# Public Information and Coordination:
## Evidence from a Credit Registry Expansion

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# Motivation

- Do creditors to a firm close to distress have incentives to coordinate lending decisions?
  - Mechanism behind creditor runs (more broadly, bank runs, currency crises)
  - Bankruptcy code designed to alleviate creditor coordination problems
- Empirical problem
  - Coordination motive or arrival of bad news about the firm?
  - i.e.: Bear Sterns, Northern Rock (Brunnermeier 2009, Shin 2009)

# This Paper

- Evidence of lender coordination motives
- Natural experiment that resembles an ideal laboratory setting:
  - Two banks lend to same firm
  - Bank A has bad news about the firm that B does not have
  - Exogenously make A's private bad news public
  - Any lending change by bank A is due to coordination motives
- Publicity multiplier of information
  - Credit outcomes more sensitive to ***same piece of information*** about borrower creditworthiness when it is public

# Natural Experiment

- Setting: Public Credit Registry in Argentina
  - Database of credit information on borrowers
  - Government operated, mandatory information sharing
  - Common policy: exist in 71 countries (Djankov, McLiesh, Shleifer (2007))
- Experiment: technological shock
  - In early registries, small borrowers excluded to reduce information distribution costs
  - In Argentina, small borrower: total debt < $200,000
  - CD-ROM adoption reduced distribution costs
  - Credit information privately held by banks became public (540,000 borrowers)

# Information Reporting and Sharing Timeline

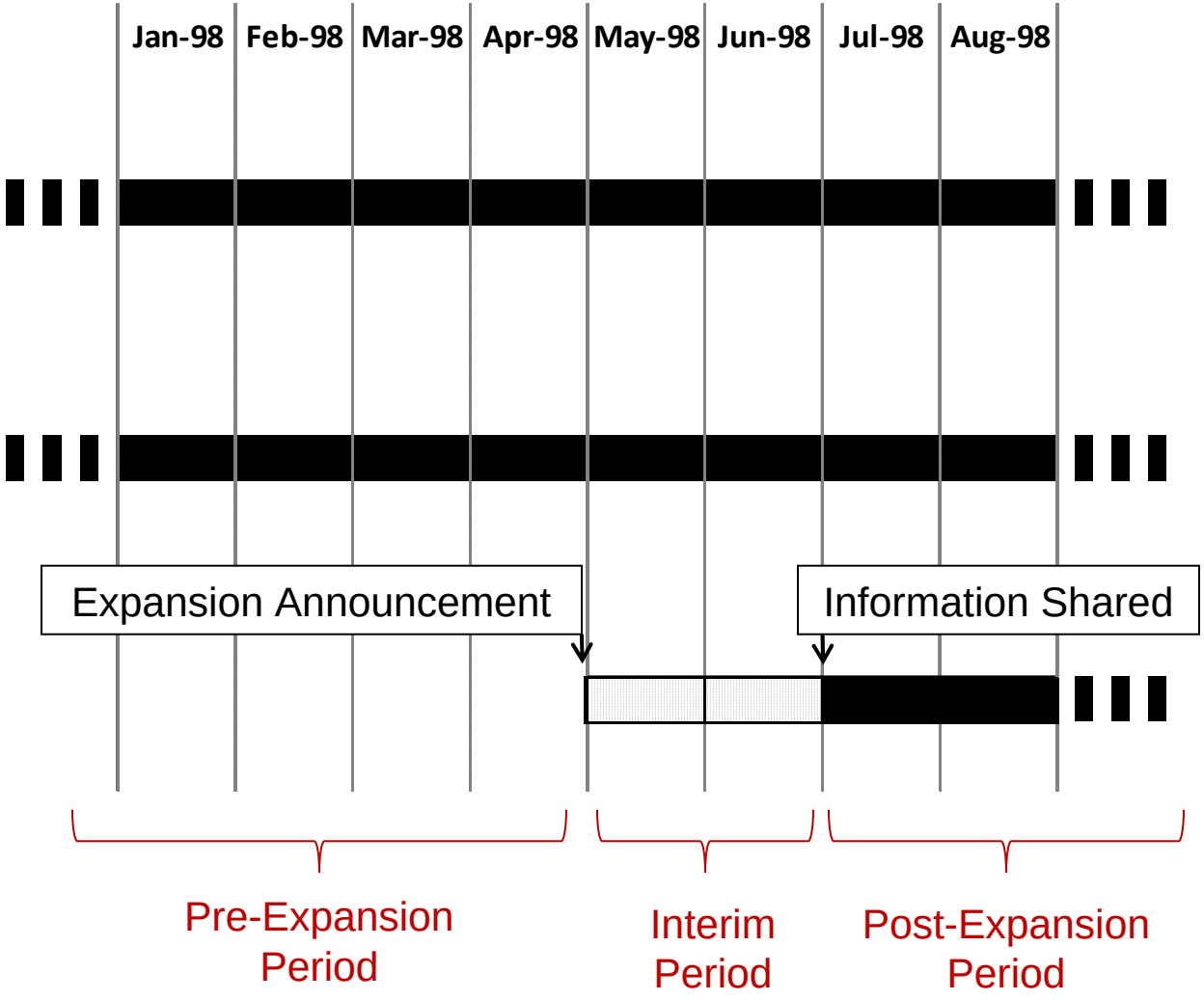
**Bank reporting to Central Bank (CB):**

Banks report information on debt & rating of each borrower

**Information Sharing:**

CB discloses information for firms in default, w/ bad risk rating (3), or w/ total debt > $200K,

CB announces registry expansion and discloses information for all firms w/ total debt > $50



# Identification

- Coordination incentives
  - Interim period: banks know private assessment will become public, but learn nothing from registry
  - Lending change in anticipation to other lenders' reaction
  - Only if lender's private information may affect other lenders' priors (bad news, multiple lenders)
- Causal effect
  - Difference-in-differences: use firms with total debt above $200,000 as counterfactual

# Outline

- Data, empirical setting
- Main Specification and Results
- Additional Empirical Results
- Conclusions

# Data

- Credit Registry
- Monthly cross-section of bank-firm pairs:
  - Outstanding debt amount
  - Risk rating: 1 (best) to 5 (in default)
- Period:
  - Pre-period: Jan-98 to Apr-98
  - Interim period: May-98 to Jun-98
  - Post-expansion period: Jul-98 to Jun-99 (12 months)

# Sample

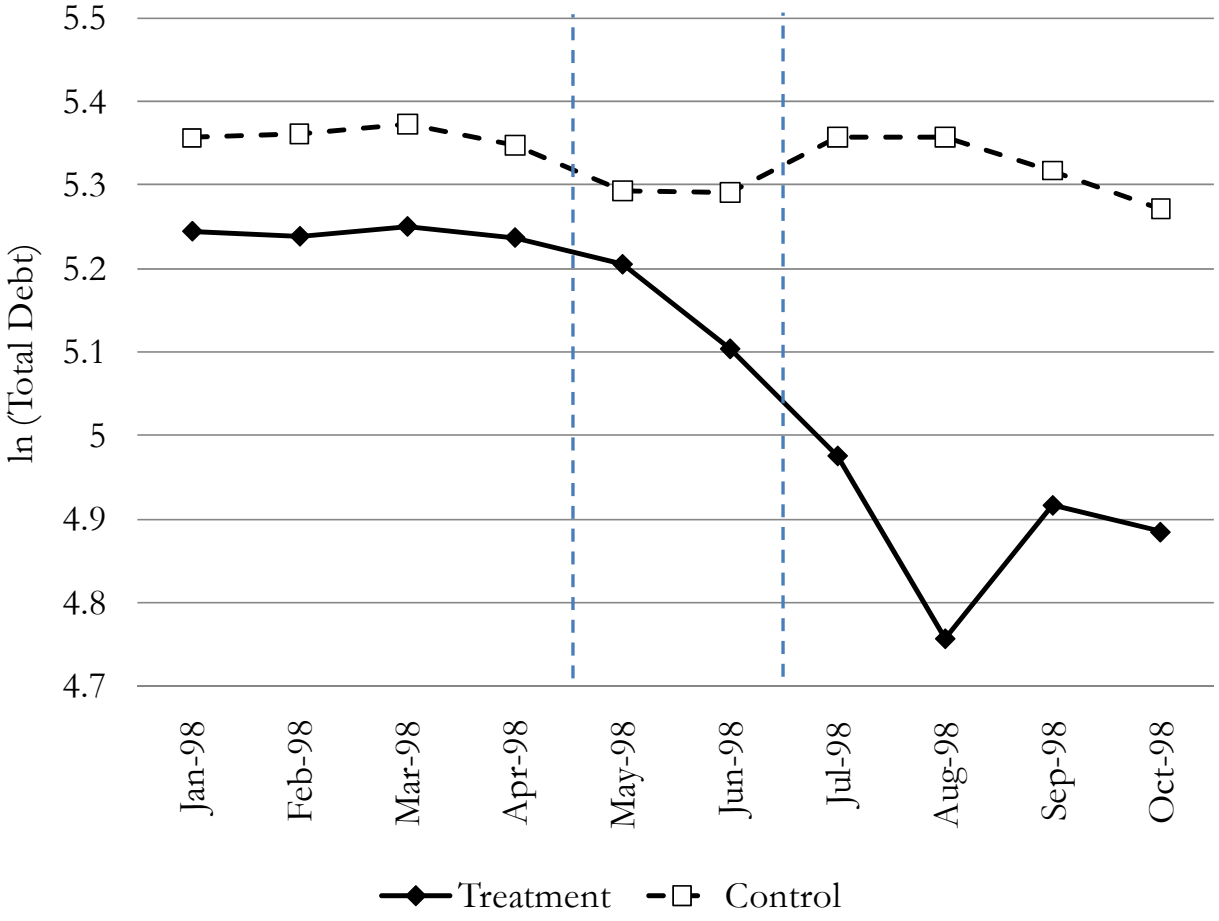
- Exclude firms with ratings above (worse than) 2 before Apr-98
- Firms with total debt during Jan-Mar 1998:
  - Treatment: $150,000 to $200,000
  - Control: $200,000 to $250,000
- Misclassification of control as treatment:
  - Total debt above $200,000 before January 1998, but below that number between January and March
  - Biases estimates towards zero

# Sample, continued

- Rating distribution:
  - 93% of bank-firm rating pairs is 1
  - Conditional on a rating of 2, the probability another lender assigned a rating of 1 to the same firm is 70%
- Only disclosure a 2 rating will affect priors
  - Main analysis sample: firms with at least one rating of 2

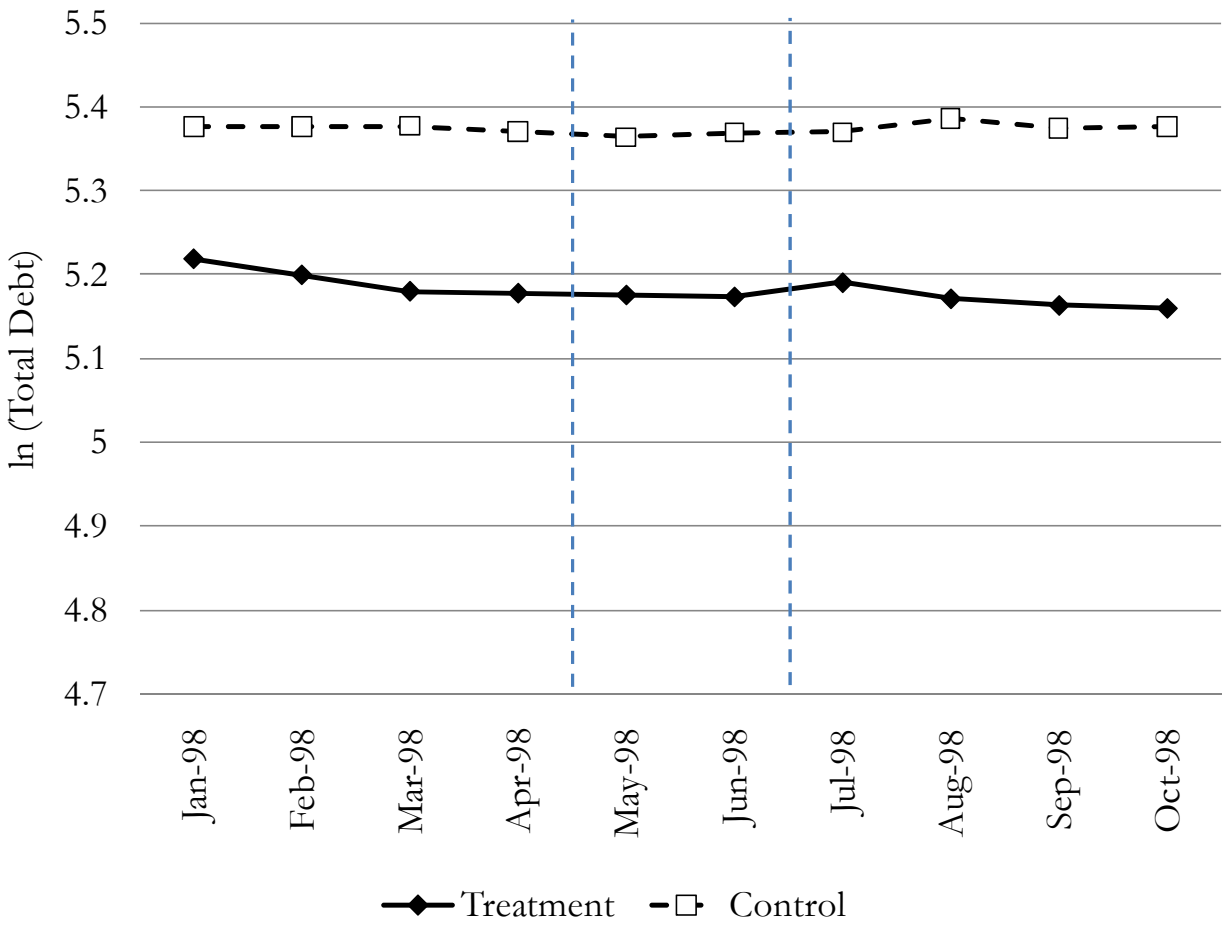
# Total (log) Debt of Firms with Multiple Lenders and at Least One Rating of 2

Treatment (control) firms have total debt between $150K and $200K ($200K and $250K) between Jan-Mar 2008



# Total (log) Debt of Firms with a Single Lender and a Rating of 2

Treatment (control) firms have total debt between $150K and $200K ($200K and $250K) between Jan-Mar 2008



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# Difference-in-Differences (DID)

$$\ln\left(Debt_{it}\right) = \alpha_i + \xi_t + \gamma_{Interim} Treat_i \times Interim_t$$
$$+ \gamma_{Post} Treat_i \times Post_t + \varepsilon_{it}$$

- Dependent variable: debt of firm i at time t
  - Estimate separately using debt with: bank that assigned a 2, bank that assigned a 1, total debt.
- Firm FE, month dummies
- Treat = 1 if firm in treatment group
- Interim (Post) = 1 during interim (post-expansion) period
- Interactions: DID estimate
- Standard errors clustered at firm level

# DID Estimate of Effect of Registry Expansion on Debt

## Sample: firms with at least one rating of 2 in Pre-Expansion

| # of Lenders before April | Multiple Lenders | | | Single Lender |
|---|---|---|---|---|
| Dependent Variable | ln(Debt from Banks w/ Rating = 2 $_{it}$) | ln(Debt from Banks w/ Rating = 1 $_{it}$) | ln(Debt$_{it}$) | ln(Debt$_{it}$) |
| | (1) | (2) | (3) | (4) |
| Effect: Interim Period | -0.198* | -0.058 | -0.075 | -0.013 |
| | (0.103) | (0.065) | (0.078) | (0.131) |
| Effect: Post Expansion | -0.356** | -0.115** | -0.135*** | 0.000 |
| | (0.148) | (0.057) | (0.045) | (0.180) |
| Firm FE, Month Dummies | Yes | Yes | Yes | Yes |
| Observations (Firm-Month) | 2,381 | 2,368 | 2,546 | 993 |
| R-squared | 0.914 | 0.671 | 0.581 | 0.556 |

# Publicity Multiplier: Differential Effect on Debt by Banks with Good and Bad News

$$\ln\left(Debt_{ijt}\right) = \alpha_{ij} + \xi_{jt} + Treat_i \times \delta_t +$$
$$+ \gamma_{Interim2} Treat_i \times Interim_t \times BankAssigned2_j +$$
$$+ \gamma_{Post2} Treat_i \times Post_t \times BankAssigned2_j + e_{ijt}$$

| | $\ln(Debt_{ijt})$ |
|---|---|
| Effect on Debt by Banks w/Rating = 2 – Interim Period | -0.214** |
| | (0.106) |
| Effect on Debt by Banks w/Rating = 2 – Post Expansion | -0.319** |
| | (0.158) |
| Firm × Bank Fixed Effects | Yes |
| Bank × Month Dummies | Yes |
| Treat × Month Dummies | Yes |
| Observations (Firm-Month-Bank) | 4,749 |
| R-squared | 0.921 |

# Additional Empirical Results

- Financial Distress
  - For firms with a rating of 2 the hazard rate of default increases 5.6 percentage points in interim period
  - No effect if firm has a single lender
- Concentration of Firm's Debt Across Banks
  - Higher 12 months after the registry expansion
- Long Run (12 Months): Average Lending
  - 5% decline in debt by firms with initially perfect ratings
  - No effect for firms with a single lender

# Conclusion

- Creditors have incentives to coordinate lending decisions when the firm is close to financial distress
- Publicity multiplier: creditors' decisions are more sensitive to the same piece of news when it is public
- Publicity of information can alter the average level of lending
  - Endogenous response: concentrated lending

# Additional Slides

- Material From Longer Talk Kept here

# Preview of Results

- Lending decline (19.8%) during interim period: by banks that assigned a rating of 2 pre-expansion
  - No lending change to <u>same firms</u> during interim period by banks that assigned a rating of 1
  - Lending by these banks drops in the post-expansion period, after the rating of 2 becomes public
- Financial distress: default hazard increases during interim and post-expansion periods
- Lender concentration: borrowers concentrate debt in fewer lenders

# Information Sharing and Coordination

## Set-Up

- Two banks lend to the same firm ($L_i$, $L_j$)
- The probability that bank $i$'s loan is repaid is $\theta_i L_j$
- Each bank's $\theta_i$ independently drawn from $f(\theta)$
- Objective of bank $i$:

$$\max_{L_i \geq 0} \quad L_i R \times \left[\theta_i E_i\left(L_j\right)\right] - \frac{1}{\delta} L_i^{\delta}$$

- Information is (is not) shared, then $\theta_j$ is (is not) known by bank $i$
  - Not shared: $E_i\left(L_j\right)$ is independent of the realization of $\theta_i$

# Information Sharing and Coordination

## First order condition

$$\theta_i E_i\left(L_j\right)R - L_i^{\delta-1} = 0$$

- Bank $i$'s optimal level of lending is:
  - Increasing in creditworthiness $\theta_i$
  - Increasing in expected lending by bank $j$

# Information Sharing and Coordination

## Publicity Multiplier

- Elasticity of equilibrium lending with respect to loan creditworthiness

$$\eta \equiv \frac{\partial L_i}{\partial \theta_i} \frac{\theta_i}{L_i}$$

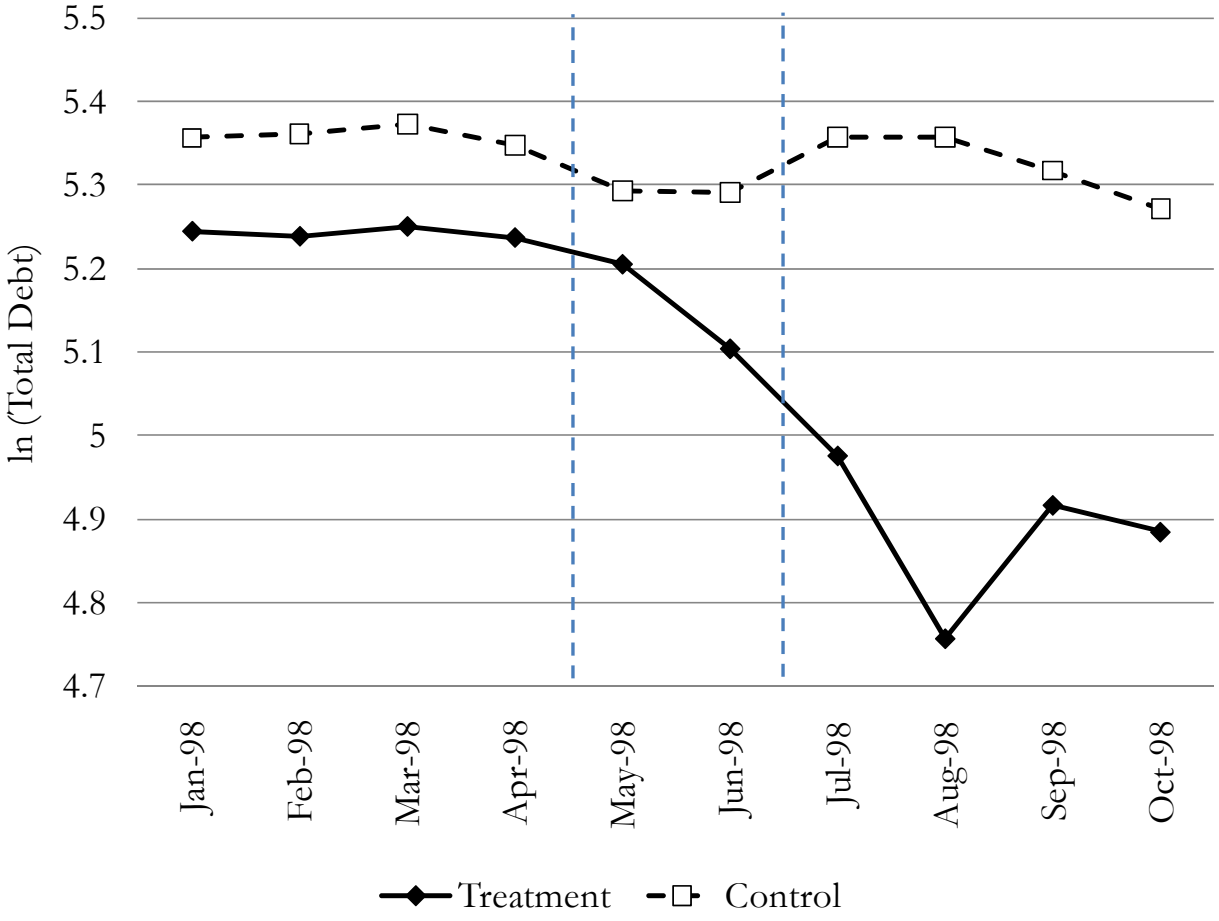
- No information sharing: $\eta^{NS} = \dfrac{1}{\delta - 1}$

- Information sharing: $\eta^{S} = \Omega \cdot \eta^{NS}, \quad where\ \Omega > 1$

- Empirically test $H_1 : \eta^{S} - \eta^{NS} > 0$

# Total (log) Debt of Firms with Multiple Lenders and at Least one Rating of 2

Treatment (control) firms have total debt between $150K and $200K ($200K and $250K) between Jan-Mar 2008



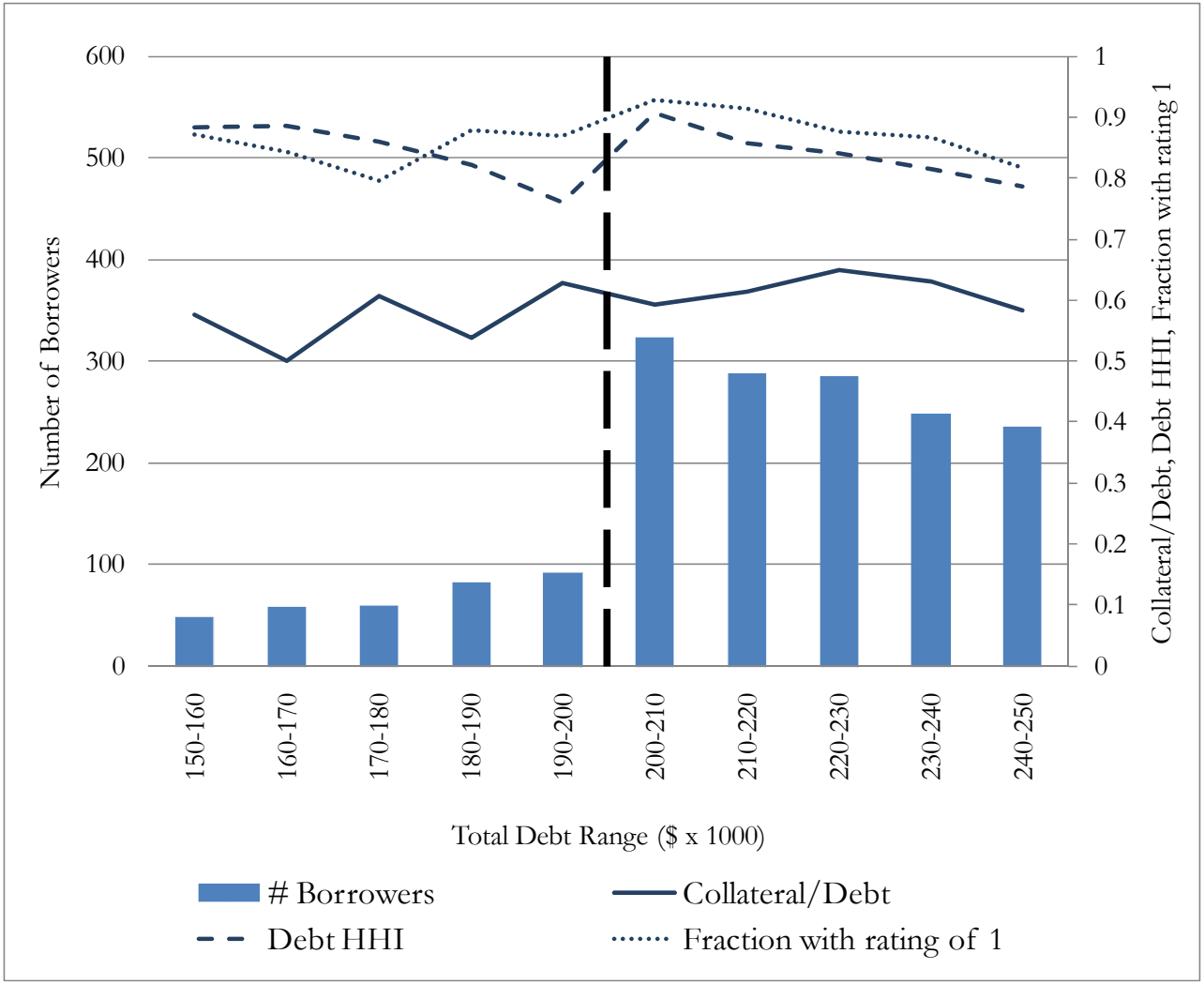
# Firm Descriptive Statistics

## Pre-Expansion Cross Section

### Subsample: March 1998, Firms with rating of 2 or better before expansion announcement

| Sample | All | | | Treatment Firms | | | Control Firms | | |
|---|---|---|---|---|---|---|---|---|---|
| | mean | med | sd | mean | med | sd | mean | med | sd |
| | n = 1,715 | | | n = 337 | | | n = 1,378 | | |
| Total debt ('000) | 214.6 | 217.0 | 22.8 | 178.7 | 181.2 | 14.3 | 223.4 | 222.1 | 14.3 |
| Number of lenders | 1.88 | 2.00 | 1.06 | 1.89 | 2.00 | 1.13 | 1.88 | 2.00 | 1.04 |
| Debt concentration (HHI) | 0.84 | 1.00 | 0.22 | 0.83 | 1.00 | 0.23 | 0.85 | 0.99 | 0.21 |
| Fraction debt from lead bank | 0.88 | 1.00 | 0.17 | 0.88 | 1.00 | 0.18 | 0.89 | 1.00 | 0.17 |
| Collateral/Debt | 0.61 | 0.78 | 0.40 | 0.57 | 0.71 | 0.39 | 0.61 | 0.80 | 0.40 |
| Average risk rating | 1.10 | 1.00 | 0.31 | 1.12 | 1.00 | 0.32 | 1.10 | 1.00 | 0.31 |
| Std. Dev. of same firm ratings | 0.13 | 0.00 | 0.32 | 0.16 | 0.00 | 0.35 | 0.12 | 0.00 | 0.31 |

# Sample Firm Characteristics by Total Debt, March 1998



# Financial Distress: DID Estimate of Effect of Registry Expansion on Default Hazard

## Sample: firms with at least one rating of 2 in Pre-Expansion

$$1\left[Default_{it} = 1 \mid Default_{it-1} = 0\right] = \xi'_t + \lambda_{Interim} Treat_i \times Interim_t + \lambda_{Post} Treat_i \times Post_t + \zeta_{it}$$

| Dependent Variable: | Default Hazard: 1 if Firm in Default at *t*, and not at *t-1* | |
|---|---|---|
| Subsample: | Multiple Lenders | Single Lender |
| | (1) | (2) |
| Effect on Default Hazard Rate – Interim Period | 0.056* | -0.008 |
| | (0.030) | (0.028) |
| Effect on Default Hazard Rate – Post Expansion | 0.030* | 0.033 |
| | (0.016) | (0.022) |
| Month Dummies | Yes | Yes |
| Observations (Firm-Month) | 2,546 | 993 |
| R-squared | 0.104 | 0.057 |

# Long Run: Effect of Registry Expansion on Firms with Perfect Credit Records

## Sample: firms with only ratings of 1 in Pre-Expansion

| Dependent Variable | $\ln(Debt_{it})$ | | Default Hazard: 1 if Firm in Default at *t*, and not at *t-1* | |
|---|---|---|---|---|
| # lenders pre-expansion | Multiple | Single | Multiple | Single |
| | (1) | (2) | (3) | (4) |
| Effect Interim Period | -0.0455 | 0.0468 | 0.0026 | -0.0068 |
| | (0.0591) | (0.0472) | (0.0047) | (0.0074) |
| Effect Post Expansion | -0.0543* | 0.0550 | 0.0033 | -0.0037 |
| | (0.0281) | (0.0604) | (0.0038) | (0.0068) |
| Firm Fixed Effects | Yes | Yes | Yes | Yes |
| Month Dummies | Yes | Yes | Yes | Yes |
| In sample after default? | Yes | Yes | No | No |
| Observations (Firm-Month) | 17,639 | 9,160 | 13,370 | 9,073 |
| R-squared | 0.540 | 0.512 | 0.183 | 0.167 |

# Effect of Registry Expansion on Lender Concentration

## Sample: firms with multiple lenders in Pre-Expansion

| Dependent Variable | Debt $HHI_{it}$ | $\ln(\#Lenders_{it})$ | Fraction by Top $Lender_{it}$ |
|---|---|---|---|
| | (1) | (3) | (5) |
| Effect – Interim Period | -0.0021 | 0.0092 | -0.0021 |
| | (0.0043) | (0.0075) | (0.0041) |
| Effect – Post Expansion | 0.0148* | -0.0196 | 0.0122* |
| | (0.0078) | (0.0148) | (0.0074) |
| Firm Fixed Effects | Yes | Yes | Yes |
| Month Dummies | Yes | Yes | Yes |
| Observations (Firm-Month) | 17,577 | 17,577 | 17,577 |
| Clusters (Firms) | 1,042 | 1,042 | 1,042 |
| R-squared | 0.826 | 0.784 | 0.817 |

# Placebo Tests

- Shift forward by 12 months:
  - Firm in placebo treatment (control) if total debt between $150,000 and $200,000 ($200,000 and $250,000) Jan-Mar 1999 instead of 1998
  - 2,313 (2,435) placebo treatment (control) firms: no sharp distribution discontinuity
  - Misclassification error: 52.4% of firms in the placebo treatment group had debt>$200,000 between Jan-Dec 1998
- Shift upwards by $100,000:
  - Firm in placebo treatment (control) if total debt between $250,000 and $300,000 ($300,000 and $350,000) Jan-Mar 1998
- All estimates not-significant