Bank Competition and Information Production

Theory and Evidence

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Outline of this talk

Today I present two twin papers on bank competition and information production:

1. "Bank Competition, Information Choice and Inefficient Credit Booms"
2. "Bank Competition and Information Production" (w. Filippo De Marco)

We'll start with the theory (paper 1) in abbreviated form and proceed to test its main prediction in the data (paper 2).

Bank Competition, Information Choice, and Inefficient Credit Booms

Motivation

- since the mid-80's we have seen substantial deregulation of banking industry in most countries
  - 1994 Riegle-Neal Act lifted interstate branching restrictions
  - 1999 Gramm-Leach-Bliley Act lifted separation between investment banking and commercial banking
- these reforms have increased banking competition and are thought to have increased availability of credit
- but is it possible that competition has prompted *too much* lending?
  - U.S. Senior Loan Officer Survey underscores a competition channel behind the 2003-2006 boom in residential mortgage lending

Can more banking competition foster inefficient lending booms?

The message of this paper

Information spillovers between competing banks can depress bank information production and create harmful lending booms:

- in many countries, binding loan offers must be made in writing
- such written offers convey credible information about the creditworthiness of a customer
- customers can use a written offer of an informed bank to signal their creditworthiness to uninformed outside lenders and "shop for loans"
  $\Rightarrow$ information spillovers

In the following, I will show:

If loan offers can be subsequently observed by rival lenders,

1. banks lend too much and also approve some bad loans
2. banks produce too little information
3. credit becomes too procyclical: too much credit in booms, not enough credit in recessions

More competition exacerbates these problems and reduces welfare.

Model (I)

Heterogeneous Entrepreneurs:

- two islands $j \in \{1, 2\}$
- each island has a continuum of mass 1 of wealthless entrepreneurs, indexed by $i \in [0, 1]$
- option to run risky project: invest one unit at time t, obtain in $t + 1$ a payoff

$$X_i = \begin{cases} R & \textit{with probability } p_i \\ \\ r & \textit{with probability } 1 - p_i \end{cases} \tag{1}$$

- $p_i \sim U(\bar{p} - \frac{\varepsilon}{2}, \bar{p} + \frac{\varepsilon}{2})$, private knowledge
- no signaling or self-selection mechanisms available

Model (II)

Bank:

- one risk neutral bank on each island with unlimited access to funds at cost ρ
- can lend both domestically and on other islands
- lending abroad incurs extra monitoring cost $\gamma > 0$ per loan
- bank uses costless *credit-worthiness test* to assess borrower quality
- precision of the test is given by the bank's *screening precision* $\lambda \in [0, 1)$
- screening precision λ is costly: convex cost function $c(\lambda)$ with $c(0) = 0, c'(\lambda) > 0, \lim_{\lambda \to 1} c(\lambda) = \infty$.
- screening works only for entrepreneurs on the same island

Model: Timing

Timing:

1. Each bank
   - chooses its screening precision λ^j (observable to everyone),
   - pays screening cost $c(\lambda^j)$ and
   - observes private signal $\sigma_{i,\lambda}$ for every project $i \in [0,1]$
2. both banks choose their domestic *loan portfolio* comprising of
   - a set $\mathcal{P}_j$ of projects to be offered a loan, and
   - state-contingent repayment terms (D_i, d_i) for every project $i \in \mathcal{P}_j$.
3. each bank observes the domestic loan offers made on the other island and chooses whether and under which terms $(O_i^{j'}, o_i^{j'})$ to offer outside credit to loan-approved entrepreneurs
   $\Rightarrow$ informational spillover
4. entrepreneurs choose loan offer with lowest expected repayment rate; if indifferent, they stay with the domestic bank.

Monopoly

If switching cost are very high:

- assume γ is so high that, even with monopoly pricing, banks earn a profit per domestic customer less than γ
- then, even if banks extract all surplus by charging (R, r), outsiders can never poach profitably $\rightarrow$ monopoly case!
- banks finance up to the marginal type who has success probability q:

$$\begin{aligned} \pi(q) &= qR + (1-q)r - \rho \stackrel{!}{=} 0 \\ \Leftrightarrow q &= \frac{\rho - r}{R - r} \end{aligned}$$

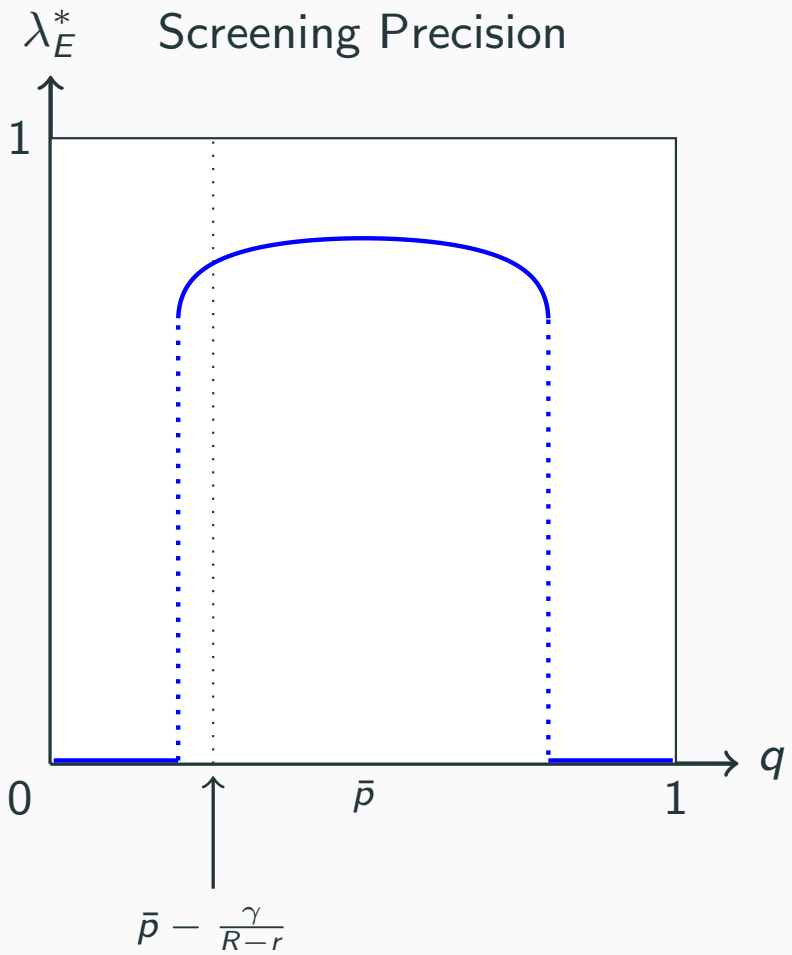
Reminder:

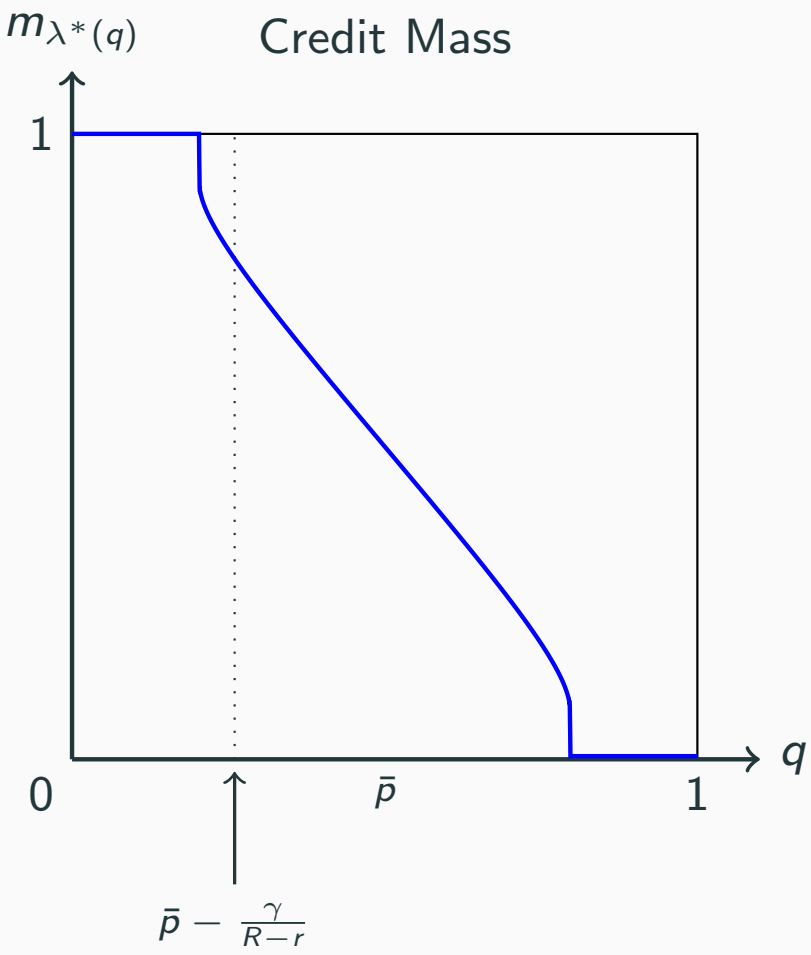
R	payoff upon project success
r	payoff upon project failure (liquidation)
ρ	Bank refinancing rate

q is **high** in recession, **low** in boom.

- equilibrium credit mass and screening precision are functions of q.

Equilibrium Allocations under Monopoly



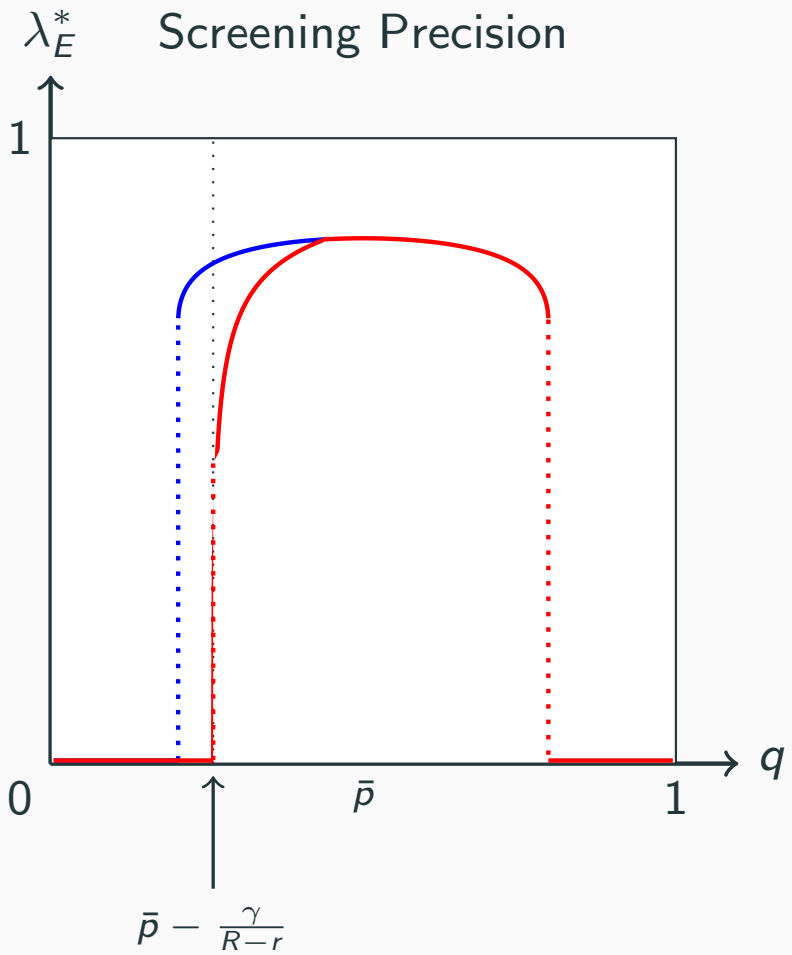


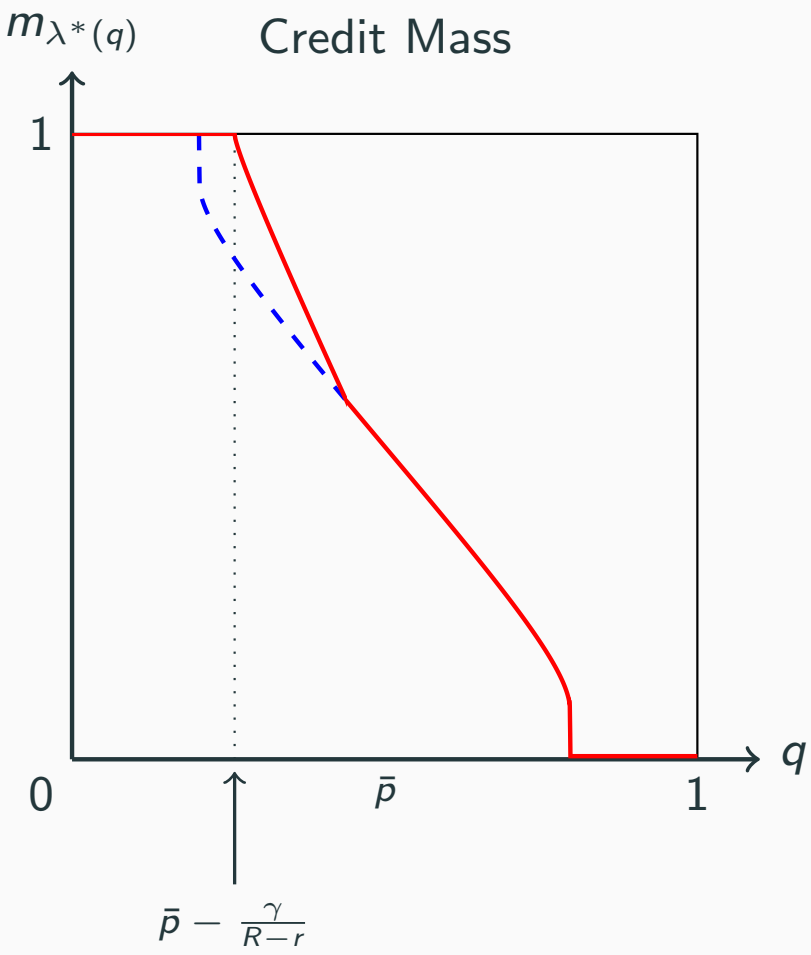
Equilibrium, Case 2: Threat of Poaching

If monopolistic profits exceed γ per customer:

- outside lender could profitably undercut by poaching loan-approved customers
- in equilibrium, incumbent must react to this threat:
  - reduce repayment rates, or
  - change composition of the loan portfolio
- **Key insight:** it's more profitable for the bank to change composition than to reduce repayment rates!
- in equilibrium, bank adds (marginally) negative NPV loans to its portfolio to dilute the informational content of loan approvals
  $\Rightarrow$ too much credit!
  - banks add exactly as many negative NPV loans as needed to restore a profitability of no more than γ per customer
  - this also reduces ex-ante incentives for information acquisition
  - **testable prediction: competition dampens the upward revision of posterior expectations upon the award of a bank loan**

Equilibrium Allocations under Competition





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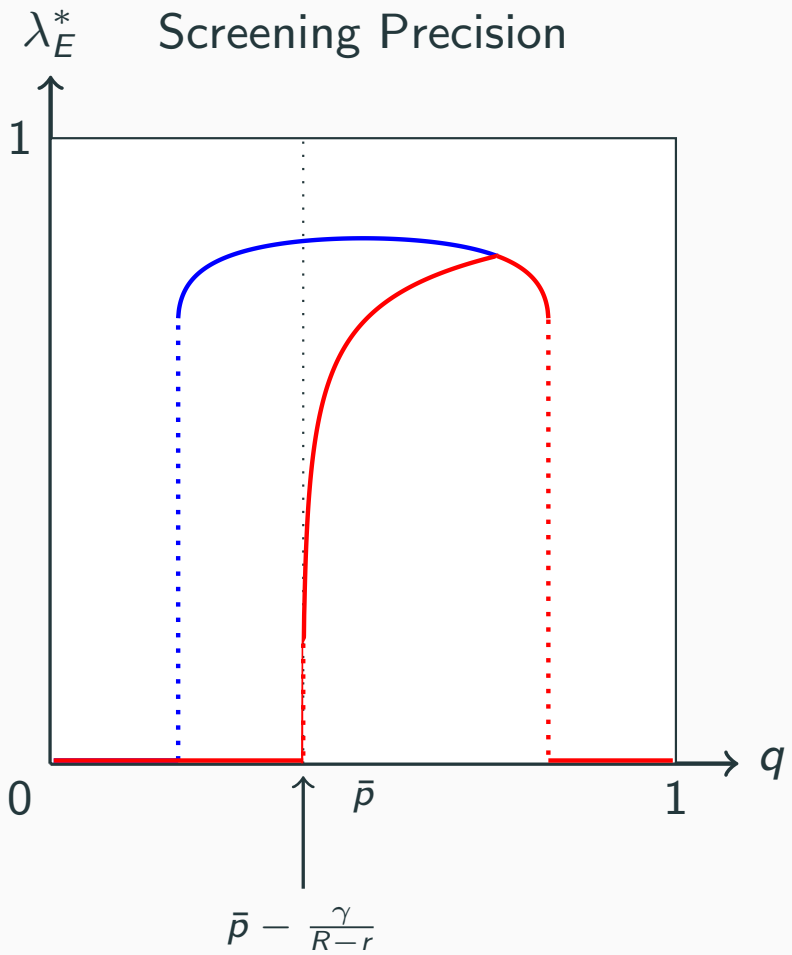

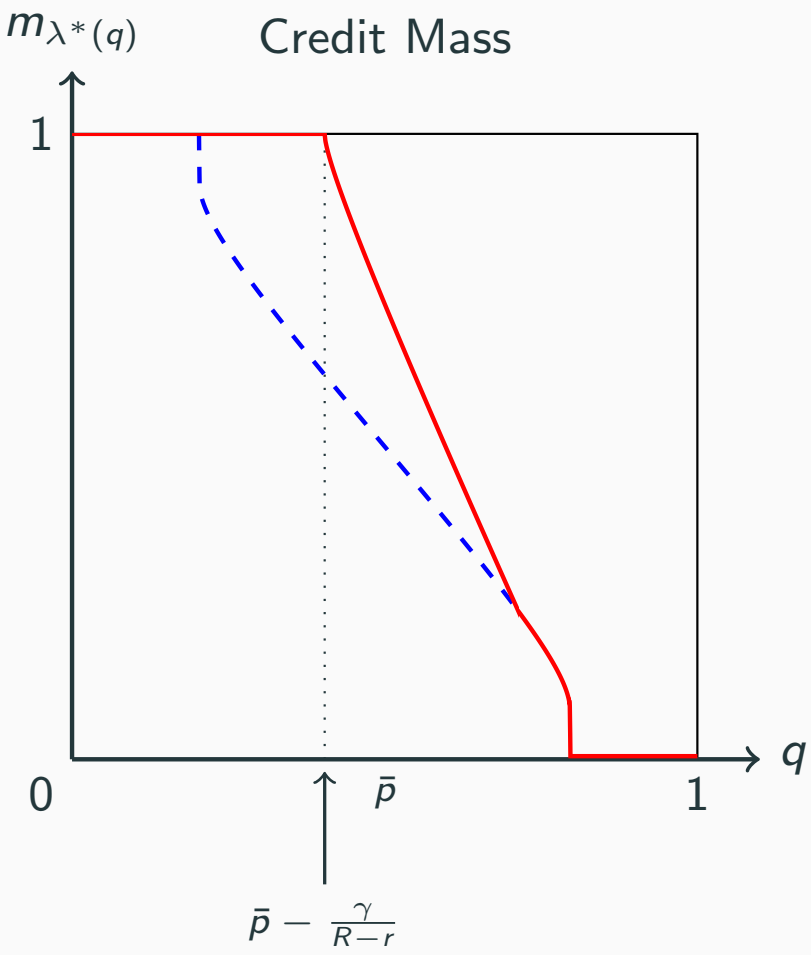

Bank Competition and Information Production

(w. Filippo De Marco)

Competition and Information Production

- We use syndicated loan market data from LPC Dealscan to test the model's prediction that competition reduces information production.
- Large strand of literature following James (1987) has shown that announcement of loan generates positive abnormal stock return for borrowing firm due to revealed information ("specialness of loans") / certification effect.
- Syndicated loan market is setting with strong sequentiality friction:
  - Syndicated loans can always be refinanced immediately, no penalties.
  - Any information conveyed by loan announcement can immediately be used by free-riders.

Competition and Information Production

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We find:

- Loan abnormal return is positive (0.4%) in our sample period (1993-2006) but is driven to zero in states that **deregulate interstate branching**

- Especially for informationally opaque firms (low tangibles, smallcap, no access to bond market) and small banks: **information channel**

- Moreover, probability of covenant violations and default (on small business loans) are higher in states that deregulate: **loan quality decreases** after deregulation

Data: Branching Deregulation

- Long history of restrictions to banks' geographical expansions (granting charters generated fee income for US states)
- $<$1970 no **intrastate** (i.e. expand within state borders) nor **interstate** (i.e expand across state borders) branching was allowed.

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- 1994: Interstate Banking and Branching Efficiency Act (IBBEA) allowed states to erect barriers to entry. All did (out-of-state banks: 2.5% market share in 1994).

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- 1994: Interstate Banking and Branching Efficiency Act (IBBEA) allowed states to erect barriers to entry. All did (out-of-state banks: 2.5% market share in 1994).
- 1994-2006: **second wave of interstate** deregulation, knocking down barriers state-by-state
- We exploit the second deregulation wave (DealScan data not avaiable before 1990)

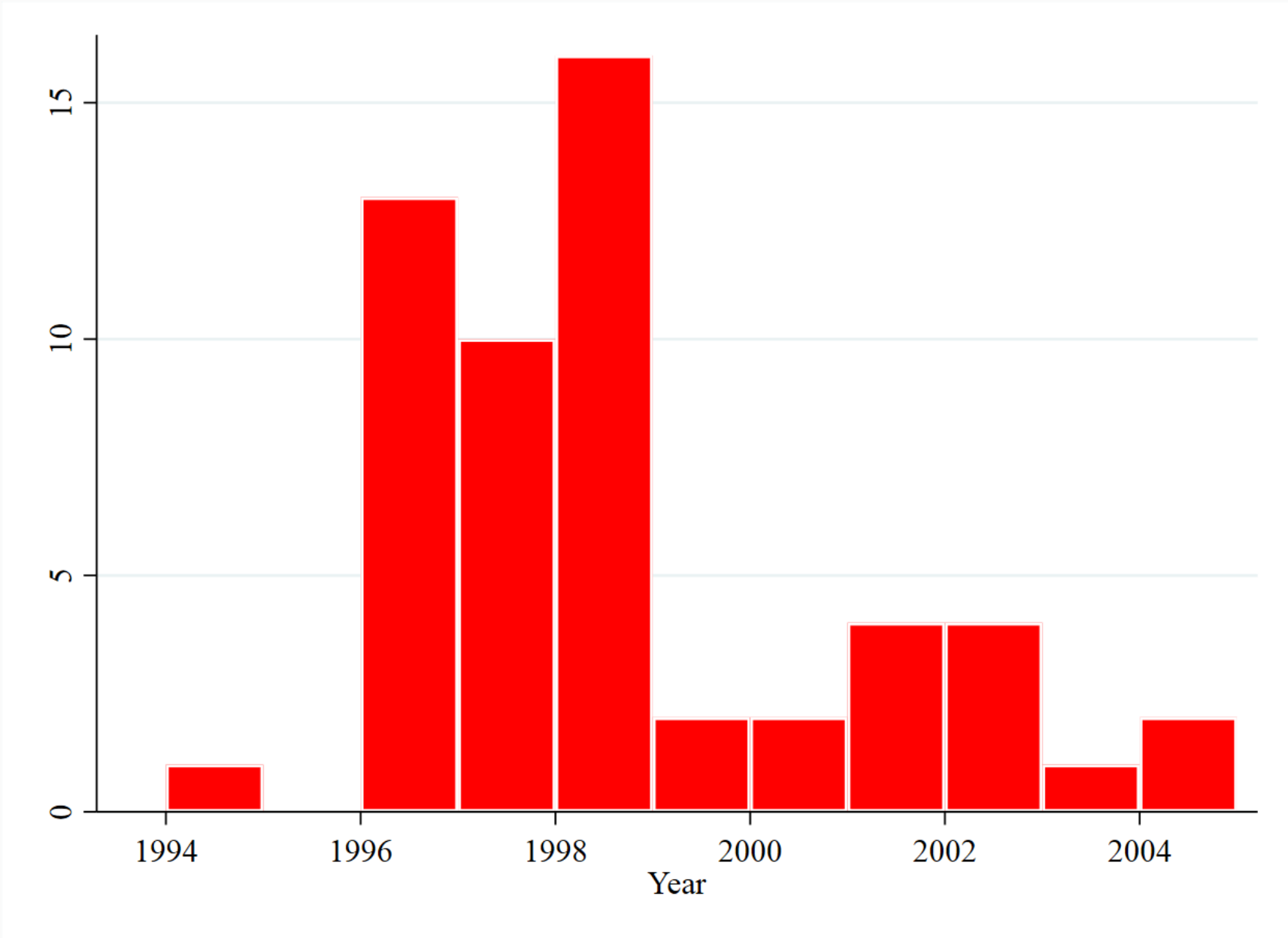
Data: Branching Deregulation

There were four barriers to entry:

1. Minimum age of M&A target by an out-of-state bank
2. Limits to market share of deposits from out-of-state banks
3. Not allowing opening of new branches by out-of-state banks (*de novo* branching)
4. Not allowing purchase of individual branches without acquiring the entire bank

- Rice and Strahan (2010) count these restrictions for each state in each year
- An increase in the index implies greater competition (0 fully restricted, 4 fully open)

Number of Deregulation changes, 1993-2006



Data: Loan Announcements

- **Loan Announcements**: syndicated loans from LPC DealScan from 1993 to 2006
- For our purposes, we consider the issue date of the loan (*DealActiveDate*) as its announcement date
- Match US non-financial firms to Compustat using Chava and Roberts (2008) link file (90% of all US publicly listed firms in DealScan)
- Match to borrower stock returns via CRSP-Compustat file
- Match to lender (i.e. lead arranger) balance sheet information at bank-holding company level using Schwert (2018) DealScan-Compustat lender link file
- Final sample: 4339 firms with 17331 loan announcements from about 90 lead arrangers (400 individual lenders)

Calculation of CARs

- We download daily stock returns from CRSP for each loan announcement
- We set an estimation window of 150 trading days (at least 120 days of non-missing returns) and a 30 days gap before the announcement
- We then run a Fama-French 3 factor model for the estimation window:

$$ER_{i,t} = \alpha_i + \beta_{m,i} ER_{m,t} + \beta_{SMB,i} SMB_t + \beta_{HML,i} HML_t$$

where $ER_{i,t} = R_{i,t} - R_t^f$ is the excess return of stock i over the risk-free rate

- We then compute the abnormal return as:

$$AR_{i,t} = ER_{i,t} - (\hat{\alpha}_i + \hat{\beta}_{m,i} ER_{m,t} + \hat{\beta}_{SMB,i} SMB_t + \hat{\beta}_{HML,i} HML_t)$$

and finally compute $CAR_i = \sum_{\tau_1}^{\tau_2} AR_{i,t}$ with $(\tau_1 = T - 1, \tau_2 = T + 3)$

Loan Announcement Returns

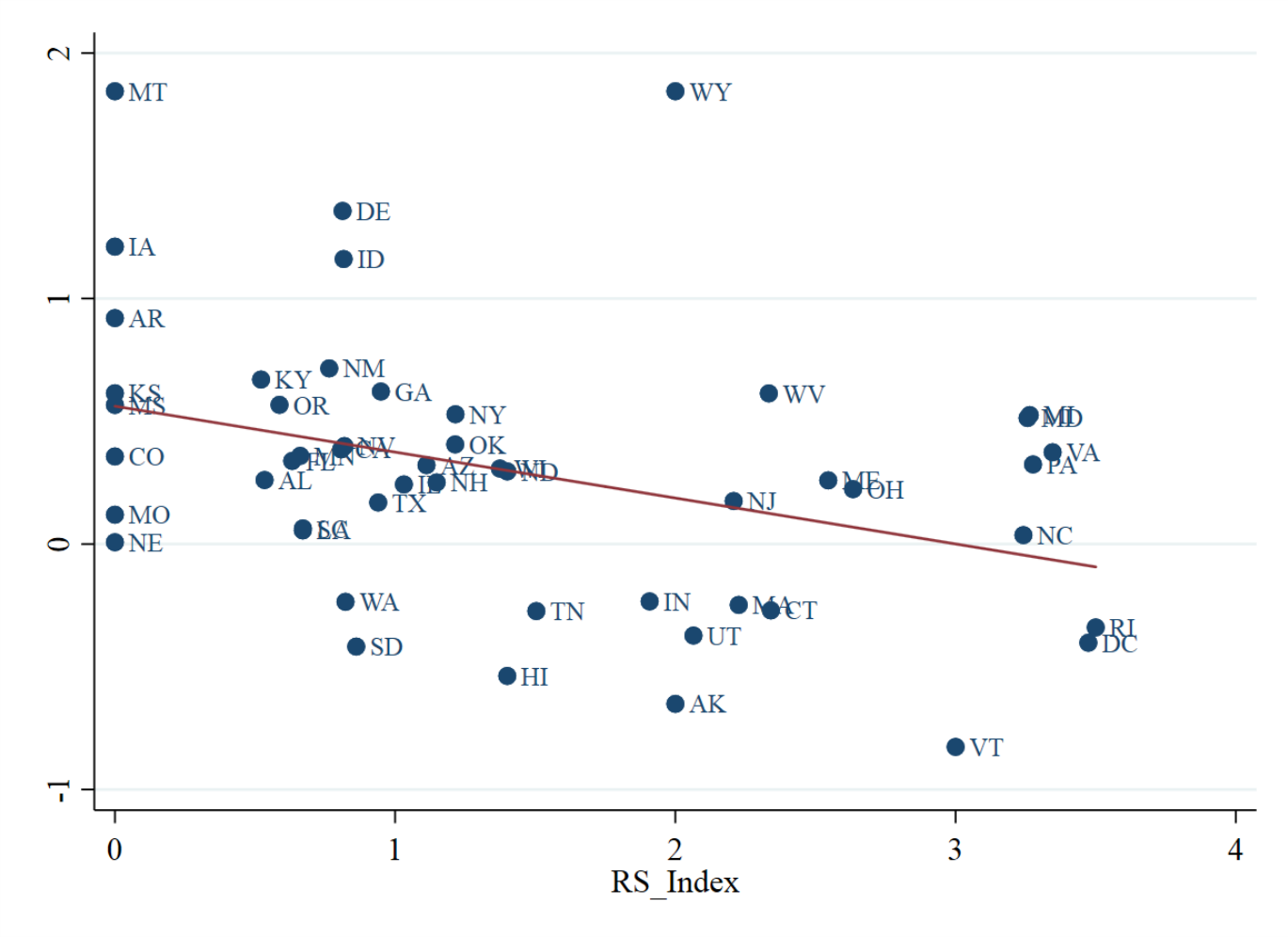
CARs and Competition

$$CAR_{i,t} = \beta_1 \text{RS Index}_{s,t} + \gamma' X_{i,t-1} + \lambda_s + \lambda_t + \epsilon_{i,t}$$

- RS Index$_{s,t}$ is the deregulation index in state s at time t where firm i is headquartered
- $X_{i,t-1}$ is a vector of deal-specific and firm-specific variables
- λ_s and λ_t are state and time fixed-effects, respectively.
- **Importantly**: we also use with λ_i (firm) and $\lambda_{ind,t}$ (2-digit industry$\times$time) fixed-effects
- Standard errors are clustered at the state level (robust to state-time and firm clustering)

CARs and Competition: State Averages

$\widehat{\beta} = -0.19$ (t-stat -2.88), $R^2 = 0.13$



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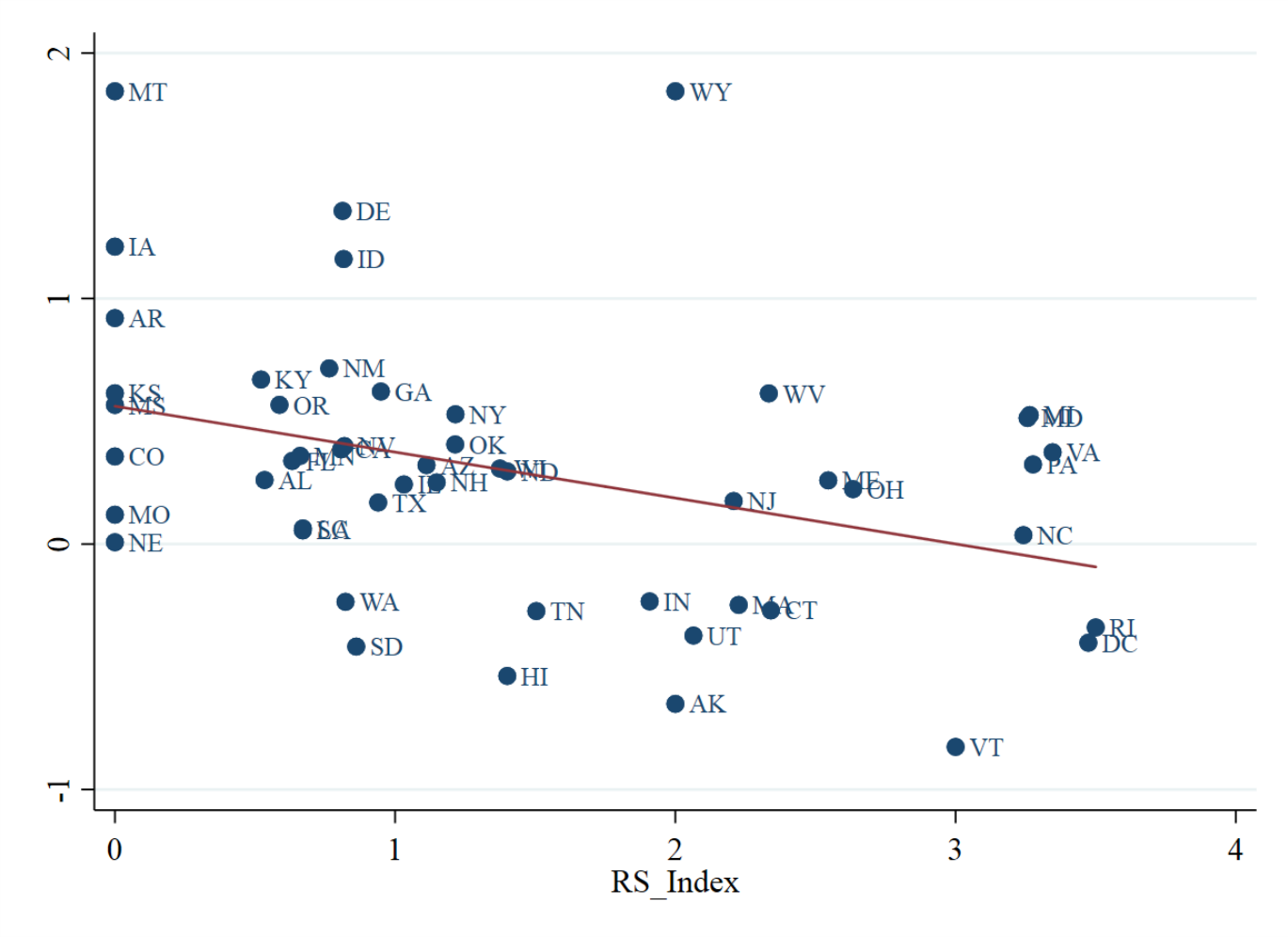

In the regression, we will exploit *changes* in deregulation index (i.e. we absorb λ_s)

CARs and Competition: Results

RS Index	-0.171***	-0.186***	-0.174***	-0.167***	-0.183***	-0.173***
	(0.043)	(0.037)	(0.037)	(0.054)	(0.042)	(0.043)
log(Deal Maturity)				0.032	0.084	0.041
				(0.088)	(0.082)	(0.080)
log(Deal Amount)				0.131***	0.118**	0.012
				(0.044)	(0.045)	(0.053)
Purpose: Corporate				-0.021	-0.034	0.005
				(0.125)	(0.127)	(0.121)
Purpose: Acquisition				0.291	0.403*	0.356
				(0.186)	(0.206)	(0.224)
Purpose: Debt Repayment				-0.056	-0.018	-0.123
				(0.134)	(0.140)	(0.171)
log(1+age)				0.233***	0.225***	0.506
				(0.051)	(0.051)	(0.312)
log(MktVal)				-0.203***	-0.175***	-0.415***
				(0.045)	(0.043)	(0.121)
Tangibility				0.157	0.255	0.203
				(0.220)	(0.356)	(0.673)
Profitability				-0.779	-0.965	-0.262
				(0.777)	(0.799)	(0.985)
Cash				0.573	0.580	0.070
				(0.426)	(0.417)	(1.098)
TobinQ				0.073	0.109**	0.071
				(0.061)	(0.052)	(0.137)
Fixed effects						
State	Yes	Yes	–	Yes	Yes	–
Year	Yes	–	–	Yes	–	–
Industry-Year	No	Yes	Yes	No	Yes	Yes
Firm	No	No	Yes	No	No	Yes
Observations	16854	16819	15649	15079	15039	13831
R^2	0.004	0.051	0.274	0.007	0.056	0.289

CARs and Competition: Interpretation and Robustness

- CAR is 0.68 pct. points lower in fully competitive state (RS=4) compared to one that fully restricts branching (RS=0)
- If we use a dummy for deregulation (=1 if RS>0, 0 otherwise) obtain $\widehat{\beta} \approx -0.5$: eliminates average CAR

Robustness:

- WLS with number of deals in the state as weights
- Include lead arranger characteristics (size, capitalization, funding...)
- Include Lender×Post fixed-effects: absorbs average screening ability of each lender, before and after deregulation

CAR Firm Heterogeneity

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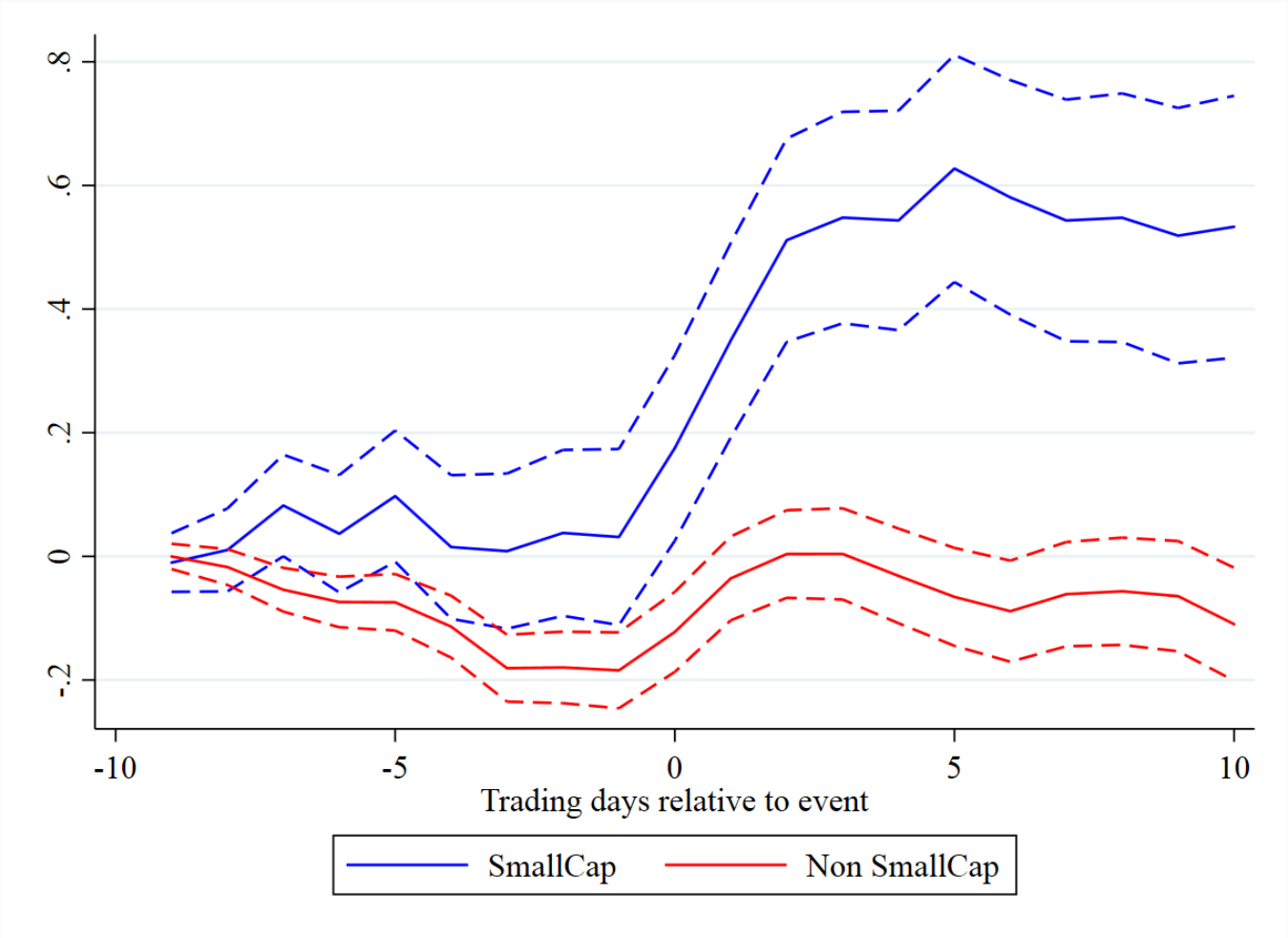

- We expect the CAR to decrease especially for informationally sensitive (opaque, small, bank-dependent) firms after deregulation

CAR and Competition: Firm Heterogeneity

	Small Cap		Bond Issuer		Bond Rating	
	No	Yes	Yes	No	Yes	No
RS Index	0.014	-0.347***	-0.105	-0.291***	-0.076	-0.444**
	(0.063)	(0.081)	(0.069)	(0.093)	(0.063)	(0.179)
Industry-Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Borrower and Deal controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5033	8315	6616	7073	9062	4594
R^2	0.271	0.351	0.263	0.361	0.246	0.408

Loan Quality and Ex-Post Performance

- Additional implication of our hypothesis: quality of the loans originated after deregulation should be lower

- Ex-post loan defaults are not available on DealScan, so look at probability of covenant violation instead (Demerjian and Owens, 2016)

- We can use data from Small Business Administration (SBA) government guaranteed loans which contains information on ex-post defaults (charge-offs):

$$ChargeOff_{ifst} = \beta_1 \text{RS Index}_{st} + \gamma' X_{ifst} + \lambda_s + \lambda_t + \epsilon_{ifst}$$

Deregulation and Probability of Covenant Violations

	Any	Performance	Capital
RS Index	0.015**	0.014**	0.002
	(0.007)	(0.006)	(0.008)
Fixed effects			
Industry-Year	Yes	Yes	Yes
Firm	Yes	Yes	Yes
Observations	10007	10007	10007
R^2	0.587	0.603	0.532

- Same borrower after state fully opens up to competition has 6 pct. points (0.015×4) higher probability of violating a (perfomance) covenant (average 40%, median 13%)

Conclusions

- Market power is a key determinant of banks' information production incentives

- The results speak about the potential downside of regulation promoting competition in financial markets (Crawford et al., 2018; Gissler et al., 2019)