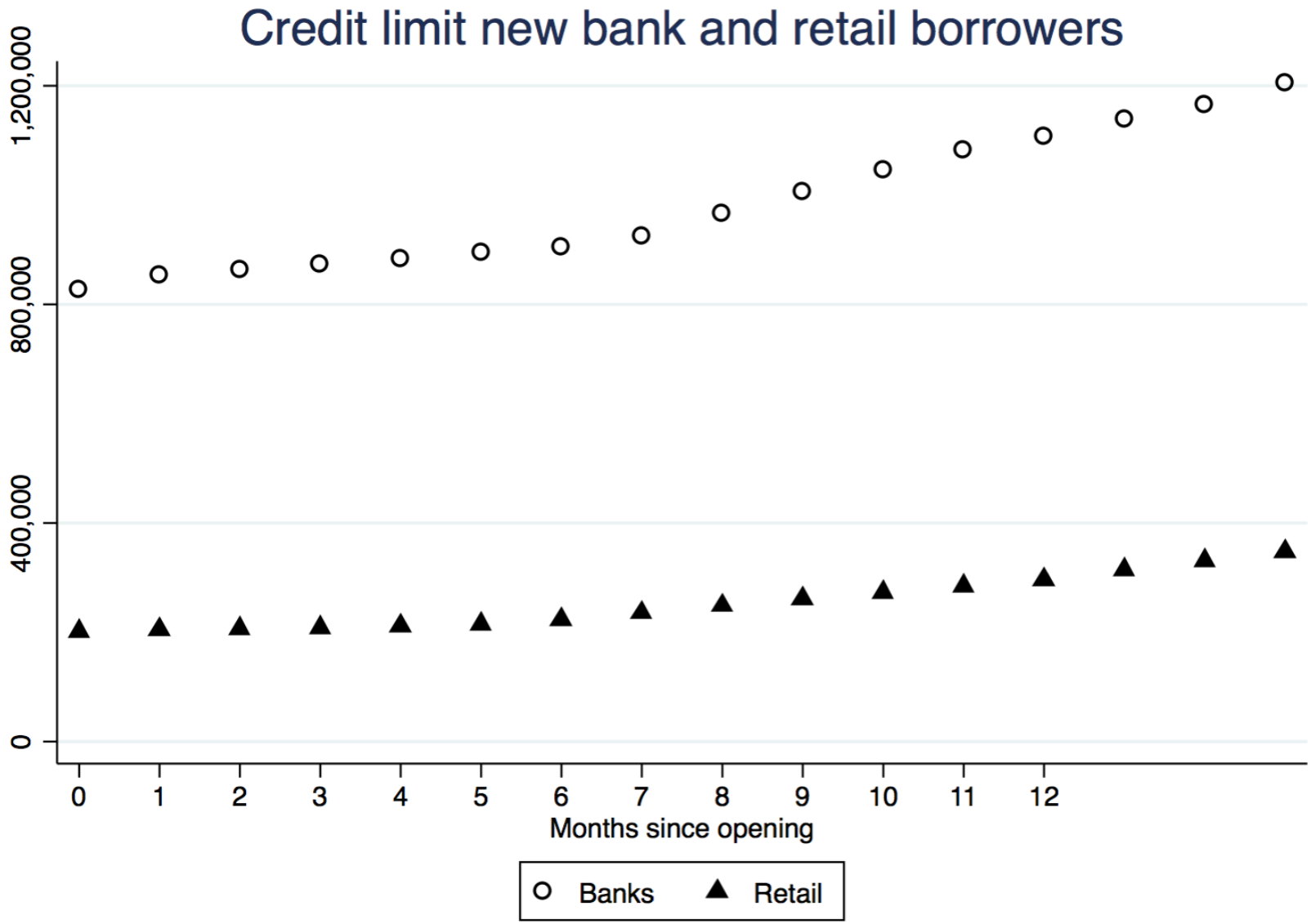
| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | All | Bank | Retail | Retail minus Bank |
| Monthly income bin | 1.0792 | 1.1160 | 1.0576 | −0.0584*** |
| Fraction in income bin 1 | 0.8765 | 0.8602 | 0.8865 | 0.0263*** |
| Female | 0.5061 | 0.5267 | 0.4973 | −0.0294*** |
| Married | 0.3860 | 0.3052 | 0.4268 | 0.1217*** |
| Age | 38.11 | 34.46 | 39.95 | 5.4872*** |
| Individuals | 252,992 | 86,808 | 160,521 | |

# ...and have a relatively higher default rate

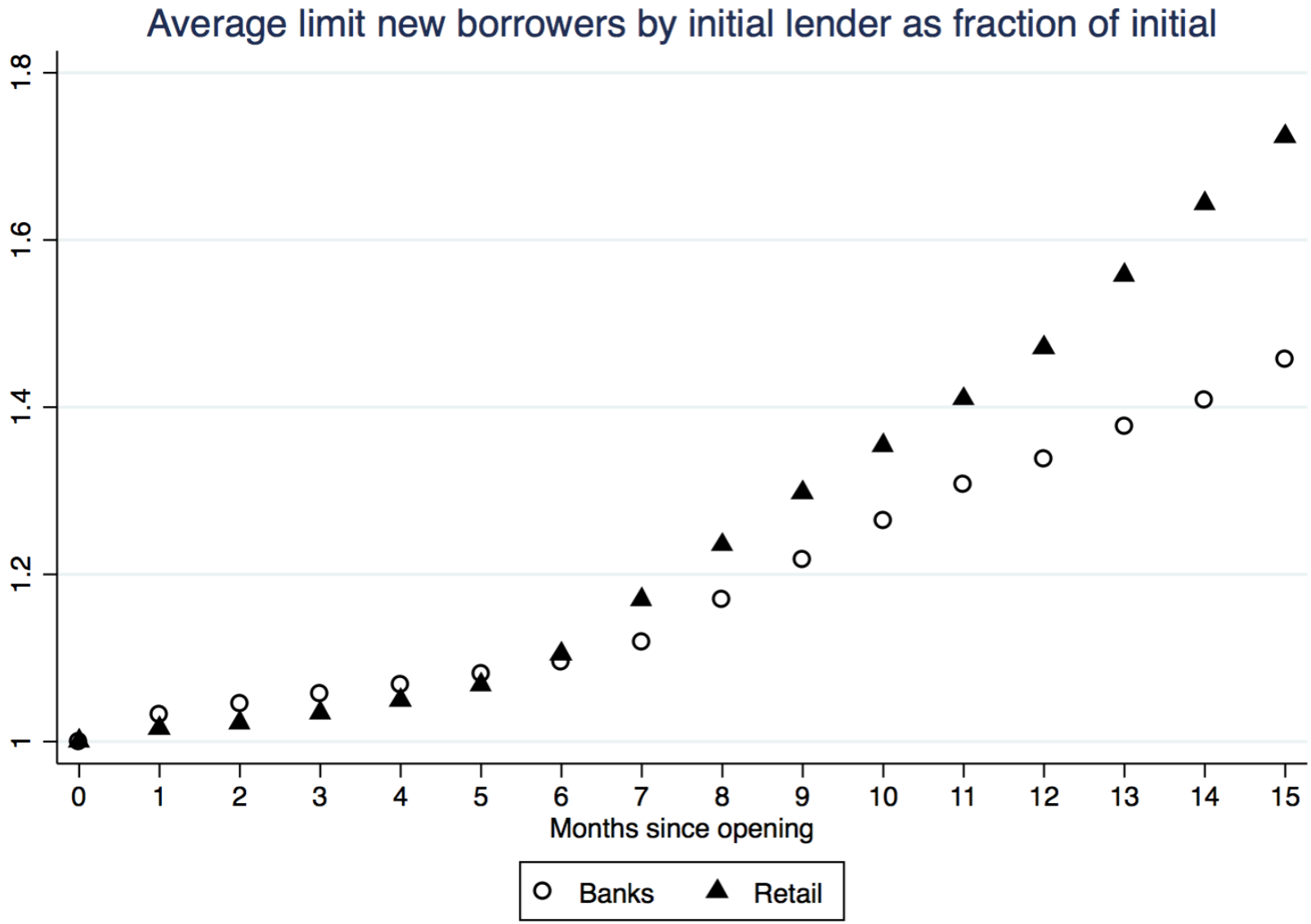
- Regress cumulative default for first lender in first 12 months on a dummy for new retail borrower

| | (1) | (2) | (3) |
|---|---|---|---|
| | Default in 1 year | Default in 1 year | Default in 1 year |
| New Retail Borrower | 0.1003*** | 0.0864*** | 0.0847*** |
| | (0.0016) | (0.0040) | (0.0080) |
| Fixed Effects: | | | |
| Month | | Y | |
| 5-year age bin | | Y | |
| Female | | Y | |
| Married | | Y | |
| Income bin | | Y | |
| County | | Y | |
| Age bin x Female x Month x Income bin x County | | | Y |
| Dep. variable Mean | 0.20 | 0.20 | 0.20 |
| Observations | 247,329 | 247,329 | 247,329 |
| R-squared | 0.01 | 0.07 | 0.39 |

# Credit limit is is initially lower for new retail borrowers



# Credit limit increases proportionally more for retail borrowers



# Summarizing: regression

- Regress probability of having a card, default, and log limit on event month dummies interacted with first time retail (omitted are first time bank)

| | (1) | (2) | (3) |
|---|---|---|---|
| | Has Limit | Default | log(Limit) |
| Retail x $t_1$ | $-0.0104^{***}$ | 0.0000 | $-0.0778^{***}$ |
| | (0.0007) | (0.0000) | (0.0053) |
| Retail x $t_2$ | $-0.0214^{***}$ | 0.0000 | $-0.0695^{***}$ |
| | (0.0008) | (0.0000) | (0.0055) |
| | | ... | |
| Retail x $t_{14}$ | $-0.0846^{***}$ | $0.1692^{***}$ | $0.1081^{***}$ |
| | (0.0022) | (0.0028) | (0.0082) |
| Retail x $t_{15}$ | $-0.0873^{***}$ | $0.1724^{***}$ | $0.1177^{***}$ |
| | (0.0023) | (0.0029) | (0.0085) |
| Observations | 1,365,771 | 1,489,648 | 1,284,258 |
| R-squared | 0.0390 | 0.1179 | 0.1805 |
| Clusters | 93,111 | 93,103 | 93,111 |

# Natural experiment

# Identification concern

- Banks and retailers differ in their information setting...

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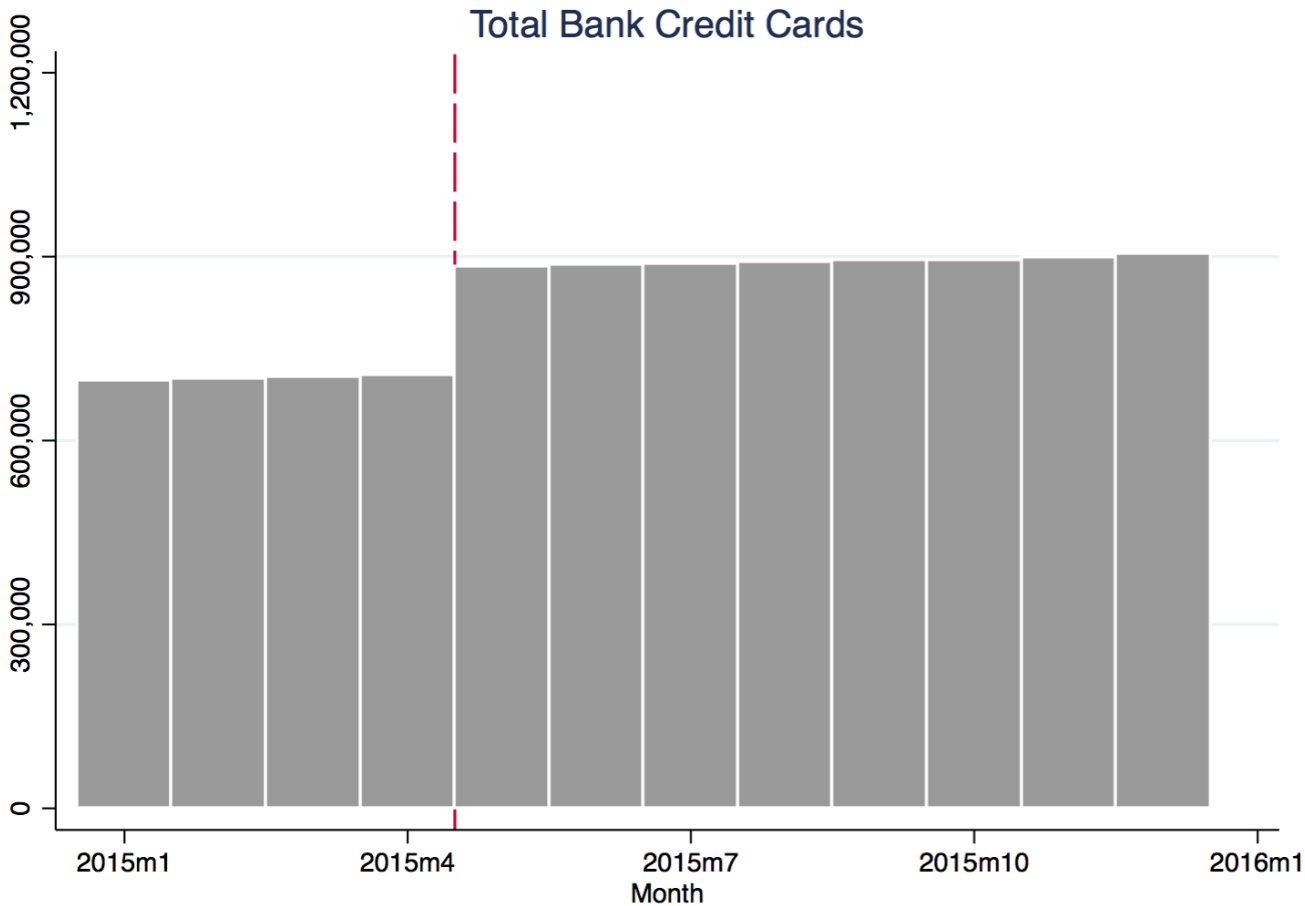
- Banks and retailers differ in their information setting...
- ...and in their source of funding, distribution network, management, etc...
- Although we want to argue some of these difference are endogenous to information setting, compromises identification of the effect of information
- Ideal test: randomly assign information structure across lenders
- Something like this happened in 2015

# Sale of credit card portfolio

- In May 2015, one of the largest retail lenders (the "Lender") sold its credit card portfolio to a bank



# Information effects

- As a result of the transaction, the Lender's borrowers were transitioned from the retail information regime to the bank information regime
  - Other retailers: no significant change in information structure
  - Other banks: can distinguish non-defaulters among the Lender's borrowers

# Information effects

- As a result of the transaction, the Lender's borrowers were transitioned from the retail information regime to the bank information regime
  - Other retailers: no significant change in information structure
  - Other banks: can distinguish non-defaulters among the Lender's borrowers
- We expect to see:
  1. Increase in bank limits to the Lender's (non-defaulting) borrowers relative to other retail borrowers
     1.1 Also, increase in limits from Lender to its borrowers
  2. Lender shift originations to safer populations, higher initial credit limit

# First test: existing borrowers

- We first condition the sample on all individuals who have a positive limit with any retailer as of August 2014
  - Define dummy Lender, equals one for individuals who have a positive credit line from the Lender and zero for other retail borrowers
- We implement a diff-in-diffs: Lender=1 versus Lender=0, after versus before transaction
  - We can also control for retail lender outcomes (does not change much)
- Collapse in three-month periods, 2 pre-periods prior to May 2015, 3 post-periods

# Summary stats pre-transaction I

| | (1) Lender borrowers | (2) Non-Lender borrowers |
|---|---|---|
| *Panel A: Outside Credit Card Characteristics* | | |
| Credit Card Limit | 4,678,069 | 2,401,954 |
| Bank Credit Card Limit | 3,564,118 | 1,656,261 |
| Retail Credit Card Limit | 1,113,951 | 745,693 |
| Has Credit Card | 0.9013 | 1.0000 |
| Has Bank Credit Card | 0.7450 | 0.4791 |
| Has Retail Credit Card | 0.7665 | 1.0000 |
| Number of Lenders | 2.5776 | 2.0947 |
| Number of Bank Lenders | 1.3664 | 0.7512 |
| Number of Retail Lenders | 1.2112 | 1.3435 |
| Credit Card Balance | 1,161,896 | 688,890 |
| Bank Credit Card Balance | 754,837 | 375,561 |
| Retail Credit Card Balance | 407,059 | 313,329 |
| Number of Lenders with Balance | 1.5694 | 1.3747 |
| Number of Bank Lenders with Balance | 0.7478 | 0.4158 |
| Number of Retail Lenders with Balance | 0.8216 | 0.9588 |
| Credit Card Balance/Limit | 0.3088 | 0.4281 |
| Bank Credit Card Balance/Limit | 0.1795 | 0.1407 |
| Retail Credit Card Balance/Limit | 0.2622 | 0.4398 |
| Credit Card Default | 0.0211 | 0.0574 |

# Summary stats pre-transaction II

| | | |
|---|---|---|
| Bank Credit Card Default | 0.0080 | 0.0076 |
| Retail Credit Card Default | 0.0146 | 0.0523 |
| *Panel B: Lender Credit Card Characteristics* | | |
| Lender Credit Card Limit | 766,089 | 0 |
| Has Lender Credit Card | 1.0000 | 0.0000 |
| Lender Credit Card Balance | 207,001 | 0 |
| Lender Credit Card Balance/Limit | 0.3600 | 0.0000 |
| Lender Credit Card Default | 0.0239 | 0.0000 |
| *Panel C: Borrower Characteristics* | | |
| Monthly income | 957,750 | 787,206 |
| Income bin | 1.6335 | 1.3256 |
| Female | 0.5842 | 0.5218 |
| Married | 0.7021 | 0.6152 |
| Age | 49.66 | 46.12 |
| Individuals | 191,190 | 328,829 |

# Summary stats pre-transaction III

# Regression

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

- Individual $i$ at bank $j$ in quarter $t$
- $t = 0$ is the May-June-July 2015 quarter; omit quarter -2
- $X_{i,t}$ fixed effects: Individual and month
- Cluster at the individual level

# Higher limits from other banks

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Limit | Number Lenders | Balance | Balance / Limit | Default |
| Lender × $t_{-1}$ | $-34,154.68^{***}$ | | | | |
| | (3,308.29) | | | | |
| Lender × $t_0$ | $11,064.13^{*}$ | | | | |
| | (5,755.04) | | | | |
| Lender × $t_1$ | $99,830.17^{***}$ | | | | |
| | (7,555.16) | | | | |
| Lender × $t_2$ | $156,269.53^{***}$ | | | | |
| | (12,128.98) | | | | |
| Dep. variable Mean | 2,383,359 | | | | |
| Observations | 7,569,285 | | | | |
| R-squared | 0.95 | | | | |
| Clusters | 504,619 | | | | |

# Higher limits from other banks

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Limit | Number Lenders | Balance | Balance / Limit | Default |
| Lender × $t_{-1}$ | $-34,154.68^{***}$ | $-0.0057^{***}$ | | | |
| | (3,308.29) | (0.0005) | | | |
| Lender × $t_0$ | $11,064.13^{*}$ | $-0.0123^{***}$ | | | |
| | (5,755.04) | (0.0009) | | | |
| Lender × $t_1$ | $99,830.17^{***}$ | $-0.0196^{***}$ | | | |
| | (7,555.16) | (0.0011) | | | |
| Lender × $t_2$ | $156,269.53^{***}$ | $-0.0254^{***}$ | | | |
| | (12,128.98) | (0.0013) | | | |
| Dep. variable Mean | 2,383,359 | 0.9499 | | | |
| Observations | 7,569,285 | 7,569,285 | | | |
| R-squared | 0.95 | 0.96 | | | |
| Clusters | 504,619 | 504,619 | | | |

# Higher limits from other banks

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Limit | Number Lenders | Balance | Balance / Limit | Default |
| Lender × $t_{-1}$ | $-34,154.68^{***}$ | $-0.0057^{***}$ | $2,441.10$ | $-0.0000$ | |
| | (3,308.29) | (0.0005) | (2,349.96) | (0.0005) | |
| Lender × $t_0$ | $11,064.13^{*}$ | $-0.0123^{***}$ | 819.55 | $-0.0028^{***}$ | |
| | (5,755.04) | (0.0009) | (3,609.71) | (0.0007) | |
| Lender × $t_1$ | $99,830.17^{***}$ | $-0.0196^{***}$ | $-5,395.71$ | $-0.0028^{***}$ | |
| | (7,555.16) | (0.0011) | (4,287.44) | (0.0007) | |
| Lender × $t_2$ | $156,269.53^{***}$ | $-0.0254^{***}$ | $10,143.54^{**}$ | $-0.0028^{***}$ | |
| | (12,128.98) | (0.0013) | (4,820.12) | (0.0007) | |
| Dep. variable Mean | 2,383,359 | 0.9499 | 548,984 | 0.2819 | |
| Observations | 7,569,285 | 7,569,285 | 7,569,285 | 4,310,800 | |
| R-squared | 0.95 | 0.96 | 0.87 | 0.83 | |
| Clusters | 504,619 | 504,619 | 504,619 | 305,165 | |

# Higher limits from other banks

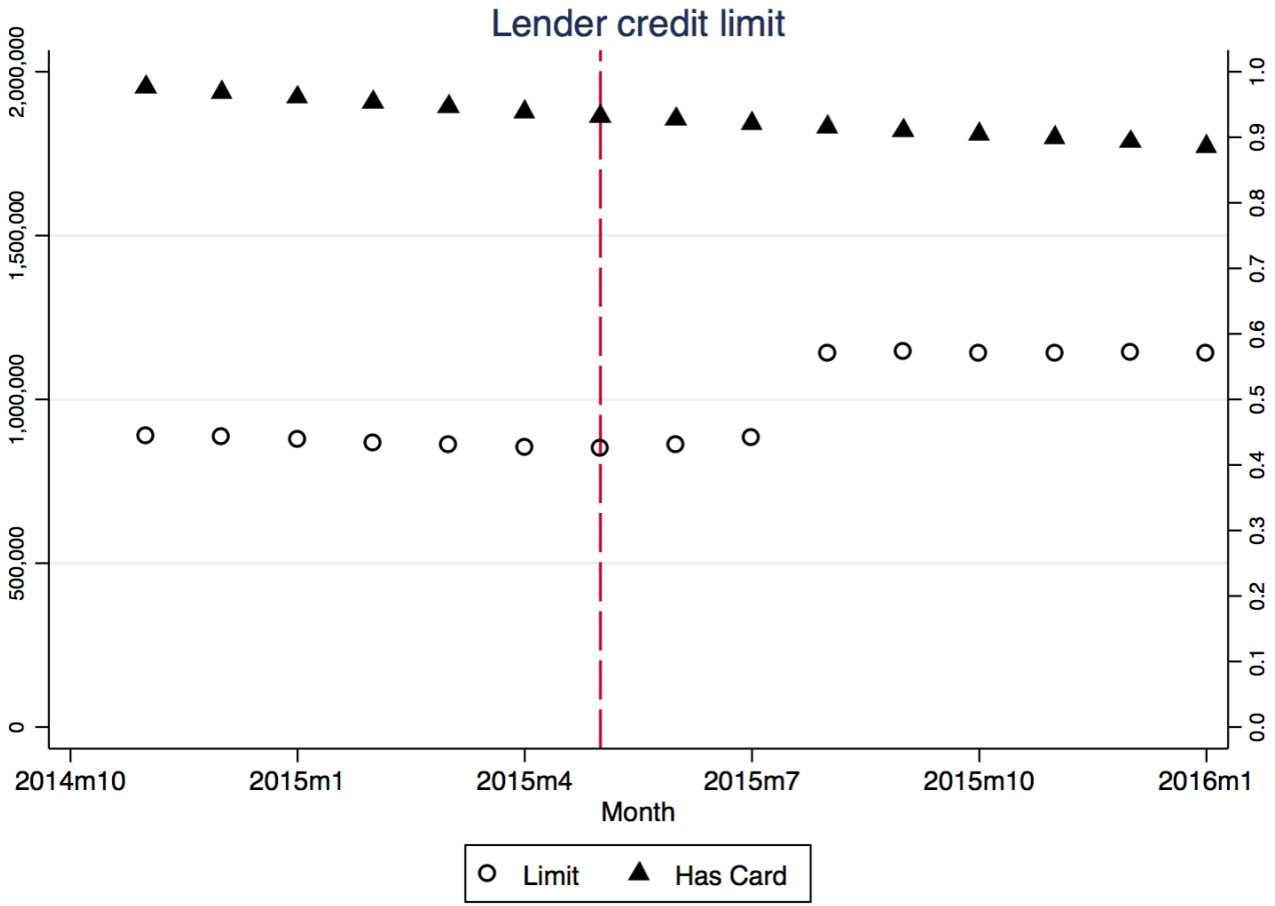
$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Limit | Number Lenders | Balance | Balance / Limit | Default |
| Lender × $t_{-1}$ | $-34,154.68^{***}$ | $-0.0057^{***}$ | $2,441.10$ | $-0.0000$ | $-0.0047^{***}$ |
| | (3,308.29) | (0.0005) | (2,349.96) | (0.0005) | (0.0003) |
| Lender × $t_0$ | $11,064.13^{*}$ | $-0.0123^{***}$ | 819.55 | $-0.0028^{***}$ | $-0.0073^{***}$ |
| | (5,755.04) | (0.0009) | (3,609.71) | (0.0007) | (0.0003) |
| Lender × $t_1$ | $99,830.17^{***}$ | $-0.0196^{***}$ | $-5,395.71$ | $-0.0028^{***}$ | $-0.0088^{***}$ |
| | (7,555.16) | (0.0011) | (4,287.44) | (0.0007) | (0.0003) |
| Lender × $t_2$ | $156,269.53^{***}$ | $-0.0254^{***}$ | $10,143.54^{**}$ | $-0.0028^{***}$ | $-0.0110^{***}$ |
| | (12,128.98) | (0.0013) | (4,820.12) | (0.0007) | (0.0004) |
| Dep. variable Mean | 2,383,359 | 0.9499 | 548,984 | 0.2819 | 0.0109 |
| Observations | 7,569,285 | 7,569,285 | 7,569,285 | 4,310,800 | 4,310,800 |
| R-squared | 0.95 | 0.96 | 0.87 | 0.83 | 0.36 |
| Clusters | 504,619 | 504,619 | 504,619 | 305,165 | 305,165 |

# Robustness

- No result for retail lending
- Condition on non-defaulters
- Replace individual fixed-effects for fixed effects constructed by the interaction of 5-year age bins, marital status, income bin, retail default status, retail credit limit deciles, bank credit limit deciles, number of bank accounts, and total number of accounts

# Lender increases limits



# Lender increases limits (2)

$$Outcome_{i,t} = \sum_{\tau} \beta \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) Limit | (2) Has Card | (3) Balance | (4) Balance / Limit | (5) Default |
|---|---|---|---|---|---|
| $t_{-1}$ | $-23,136.54^{***}$ | $-0.0223^{***}$ | $-9,319.92^{***}$ | 0.0006 | $0.0117^{***}$ |
| | (454.06) | (0.0003) | (377.28) | (0.0004) | (0.0003) |
| $t_0$ | $-18,733.42^{***}$ | $-0.0419^{***}$ | $-16,018.72^{***}$ | $-0.0001$ | $0.0182^{***}$ |
| | (663.95) | (0.0004) | (544.88) | (0.0006) | (0.0003) |
| $t_1$ | $258,318.89^{***}$ | $-0.0582^{***}$ | $-17,610.90^{***}$ | $-0.0057^{***}$ | $0.0220^{***}$ |
| | (2,994.57) | (0.0005) | (701.15) | (0.0006) | (0.0003) |
| $t_2$ | $257,882.71^{***}$ | $-0.0758^{***}$ | 562.35 | $0.0160^{***}$ | $0.0245^{***}$ |
| | (3,051.73) | (0.0006) | (890.12) | (0.0007) | (0.0003) |
| Dep. variable Mean | 852,809 | 0.9377 | 200,998 | 0.3217 | 0.0194 |
| Observations | 2,696,190 | 2,696,190 | 2,696,190 | 2,501,668 | 2,501,668 |
| R-squared | 0.83 | 0.75 | 0.83 | 0.78 | 0.44 |
| Clusters | 179,746 | 179,746 | 179,746 | 174,458 | 174,458 |

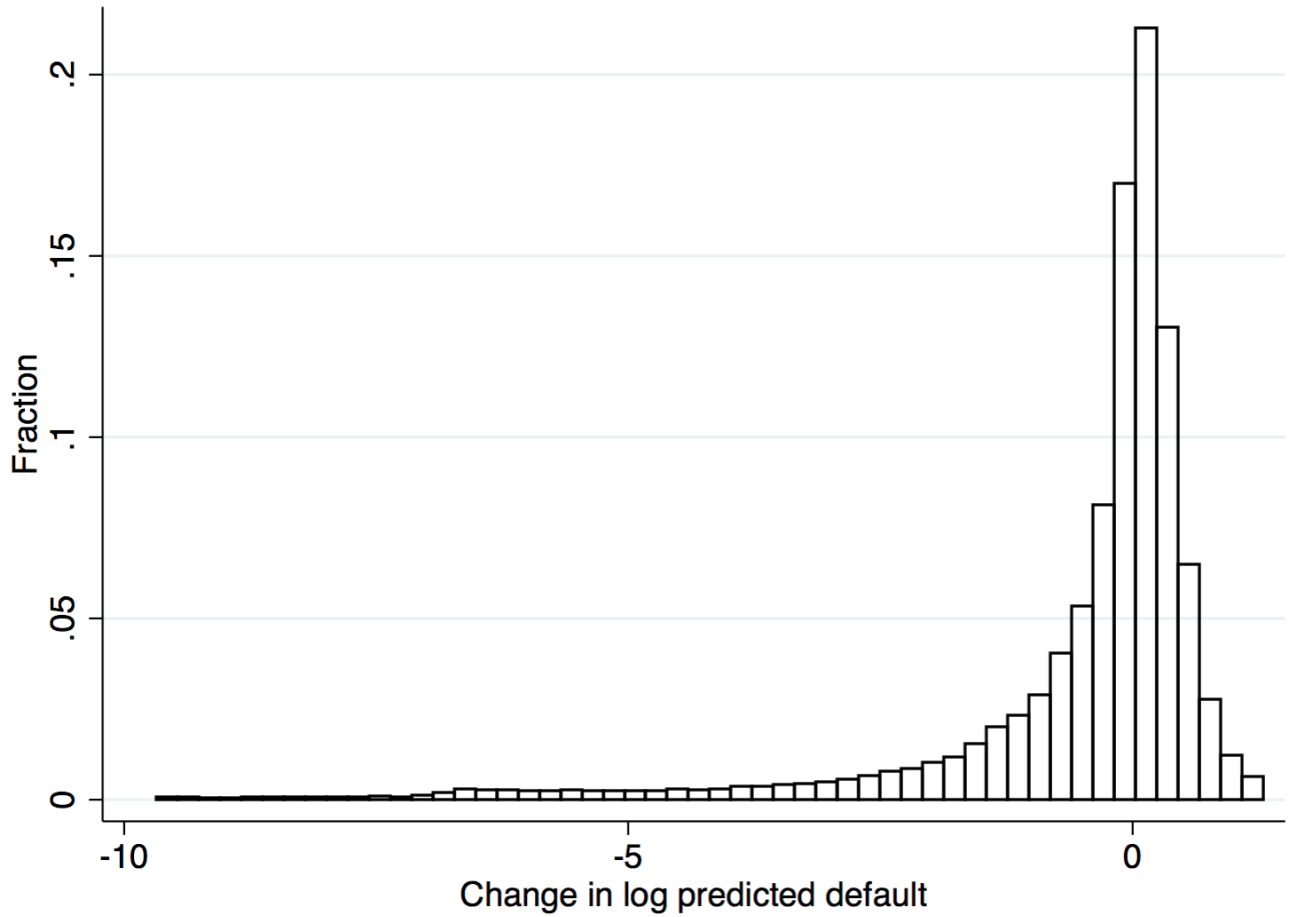
# Inspecting the mechanism

- Banks increase lending because their expectation of costs shifts
- Pre-period: Lender borrowers are pooled with non-borrowers (not observable in our sample)
- Post-period: Lender borrowers separate
- Ideal test would compare this heterogeneity, but we cannot observe non-borrowers
- We approximate by looking at change in predicted costs within the Lender's borrowers (following Liberman, Nielson, Opazo, Zimmerman 2018)

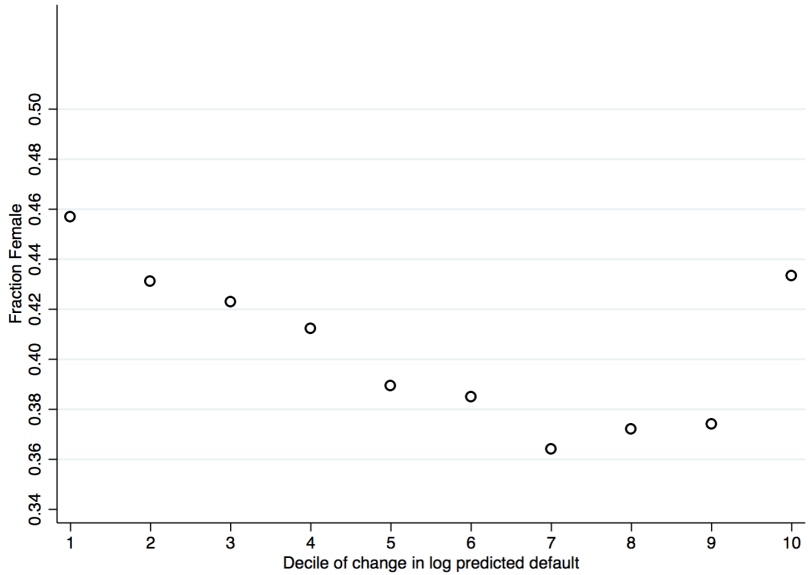
# Change in predicted costs

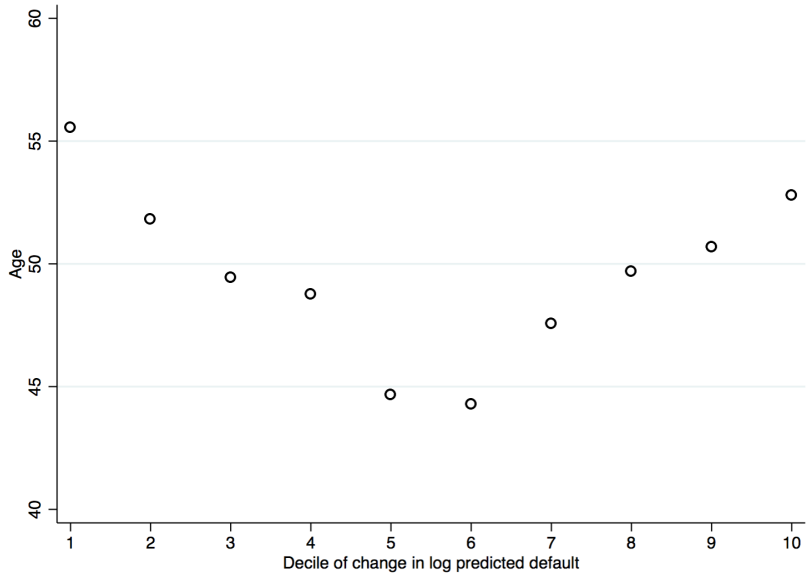
- For each of the Lender's borrowers, compute two predictions of costs:
  - $\hat{C}_{i,pre}$ uses all available information observable by banks (demographic, bank limits, all defaults)
  - $\hat{C}_{i,post}$ uses all available information observable by banks (demographic, bank limits, all defaults) PLUS Lender limits and usage
- Compute change in predicted costs as $log\left(\hat{C}_{i,post}\right) - log\left(\hat{C}_{i,pre}\right)$

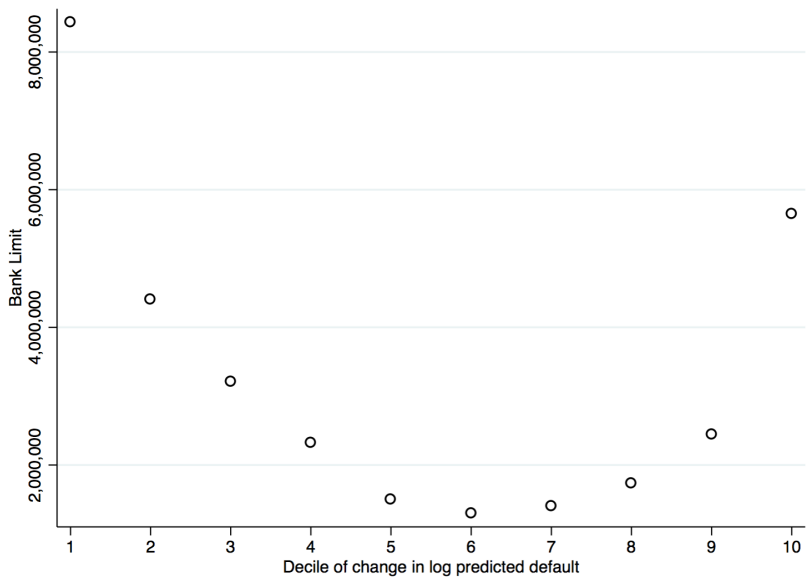
# Histogram of change in predicted costs

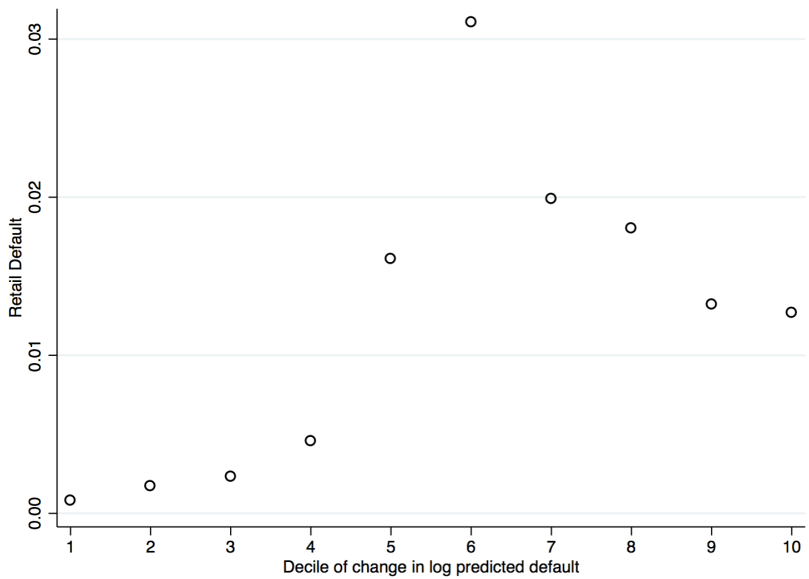


# Who sees a drop in costs?

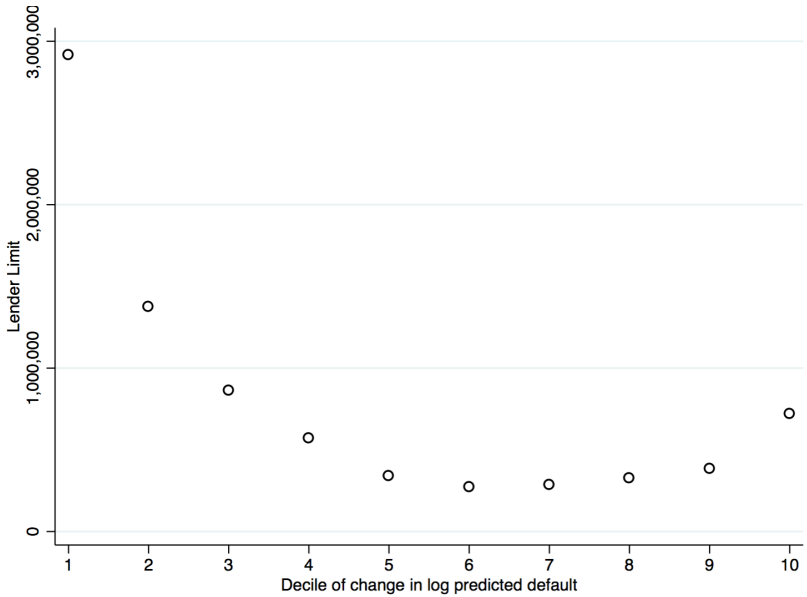


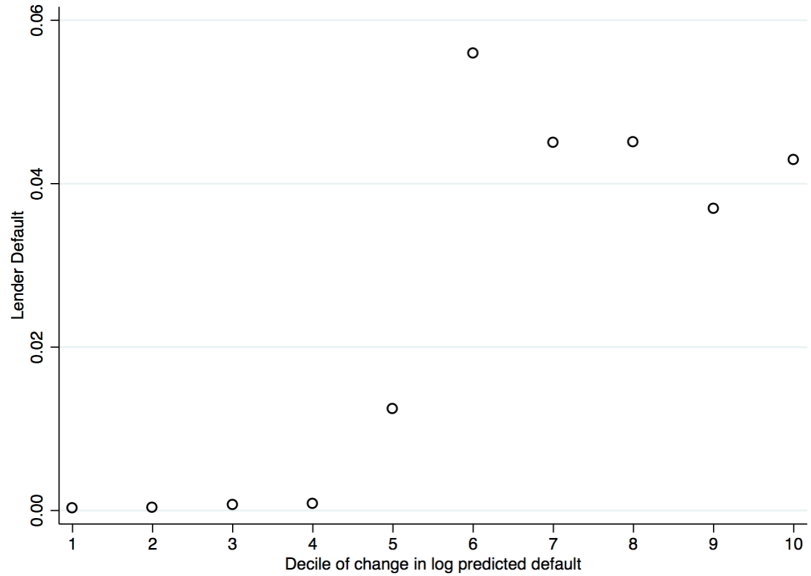



# What about new info?



# Regression test

- Define Drop in costs $= 1\left[log\left(\hat{C}_{i,post}\right) - log\left(\hat{C}_{i,pre}\right) < 0\right]$
- Run diff-in-diffs interacting quarter dummies with Drop in costs

$$Outcome_{i,t} = \sum_{\tau} \beta\delta_{\tau} \times Drop_i + X_{i,t} + \epsilon_{i,t}$$

| | (1) Limit | (2) Number Lenders | (3) Balance | (4) Balance / Limit | (5) Default |
|---|---|---|---|---|---|
| Pred. Def. Drops $\times t_{-1}$ | $7,172.54$ | $0.0114^{***}$ | $38.05$ | $-0.0066^{***}$ | $-0.0056^{***}$ |
| | (5,976.89) | (0.0009) | (4,214.01) | (0.0008) | (0.0004) |
| Pred. Def. Drops $\times t_0$ | $90,747.69^{***}$ | $0.0215^{***}$ | $-1,081.09$ | $-0.0108^{***}$ | $-0.0078^{***}$ |
| | (10,492.30) | (0.0015) | (6,531.98) | (0.0010) | (0.0004) |
| Pred. Def. Drops $\times t_1$ | $195,166.12^{***}$ | $0.0322^{***}$ | $1,181.02$ | $-0.0117^{***}$ | $-0.0102^{***}$ |
| | (13,714.48) | (0.0019) | (7,709.91) | (0.0011) | (0.0005) |
| Pred. Def. Drops $\times t_2$ | $288,236.26^{***}$ | $0.0437^{***}$ | $16,488.04^{*}$ | $-0.0149^{***}$ | $-0.0119^{***}$ |
| | (23,948.84) | (0.0022) | (8,682.72) | (0.0012) | (0.0005) |
| Dep. variable Mean | 3,641,122 | 1.3307 | 810,628 | 0.2542 | 0.0080 |
| Observations | 2,500,260 | 2,500,260 | 2,500,260 | 1,825,368 | 1,825,368 |
| R-squared | 0.93 | 0.96 | 0.86 | 0.82 | 0.34 |
| Clusters | 166,684 | 166,684 | 166,684 | 126,252 | 126,252 |

# First test: summary

- Lender's borrowers receive higher limits from their banks after the transaction; no effect at extensive margin: existing banks
  - Lender's borrowers are more likely to have a bank, more attrition over time
  - Lender becomes a bank
- Banks willing to lend to consumers who do not want to borrow more (Agarwal et al 2018)
- Effect is driven by Lender's borrowers whose predicted costs decrease

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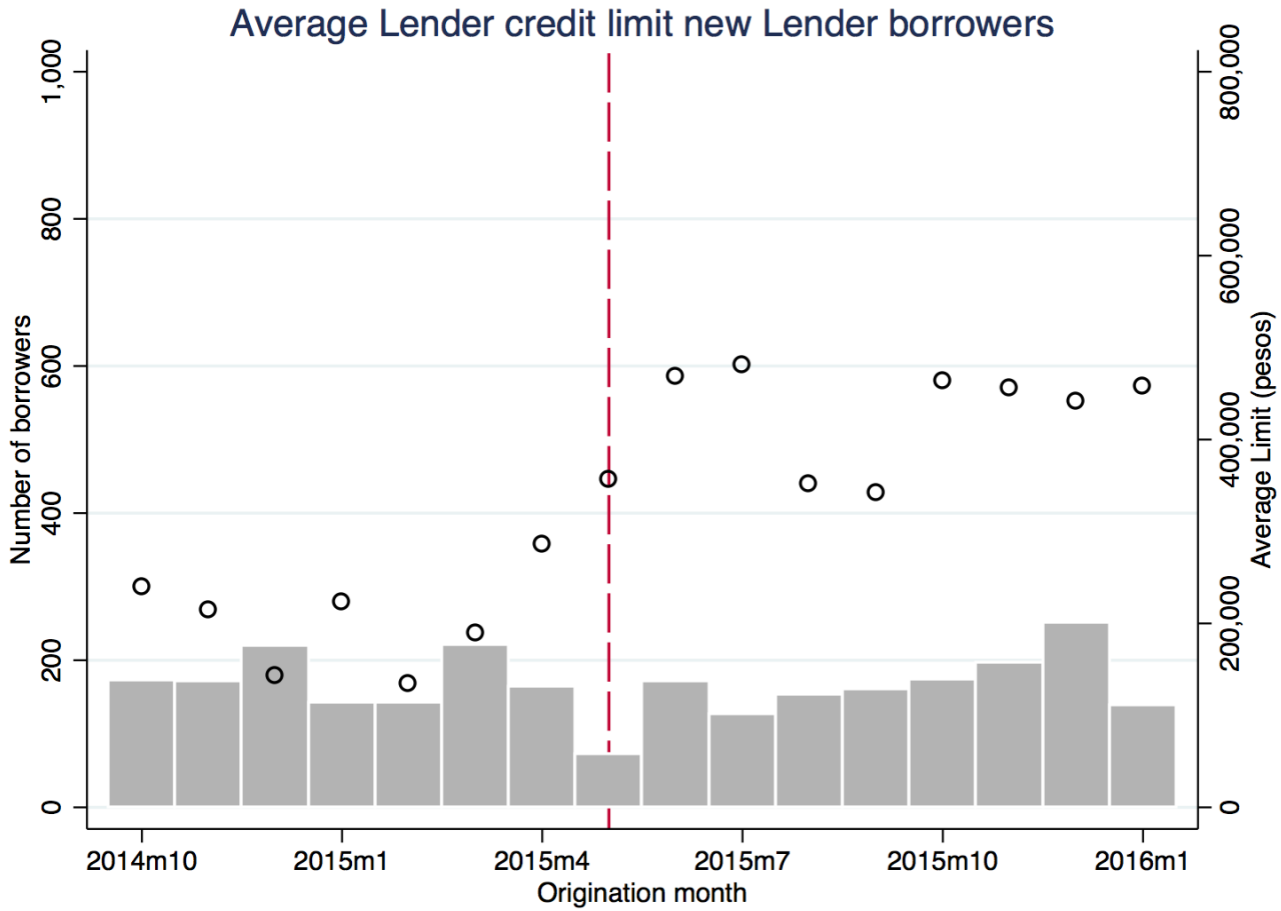
- Banks willing to lend to consumers who do not want to borrow more (Agarwal et al 2018)
- Effect is driven by Lender's borrowers whose predicted costs decrease
- Lender also increases limits, and very limited effects on borrowing

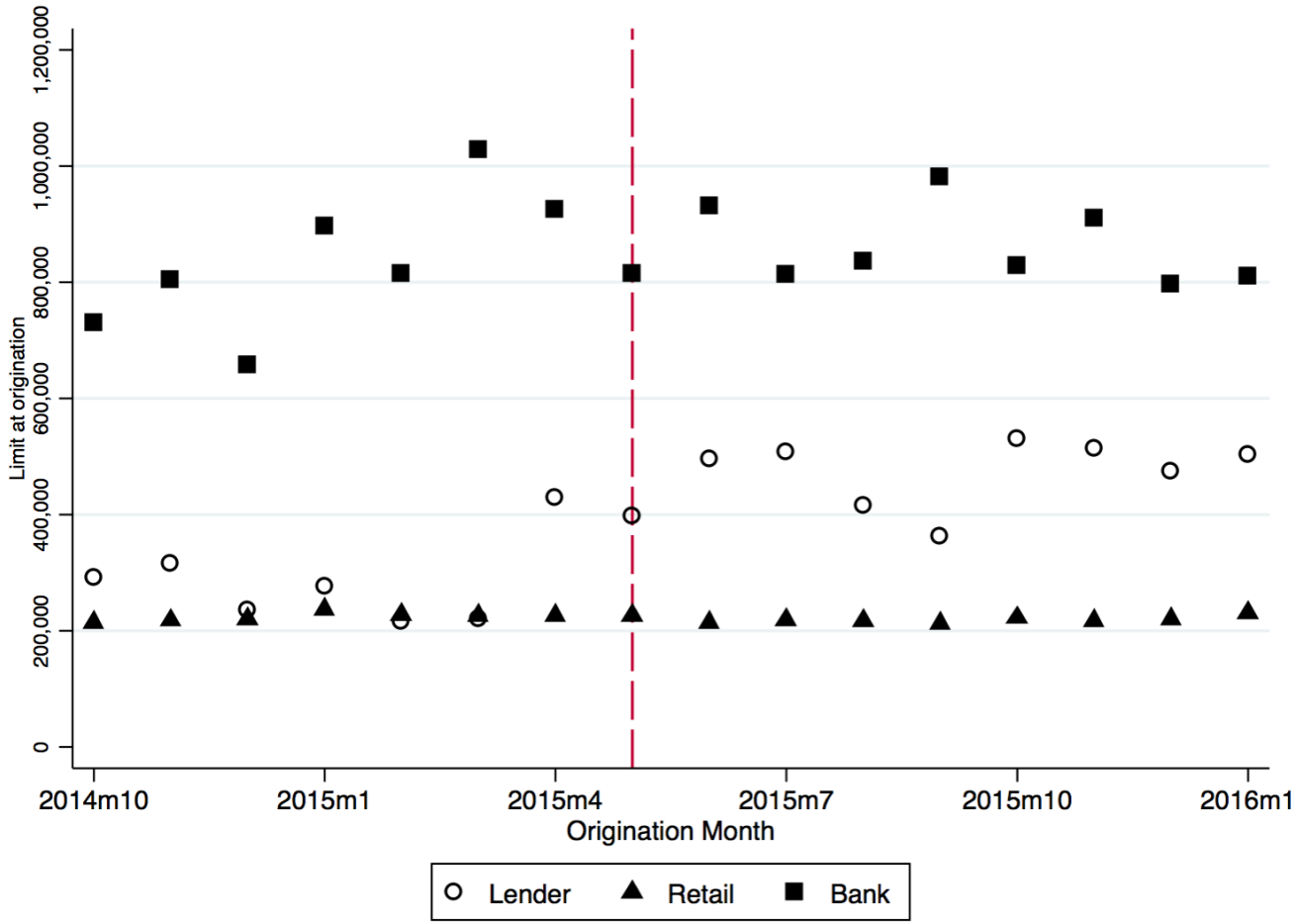
# Second test: new borrowers

- Next, we condition on the sample of new borrowers whose first card was originated by the Lender
- According to the framework, we expect that after the transaction, the Lender originates cards to safer borrowers with higher initial limits
- As in the first test, we control for secular trends with the evolution of outcomes for non-Lender new retail borrowers

# Lender originates higher limits



# Lender starts originating "more like a bank"



# Lender originates higher limits...

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

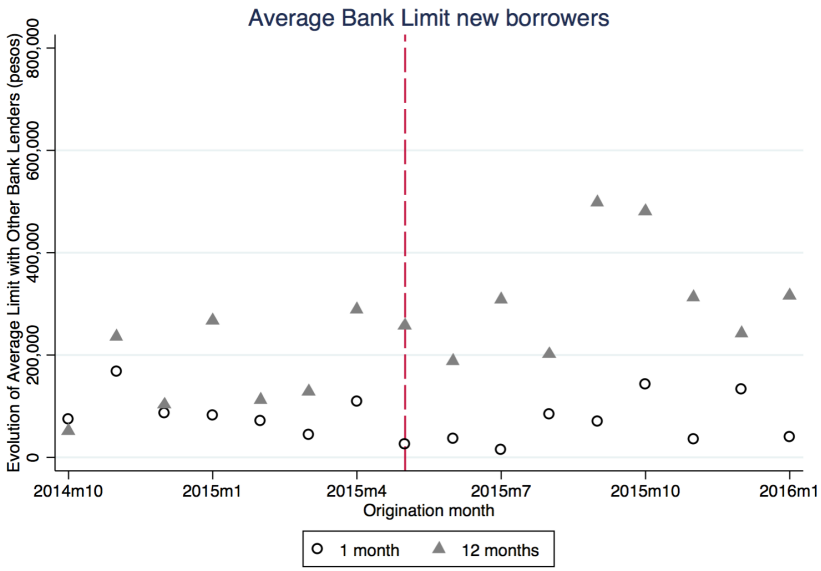
| | (1) Limit | (2) Balance | (3) Balance / Limit | (4) Default in 1 year |
|---|---|---|---|---|
| Lender × $t_{-1}$ | $3,514.58$ | $-17,840.03^{***}$ | $-0.0589^{**}$ | $-0.0452^{*}$ |
| | (22,726.29) | (6,053.82) | (0.0248) | (0.0255) |
| Lender × $t_0$ | $249,640.27^{***}$ | $37,172.81^{***}$ | $-0.0662^{**}$ | $-0.0196$ |
| | (31,057.14) | (9,805.51) | (0.0259) | (0.0281) |
| Lender × $t_1$ | $186,294.05^{***}$ | $49,366.56^{***}$ | $-0.0282$ | $-0.0500^{*}$ |
| | (24,463.20) | (9,184.43) | (0.0238) | (0.0256) |
| Lender × $t_2$ | $241,275.00^{***}$ | $61,213.59^{***}$ | $-0.0552^{**}$ | $-0.0344$ |
| | (24,478.14) | (9,958.12) | (0.0225) | (0.0248) |
| Dep. variable Mean | 209,596 | 92,618 | 0.4840 | 0.2856 |
| Observations | 70,363 | 70,363 | 70,363 | 70,363 |
| R-squared | 0.0246 | 0.0056 | 0.0131 | 0.0025 |

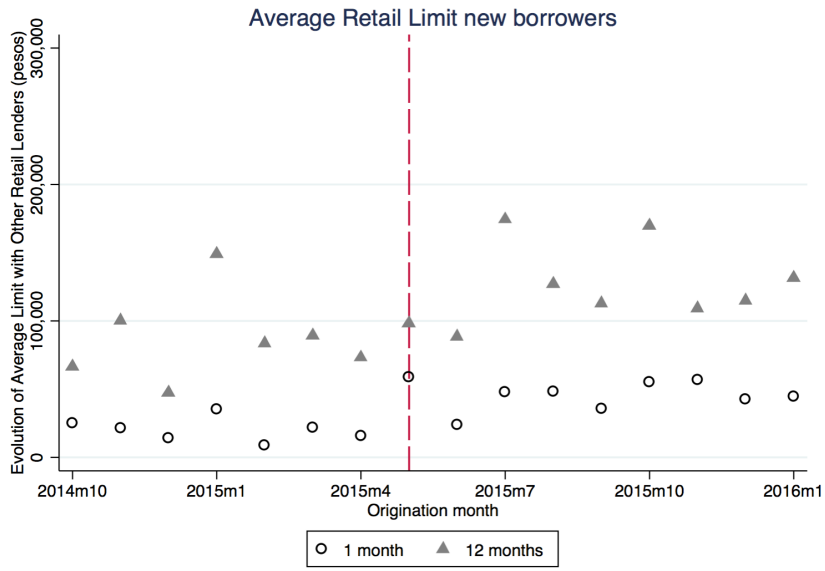
# ...to safer borrowers

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| | Age | Income bin | In income bin 1 | Female | Married |
| Lender × $t_{-1}$ | 0.05 | −0.0158 | 0.0004 | −0.0244 | 0.0021 |
| | (0.96) | (0.0281) | (0.0197) | (0.0305) | (0.0305) |
| Lender × $t_0$ | −2.18** | 0.0232 | −0.0316 | −0.0593* | −0.0285 |
| | (1.02) | (0.0359) | (0.0229) | (0.0329) | (0.0325) |
| Lender × $t_1$ | −2.04** | 0.0162 | −0.0252 | −0.1041*** | 0.0104 |
| | (0.90) | (0.0275) | (0.0201) | (0.0302) | (0.0301) |
| Lender × $t_2$ | 0.90 | 0.0448 | −0.0532*** | −0.1671*** | 0.0449 |
| | (0.87) | (0.0302) | (0.0201) | (0.0285) | (0.0288) |
| Dep. variable Mean | 40 | 1.0737 | 0.9007 | 0.5115 | 0.4560 |
| Observations | 69,805 | 67,735 | 70,363 | 70,363 | 70,363 |
| R-squared | 0.0034 | 0.0021 | 0.0020 | 0.0026 | 0.0024 |

# Other retailers and banks limits



# Other retailers and banks limits

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Retail Limit | | Has Retail Limit | |
| | Month 1 | Month 12 | Month 1 | Month 12 |
| Lender × $t_{-1}$ | $-3,857.21$ | $-334.61$ | $-0.0304^{**}$ | $0.0410^{*}$ |
| | (5,812.67) | (13,773.50) | (0.0154) | (0.0236) |
| Lender × $t_0$ | $19,885.77^{**}$ | $39,855.89^{**}$ | $0.0359^{*}$ | $0.1065^{***}$ |
| | (8,857.62) | (16,849.47) | (0.0208) | (0.0280) |
| Lender × $t_1$ | $20,446.06^{**}$ | $42,544.41^{**}$ | 0.0203 | $0.0928^{***}$ |
| | (9,286.87) | (17,912.39) | (0.0185) | (0.0253) |
| Lender × $t_2$ | $21,121.84^{***}$ | $30,699.00^{*}$ | $0.0441^{**}$ | $0.0625^{***}$ |
| | (7,414.50) | (15,858.09) | (0.0188) | (0.0235) |
| Dep. variable Mean | 23,238 | 65,131 | 0.0955 | 0.2023 |
| Observations | 70,383 | 70,475 | 70,383 | 70,475 |
| R-squared | 0.00 | 0.00 | 0.00 | 0.00 |

# Other retailers and banks limits

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Bank Limit | | Has Bank Limit | |
| | Month 1 | Month 12 | Month 1 | Month 12 |
| Lender × $t_{-1}$ | 13,776.23 | −2,295.32 | −0.0095 | −0.0008 |
| | (34,184.26) | (54,772.11) | (0.0100) | (0.0191) |
| Lender × $t_0$ | −8,290.42 | 44,049.83 | −0.0008 | 0.0531** |
| | (13,446.94) | (60,414.38) | (0.0125) | (0.0242) |
| Lender × $t_1$ | 74,181.40* | 199,431.05** | 0.0285** | 0.0624*** |
| | (40,345.74) | (88,945.67) | (0.0136) | (0.0222) |
| Lender × $t_2$ | 38,840.45 | 70,090.91 | 0.0068 | 0.0756*** |
| | (48,118.55) | (45,636.63) | (0.0116) | (0.0214) |
| Dep. variable Mean | 22,390 | 116,729 | 0.0293 | 0.1413 |
| Observations | 70,383 | 70,475 | 70,383 | 70,475 |
| R-squared | 0.00 | 0.00 | 0.00 | 0.00 |

# Revisiting assumption: small effect on rates

$$Outcome_{i,t} = \sum_{\tau} \beta_{\tau} Lender_i \times \delta_{\tau} + X_{i,t} + \epsilon_{i,t}$$

| | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| | Rate | Rate | Rate | Rate |
| Lender × $t_{-1}$ | −0.0065 | −0.0058 | −0.1141 | 0.0014 |
| | (0.1262) | (0.0708) | (0.1926) | (0.1603) |
| Lender × $t_0$ | −0.0817 | −0.0547 | −0.1760 | −0.0820 |
| | (0.1270) | (0.0736) | (0.1905) | (0.1617) |
| Lender × $t_1$ | −0.0973 | −0.0290 | −0.2451 | −0.1709 |
| | (0.1272) | (0.0885) | (0.1883) | (0.1578) |
| Lender × $t_2$ | −0.1883* | −0.0990 | −0.0861 | −0.1600 |
| | (0.1132) | (0.0670) | (0.1648) | (0.1354) |
| Control group | Retailer | Retail | Banks | Banks |
| Fixed effect | | YES | | YES |
| Dep. variable Mean | 4.0374 | 4.0374 | 3.3769 | 3.3769 |
| Observations | 819,589 | 819,586 | 1,276,302 | 1,276,229 |
| R-squared | 0.0040 | 0.4580 | 0.0574 | 0.3868 |
| Clusters | 450 | 450 | 620 | 620 |

# Second test: summary

- Lender shifts originations to new borrowers who seem safer
- New borrowers receive higher limits from retailers and from banks
  - Not an information effect: all of the Lender's new borrowers, pre- and post-transaction, are observable by banks
- Lender originates limits with higher credit cards, to borrowers who borrow more

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- Lender originates limits with higher credit cards, to borrowers who borrow more

- Consistent with credit registry restricting access to credit to good borrowers pooled in riskier populations

# Conclusion

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- We show theoretically how a credit registry may improve allocations for observably safer borrowers, and restrict access to populations with higher degrees of information asymmetry
- We compare new credit card borrowers for lenders who operate under a full credit registry–banks– with new credit card borrowers for lenders who operate under a limited information sharing agreement–retailer
  - Retailers lend lower initial limits that increase more to poorer borrowers, who default more
- We exploit a natural experiment by which a retailer's portfolio became a bank portfolio
  - Lender's borrowers get more credit from banks, new borrowers