Interstate Banking Deregulation and Bank Loan Commitments
FRBSF/BEJM Conference on Empirical Macroeconomics
Using Geographical Data

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March 18, 2011
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
- Just like demand deposit, a bank should prepare for unexpected take-down ⇒ 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 ⇒ larger banks finance funds more cheaply and BHC-member banks can use internal capital markets
- Staggering timing of each state’s deregulation ⇒ 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:**

  ![Graph showing ratio of total unused commitments to total loans, ratio of other unused commitments to C&I loans, spread between Baa and Aaa, and dates from 2003q1 to 2009q1.]

- **Until Sep 2008, C&I loans have not declined. Why?**
Figure 3: increased capital mobility across states
Years of Branching Deregulation

- Figure 4: increased capital mobility *within* states

![Graph showing increased intrastate branching through M&A](chart.png)
Figure 5: \( COM = \frac{\text{total unused loan commitments}}{\text{total loans}} \)

- Kernel density of the state-level average values of (loan commitments/total loans) shifted to the right after deregulation.

![Graph showing the Kernel density of state-level average values of loan commitments/total loans before and after deregulation. The graph indicates a shift to the right after deregulation.]
Before Interstate Banking Deregulation

- Figure 6: \( \text{COM} = \frac{\text{total unused loan commitments}}{\text{total loans}} \)
After Interstate Banking Deregulation

Figure 6: $COM = \frac{\text{total unused loan commitments}}{\text{total loans}}$

After Deregulation

Ki Young Park (Yonsei University)
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 ($\alpha$) would matter for $C^*$
  - Large and BHC-member banks with lower $\alpha$ issue more loan commitments
  - Table 1
- However, we need more exogenous change in $\alpha$ to see the sign of $\partial C^*/\partial \alpha$
Is there any exogenous change in agency cost ($\alpha$)? \(\Rightarrow\) 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 $\alpha$

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), Ivashina 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: \( z \sim \text{uniform}[a, b] \) 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 $\mu_z$ is the mean value of $z$
Comparative Statics and Testable Implication

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

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

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

- Lower $\alpha$ 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 $\alpha$ on $S_0^*$ is indeterminate:

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

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 $\alpha$:

lower $\alpha$ after deregulation $\Rightarrow C^*$ 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:

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

where \( COM = (\text{loan commitments/total loans}) \) and \( D^j \) is a dummy for interstate banking (I) and branching deregulation (B).

- Differences-in-differences (DD) estimation: we test if
  - \( \alpha_I > 0 \)
  - \( \alpha_I \geq \alpha_B \)
**Results: Table 2**

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

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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

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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.
Table 4

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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, implying agency cost is an important factor.
- Financial integration across states is more important than integration within states 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.