Interstate Banking Deregulation and Bank Loan Commitments

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Road Map

1. Background, Motivation, and Main Finding
2. A Simple Model
3. Empirical Analysis
   - Data
   - Empirical specification
   - Results
   - Robustness check
4. Summary

Loan Commitments

- A formal contract by a bank to lend to a specific borrower up to a certain amount at prespecified terms
  - A bank charges interest rates and fees
  - interest rates = market interest rates (LIBOR) + fixed markup
- Option-like exercise: firms draw down more in response to negative shocks (Morgan (1998), Sufi (2008), Jimenez et al (2009), Ivashina and Scharfstein (2010))
- Just like demand deposit, a bank should prepare for unexpected take-down $\Rightarrow$ liquidity management problem (Kashyap et al (2002))

Branching and Interstate Banking Regulation

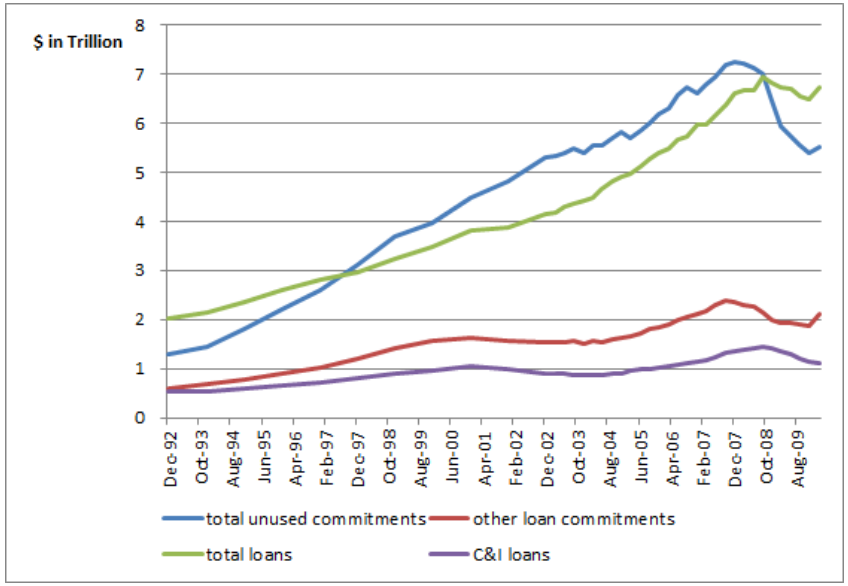
- Long time ago, the United States Constitution prevented the states from issuing fiat money and from taxing interstate commerce
- In an attempt to raise revenue, states started selling bank charters and prohibited interstate banking
- Legislature also restricted intrastate expansion $\Rightarrow$ branching regulation
- Prior to the 1970s, most states had laws restricting within-state branching, and all states forbade interstate branching

Deregulation Begins.....

- Since the 1970s, deregulation on intrastate branching started through banking holding companies (BHCs) or M&A
- Relaxing restrictions on bank expansion led to larger banks operating across a wider geographical area
- Banking industry becomes more competitive and consolidated $\Rightarrow$ larger banks finance funds more cheaply and BHC-member banks can use internal capital markets
- Staggering timing of each state's deregulation $\Rightarrow$ cross-sectional and time-series variations

Bank Loan Commitments: Getting More Popular

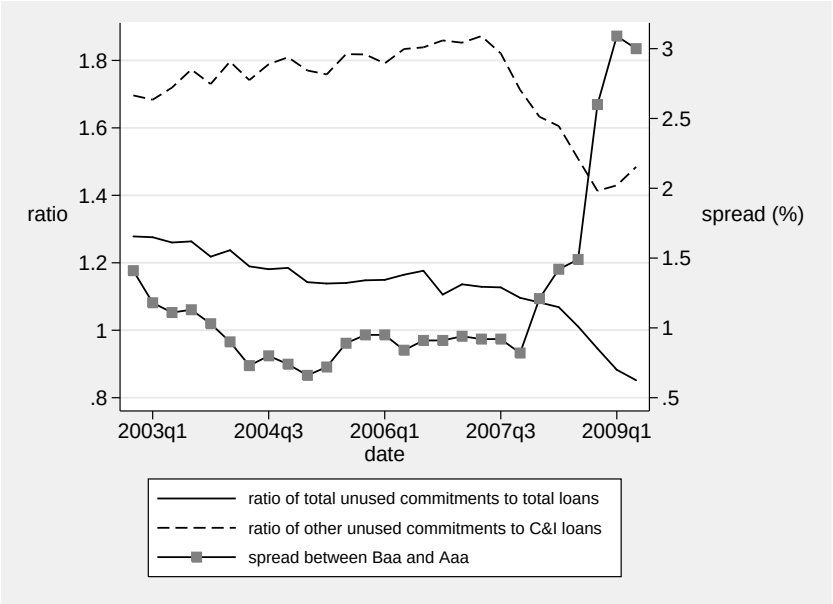
- Figure 1:



- As of early 2011, the share of C&I loans made under commitment amounts to 80 percent of total C&I loans made

It Might Be Important for the Real Economy

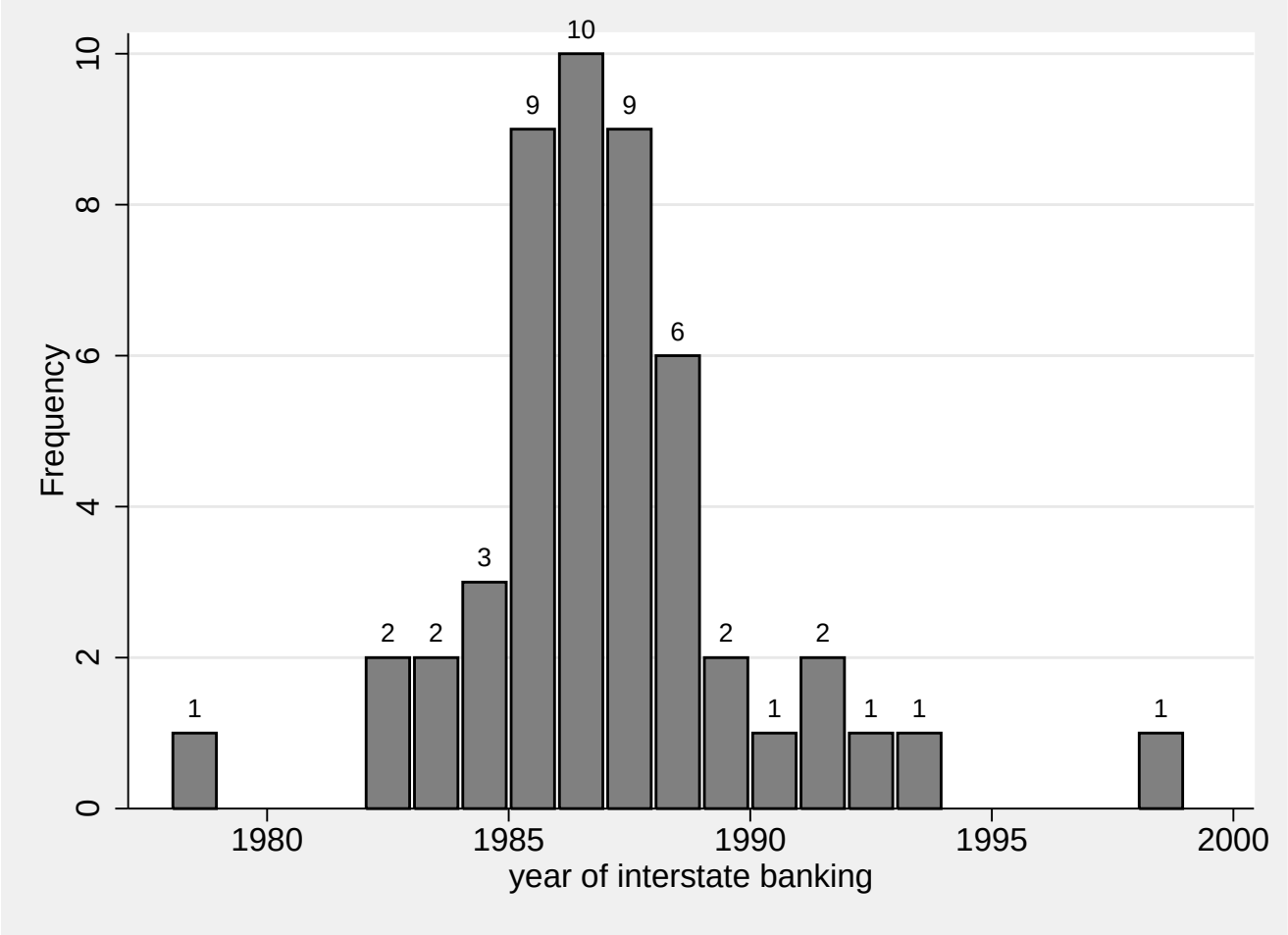
- Figure 2:



- Until Sep 2008, C&I loans have not declined. Why?

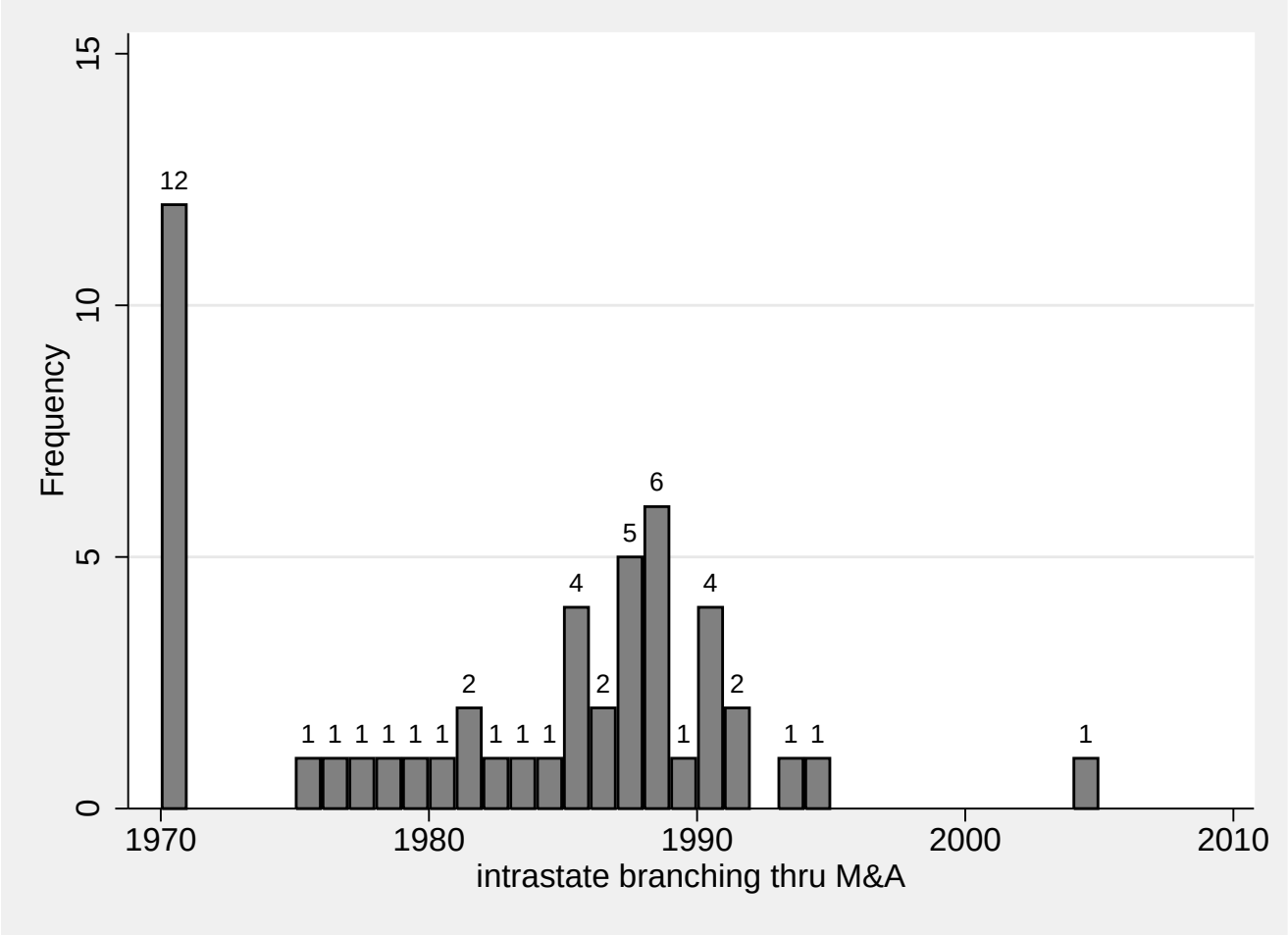
Years of Interstate Banking Deregulation

- Figure 3: increased capital mobility *across* states



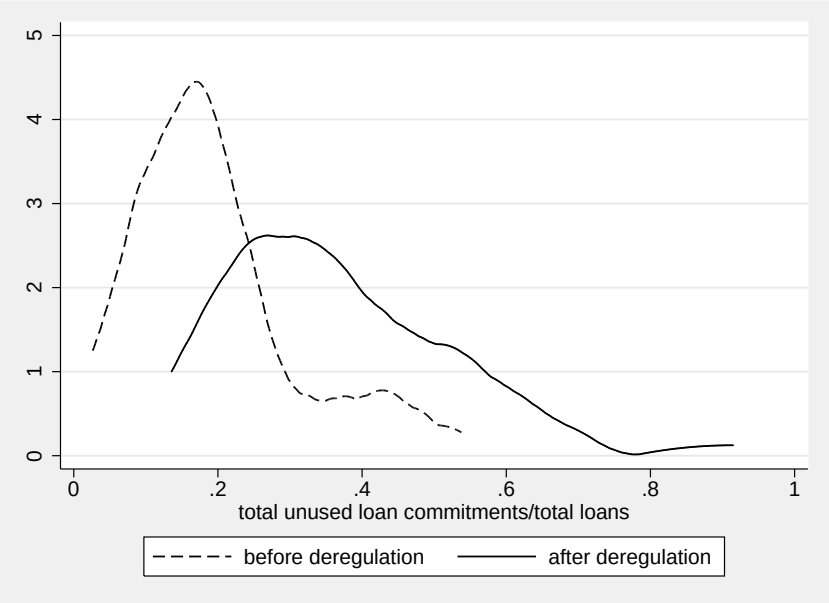
Years of Branching Deregulation

- Figure 4: increased capital mobility *within* states



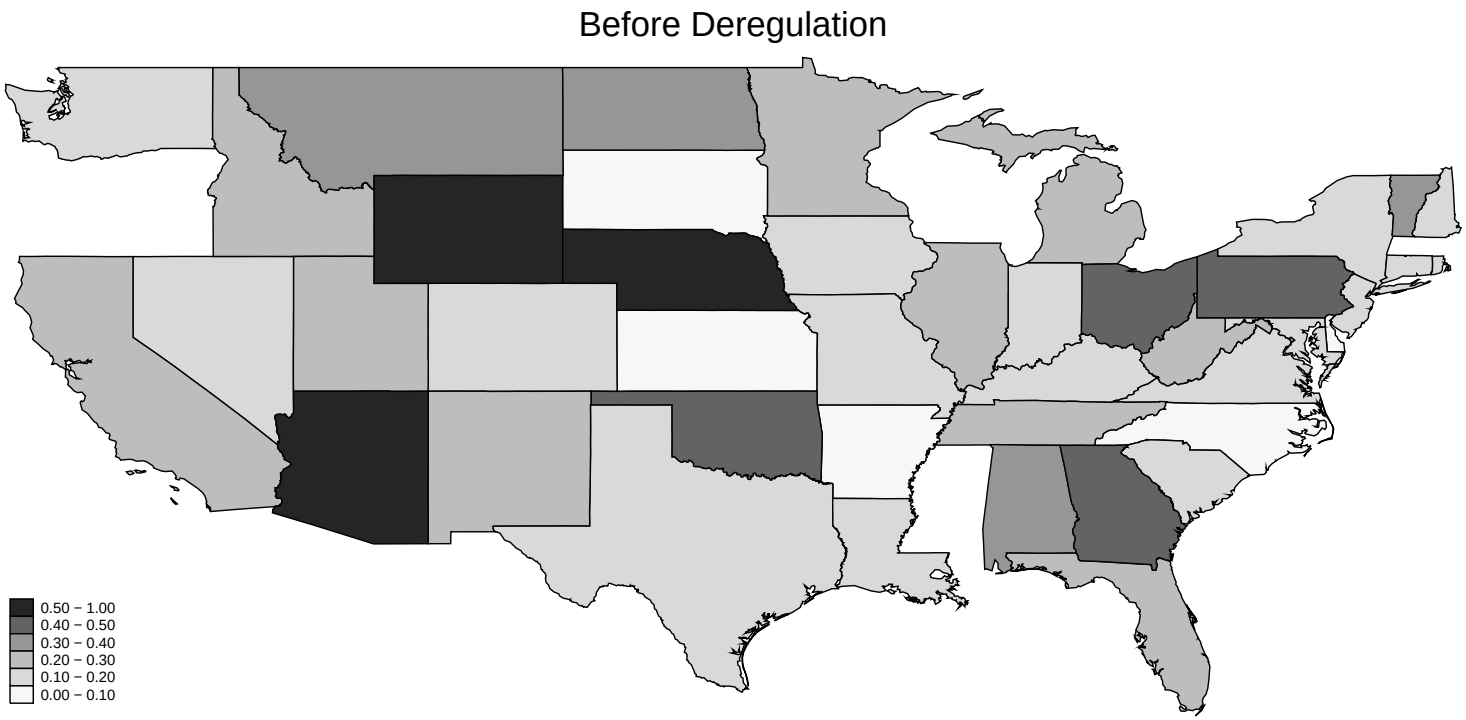
Loan Commitments Before/After Interstate Banking

- Figure 5: COM = total unused loan commitments/total loans
- Kernel density of the state-level average values of (loan commitments/total loans) shifted to the right after deregulation.



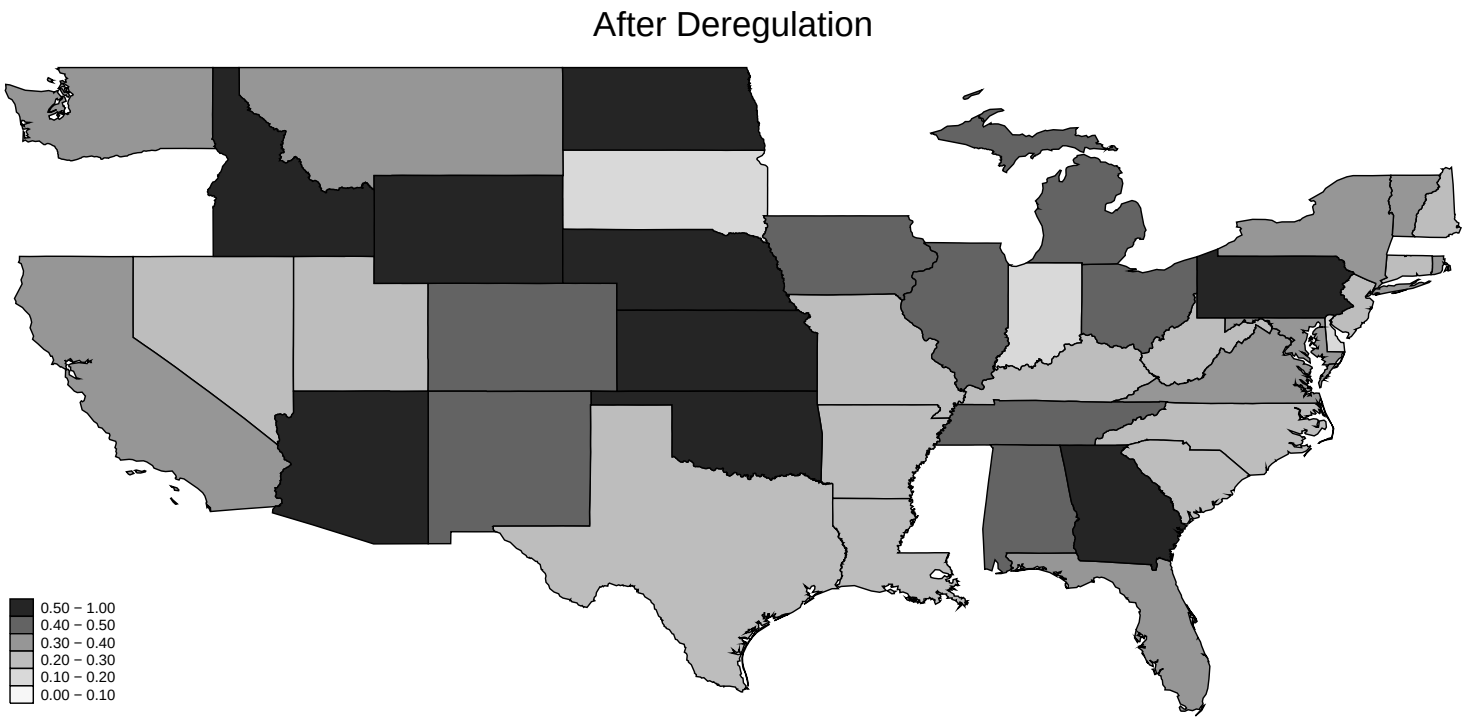
Before Interstate Banking Deregulation

- Figure 6: COM = total unused loan commitments/total loans



After Interstate Banking Deregulation

- Figure 6: COM = total unused loan commitments/total loans



Question and Conjecture

- Given this popularity and role, we ask "what makes a bank issue more loan commitments (C^*)?"
- Liquidity management because of its option-like exercise $\Rightarrow$ agency cost (α) would matter for C^*
  - Large and BHC-member banks with lower α issue more loan commitments
  - Table 1
- However, we need more exogenous change in α to see the sign of $\partial C^*/\partial\alpha$

- Is there any exogenous change in agency cost (α)? $\Rightarrow$ interstate banking and branching deregulation
  - State-level deregulation is more exogenous than size or BHC-membership
  - Staggering timing across states gives much more variations
  - Relatively free from survivorship bias of individual banks
- We test $\partial C^*/\partial \alpha < 0$ using the deregulation process as a natural experiment for a change in α
- Alternatively, can we explain figure 6 with figure 3 and 4?

Main Finding

- Use of bank loan commitments has increased *after* interstate banking deregulation, which increased capital mobility (integration *across* state lines)
- The effect of branching deregulation is weak or non-existent (integration *within* a state)
- Agency cost or access to external/internal capital markets is important for issuing loan commitments
- Bank deregulation affects bank on- and off-balance sheets

- More importantly, we find one link b/w deregulation and the real economy
- Recent studies ask *if* banking deregulation affects the real economy
  - Morgan et al (2004), Demyanyk (2007), and Hoffmann (forthcoming) say "Yes" in terms of income and consumption
- Studies by Jimenez et al (2009), Ivanshina and Scharfstein (2010), and Park and Lee (2010) show that loan commitments may have real effects especially in economic downturns
- Given this, this study can suggest one link between deregulation and the real economy: loan commitments can be one candidate

Model

- Analogy of "newsboy" problem
- It focuses on liquidity management problem and a bank's options to deal with increased take-down
- When the amount of liquidity held inside falls short of the realized take-down from loan commitments, options open to a bank are:
  1. to get uninsured funds through external financing
  2. to reduce the amount of term loans to be issued (recalling and/or denying roll-over)
- We assume that a bank uses the first option

- One-period model (period 0 and 1)
  - endowed with deposit D at period 0
  - needs to decide term loans (N), loan commitments (C), and liquidity held inside (S_0) in preparation for take-down shock (z), realized between period 0 and 1
  - needs to borrow when $zC > S_0$
- Liquidity management problem
  - too much liquidity inside $\Rightarrow$ opportunity cost of making loans
  - too small liquidity inside $\Rightarrow$ penalty of expensive external financing

- A bank maximizes its expected profit:

$$\max_{C,S_0} .E[r_N N + f(C)C + r_C zC - H(B)]$$

subject to

$$N + S_0 = D \quad \text{(time-0 constraint)}$$

$$N + zC + S_1 = D + B \quad \text{(time-1 constraint)}$$

and

$$S_1 = max\{S_0 - zC, 0\}$$

- External financing cost function:

$$H(B) = \alpha B \quad \text{where} \quad B = max\{zC - S_0, 0\} \quad \text{and} \quad \alpha > r_N$$

- Take-down shock: $z \sim$ uniform$[a, b]$ where $0 \leq a < b \leq 1$

- External financing is necessary only when $zC > S_0$. Thus expected cost of external financing is

$$E[H(B)] = \alpha \int_{S_0/C}^{b} (zC - S_0) dF(z)$$

- Reformulating the maximization problem gives:

$$\max_{C,S_0} . E[r_N(D - S_0) + (j - hC)C + r_C zC] - \int_{S_0/C}^{b} (zC - S_0) dF(z)$$

- FOCs are:

$$[C] : r_C \mu_z + j - 2hC^* = \frac{\alpha}{2}(b^2 - \frac{S_0^{*2}}{C^{*2}})$$

$$[S_0] : r_N = \alpha(b - \frac{S_0^*}{C^*})$$

where μ_z is the mean value of z

Comparative Statics and Testable Implication

- Solving for C^* and S_0^*, we obtain:

$$C^* = \frac{1}{2h}[\frac{r_N^2}{2\alpha} - r_N b + r_C \mu_z + j]$$

$$S_0^* = \frac{\alpha b - r_N}{\alpha} C^*$$

- Lower α bank issues more loan commitments:

$$\frac{\partial C^*}{\partial \alpha} = -\frac{r_N^2}{4h\alpha^2} < 0$$

- Uncertain loan take-down discourages using loan commitments (one rationale for usage fees):

$$\frac{\partial C^*}{\partial \varepsilon} = -\frac{r_N}{2h} < 0, \quad \text{letting } b \equiv b' + \varepsilon \text{ and } a \equiv a' - \varepsilon$$

- However, effect of α on S_0^* is indeterminate:

$$\frac{\partial S_0^*}{\partial \alpha} = (1 - \frac{r_N}{\alpha})\frac{\partial C^*}{\partial \alpha} + \frac{r_N}{\alpha^2} C^* \lessgtr 0$$

with

$$\lim_{\alpha \to \infty} S_0^* = bC^*$$

- A bank with less severe adverse selection problem in capital markets or with cheaper sources of external funds will issue more loan commitments: $\partial C^*/\partial \alpha < 0$
- We use banking deregulation as an exogenous change in α:

$$\text{lower } \alpha \text{ after deregulation} \Rightarrow C^* \text{ increases}$$

Data

- "Call report"
- Sample period: 1984:II-1999:IV
- 812,970 bank-quarter observations (92% of original data) after applying exclusion criteria such as
  - bank-quarter observations involved in mergers
  - (unused commitment/total loans) > 4
  - (nonperforming loans/total loans) > 0.5
- Aggregated to state level
  - can avoid survivorship bias
  - important for control for Delaware

Empirical Specification

- Fixed effects panel regression:

$$\begin{aligned} COM_{it} = c + \alpha_I D^I_{it} + \alpha_B D^B_{it} &+ (\text{control for industry structure})_{it} \\ &+ (\text{control for bank B/S structure})_{it} \\ &+ (\text{time fixed effect}) + \alpha_i + u_{it} \end{aligned}$$

  where COM = (loan commitments/total loans) and D^j is a dummy for interstate banking (I) and branching deregulation (B)
- Differences-in-differences (DD) estimation: we test if
  - $\alpha_I > 0$
  - $\alpha_I \gtrless \alpha_B$

Results: Table 2

$$COM_{it} = c + \alpha_I D^I_{it} + \alpha_B D^B_{it} + (\text{control for industry structure})$$
$$(\text{control for bank B/S variables}) + (\text{time fixed effect}) + \alpha_i + u_{it}$$

	Dependent variable: *COM*				
	(1)	(2)	(3)	(4)	(5)
After interstate banking	0.10**	0.04**	0.04**	0.05**	0.03**
deregulation (α_I)	(16.73)	(6.01)	(5.64)	(5.21)	(3.09)
After branching	0.05**	0.02**	0.01*	-0.00	-0.01*
deregulation (α_B)	(8.62)	(3.32)	(1.71)	(-0.19)	(-1.70)
log(asset)			0.11**	0.11**	0.11**
			(9.23)	(8.47)	(6.76)
Share of liquid assets			-0.16**	-0.15**	-0.11
			(-2.97)	(-2.50)	(-1.62)
Share of nonperforming loans			-0.17	-0.09	-0.47*
			(-0.97)	(-0.54)	(-1.93)
Equity/assets			2.20**	1.91**	2.12**
			(5.99)	(4.39)	(4.21)
Transaction deposits/assets			-0.46**	-0.48**	-0.62**
			(-4.78)	(-4.57)	(-4.95)
Industry structure		Yes	Yes	Yes	Yes
Bank B/S variables			Yes	Yes	Yes
Time dummy				Yes	Yes
Subsample					Yes
R^2	0.12	0.28	0.42	0.46	0.47
N	3,121	3,121	3,121	3,121	2,743
F-test (p-value)	0.00	0.00	0.00	0.00	0.00

Robustness Check (1): Different Dependent Variable

- A bank, that issues loan commitments, needs to hold some liquidity in order to prepare for unexpected takedown by firms
- We try different variables:

$$COM^{liquid} = \frac{\text{unused loan commitments}}{\text{liquid assets}}$$

where liquid assets = (cash + securities), and

$$COM^{assets} = \frac{\text{unused loan commitments}}{\text{total assets}}$$

Table 3

	Dependent variable: COM^{liquid}				
	(1)	(2)	(3)	(4)	(5)
After interstate banking	0.37**	0.19**	0.18**	0.18**	0.09**
deregulation (α_I)	(12.84)	(4.89)	(4.64)	(4.20)	(2.16)
After branching	0.14**	0.04	0.00	-0.04	-0.07**
deregulation (α_B)	(5.69)	(1.44)	(0.00)	(-1.47)	(-2.58)
log(asset)			0.48**	0.48**	0.53**
			(7.97)	(7.59)	(6.70)
Share of liquid assets			-2.11**	-2.04**	-1.77**
			(-8.36)	(-7.63)	(-5.54)
Share of nonperforming loans			1.27	1.19	-0.34
			(1.59)	(1.51)	(0.32)
Equity/assets			11.75**	12.62**	14.00**
			(6.75)	(5.68)	(5.50)
Transaction deposits/asset			-2.22**	-2.38**	-2.93**
			(-4.61)	(-4.50)	(-4.69)
Industry structure		Yes	Yes	Yes	Yes
Bank B/S variables			Yes	Yes	Yes
Time dummy				Yes	Yes
Subsample					Yes
R^2	0.08	0.21	0.39	0.42	0.44
N	3,121	3,121	3,121	3,121	2,743
F-test (p-value)	0.00	0.00	0.00	0.00	0.00

Robustness Check (2): Robust Standard Errors

- Bell (2002) shows that bias of the standard errors is larger for variables that are constant or nearly constant within cluster, which is typical in the DD model
- Bertrand et al (2004) emphasize that serial correlation may make a false rejection of the null hypothesis of no effect more likely
- Following Stock and Watson (2008) and Driscoll and Kraay (1998), we use cluster-robust standard errors and Driscoll-Kraay standard errors

Table 4

	Dependent variable							
	COM		COM^{liquid}		COM		COM^{liquid}	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
After interstate banking deregulation (α_I)	0.06**	0.06*	0.18*	0.18	0.06**	0.06**	0.18**	0.18**
	(2.02)	(1.91)	(1.86)	(1.63)	(2.99)	(3.87)	(2.92)	(3.19)
After branching deregulation (α_B)	0.02	0.00	0.00	-0.04	0.02	0.00	0.00	-0.04
	(0.63)	(0.02)	(0.00)	(-0.45)	(1.30)	(0.04)	(0.00)	(-0.86)
log(asset)	0.17**	0.17**	0.48**	0.48**	0.17**	0.17**	0.48**	0.48**
	(3.68)	(3.43)	(2.82)	(2.77)	(7.53)	(7.63)	(6.29)	(6.86)
Share of liquid assets	0.18	0.20	-2.11**	-2.04**	0.18	0.20	-2.11**	-2.04**
	(0.95)	(0.91)	(-3.17)	(-2.91)	(1.56)	(1.51)	(-4.16)	(-3.76)
Share of nonperforming loans	-0.85	-0.74	1.27	1.19	-0.85**	-0.74*	1.27	1.19
	(-1.09)	(-0.85)	(0.56)	(0.49)	(-2.33)	(-1.80)	(0.94)	(0.86)
Equity/assets	2.66*	2.20	11.75**	12.62**	2.66**	2.20*	11.75**	12.62**
	(1.79)	(1.37)	(2.45)	(2.24)	(2.52)	(1.87)	(3.25)	(3.26)
Transaction deposits/assets	-0.67	-0.70	-2.22	-2.38	-0.67**	-0.70**	-2.22**	-2.38**
	(-1.36)	(-1.32)	(-1.30)	(-1.25)	(-4.57)	(-4.04)	(-4.09)	(-3.74)
Time dummy		Yes		Yes		Yes		Yes
Cluster-robust standard errors	Yes	Yes	Yes	Yes				
Driscoll-Kraay standard errors					Yes	Yes	Yes	Yes
R^2	0.44	0.48	0.39	0.42	0.44	0.48	0.39	0.42
N	3,121	3,121	3,121	3,121	3,121	3,121	3,121	3,121
F-test (p-value)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Other Robustness Checks

1. Ashcraft (2008) documents that the benefit of becoming a member of MBHC became larger after cross-guarantee provision was introduced in 1989
   - This cross-guarantee effect might be mixed with those of D^I and D^B
   - Dummy for cross-guarantee (D^C) is significant without D^I and D^B
   - When we let three dummies compete, only the coefficient of D^I is significant: $\hat{\alpha}_I = 0.06$
   - Including D^C does not affect the estimation result much
2. Another supporting evidence: *COM* variable is positively correlated with ISAR (Interstate Asset Ratio), a measure of interstate banking used in Morgan et al (2004)

Summary

- Use of loan commitments has increased after interstate banking deregulation $\Rightarrow$ agency cost is an important factor
- Financial integration across states is more important than integration within state in terms of agency costs
- Our finding may be one link between deregulation and more stable macroeconomy
  - Morgan et al (2004), Demyanyk (2007), and Hoffmann (forthcoming) show that interstate banking contributes to increased stability. How?
  - Park (2010) shows that states with more loan commitments are less volatile when the credit spread increases
- Regulatory changes can have real effects to the economy
  - Bank loan commitments would be one candidate, which increased after interstate banking