Deregulation, Market Structure, and the Demise of Old-School Banking

Emilio Bisetti
HKUST

Stephen A. Karolyi
Carnegie Mellon

Stefan Lewellen
Penn State

October 2019

Community Banking in the 21st Century
Research and Policy Conference
Interstate Banking Deregulation: What We Know

- Did removing entry restrictions affect market structure?
  - Consensus is that deregulation affected the distribution of banks across the U.S.
  - Less evidence that deregulation changed local banking markets

- Did removing entry restrictions affect bank profitability?
  - Theoretical disagreement (Keeley, 1990; Boyd & De Nicolo, 2005)
  - Empirical disagreement (Jayaratne & Strahan, 1999; Berger & Mester, 2003; Dick, 2006)

- Did removing entry restrictions affect bank risk-taking?
  - Theoretical disagreement (Keeley, 1990; Boyd & De Nicolo, 2005)
  - Empirical disagreement (Goetz et al., 2016; Jiang et al., 2017)
Interstate Banking Deregulation: What We Know

- Did removing entry restrictions affect banks’ business models?
  - The evolution of bank business models coincided with the deregulation period
  - The decline in traditional bank business models (taking deposits and making loans) has been attributed to:
    - Tech. change/securitization – Keys et al. 2010, Stein 2010
  - Did bank deregulation contribute to the decline of traditional banking (as predicted by Keeley 1990)?
This paper

- Develops network-based competition shocks to local banking markets
  - Uses bilateral interstate banking laws of the 1980s and 1990s
- Shows that increased competition leads to
  - Lower net interest margins (NIM)
  - Higher risk-taking (income volatility, loan charge-offs, etc.)
  - Business model changes (loan/assets, loan sales, etc.)
- Mechanism (Keeley 1990)
  - Interstate branching deregulation removed entry restrictions
  - Banks have charter value from entry restrictions
    - Entry restrictions allow banks to extract rents
  - Restrictions naturally limit risk-taking
    - Too much risk → lost future rents
Data

- **Sources:**
  - FFIEC Call Reports
    - Quarterly bank-level financials
    - Drop pre-1984 period due to changes in NIM reporting
  - FDIC and Christa Bouwman (TAMU)
    - Annual branch-level deposits data
  - Amel 1993
    - Deregulation data, timing of states’ reciprocal agreements

- **Sample period: Q1-1984 to Q4-2000**
  - Appendix contains results with different sub-periods
Thinking about Deregulation in Network Terms

- We use interstate banking laws in 1980s/1990s to develop a network of deregulation shocks
  - States are network nodes
  - Links are determined by extent of deregulation agreements

- We exploit two unique features of deregulation:
  - Some states allow entry without requiring reciprocal agreement
  - Even in reciprocal arrangements, nothing happens until **both** states have agreements in place

- The existing literature largely uses the Kroszner and Strahan (1999) deregulation dates, which are based on the **first** date a state passed a deregulation bill
Thinking about Deregulation in Network Terms

- **Key observation:** Reciprocal interstate deregulation affects:
  - Competitive pressure (more banks with access to local markets)
  - Investment opportunities (local banks can access more markets)

- **Our network approach allows us to disentangle these effects**
Thinking about Deregulation in Network Terms

- **Key observation:** Reciprocal interstate deregulation affects:
  - Competitive pressure (more banks with access to local markets)
  - Investment opportunities (local banks can access more markets)

- Our network approach allows us to disentangle these effects

- **States In\(_{m,t}\):**
  - Number of states whose banks can acquire banks in state \(m\) in year \(t\)
  - Captures changes in *competition* faced by state-\(m\) banks due to deregulation
Thinking about Deregulation in Network Terms

**Key observation:** Reciprocal interstate deregulation affects:
- Competitive pressure (more banks with access to local markets)
- Investment opportunities (local banks can access more markets)

Our network approach allows us to disentangle these effects

- *States In*$_{m,t}$:
- *States Out*$_{m,t}$:
  - Number of states that state-*m* banks can access in year *t*
  - Captures changes in *investment opportunities* for state-*m* banks due to deregulation
Thinking about Deregulation in Network Terms

- **Key observation:** Reciprocal interstate deregulation affects:
  - Competitive pressure (more banks with access to local markets)
  - Investment opportunities (local banks can access more markets)

- Our network approach allows us to disentangle these effects
  - $States\ In_{m,t}$:
  - $States\ Out_{m,t}$:
  - $Net\ States\ In_{m,t}$ (our main competition measure):
    - Captures *net competition shocks*
    - Ensures no aggregate trends in treatment intensity
Example: Colorado, Nebraska, Massachusetts

- In 1981, no state has signed interstate agreements
- CO, NE, MA are isolated
  - CO States In = 0; Banks from other states cannot enter CO
  - CO States Out = 0; CO banks cannot enter other states

- In 1988, CO signs regional reciprocal agreement with NE
- However, NE does not reciprocate
- Literature usually codes 1988 as CO deregulation year, yet CO is still isolated
Colorado-Nebraska Reciprocals (1988, 1991)

- In 1991, NE reciprocates CO
- CO banks can access NE and vice-versa
  - CO States In +1; More competition
  - CO States Out +1; more investment opportunities

- In 1991, CO signs national non-reciprocal agreement
  - MA banks can access CO, but CO banks cannot access MA
    - CO States In +1
    - CO States Out unchanged
  - Competition shock without investment opportunities shock
    - This is our main departure from the deregulation literature
Riegle-Neal Act (1994)

- Riegle-Neal (IBBEA) allows banks to access all U.S. states as of September 1995
  - CO States In unchanged
  - CO States Out +1
- Investment opportunities shock without competition shock
On average, Kroszner & Strahan (1999) deregulation indicator leads average States In by ~3 years.
- Net States In is zero on average
  - Identification comes from within-year differences across states
  - Mitigates concerns about spurious estimates in staggered DiD
Distribution of *Net States In*

- *Net States In* is zero on average
  - Sufficient deviations from 0 for identification
Distribution of *Net States In* Changes

Excluding Riegle-Neal Act changes in *Net States In*, states:
- Changed *Net States In* between -13 and 3.5 states (given any change)
- Significant within-state variation in change intensity
## Competition and Concentration

**Dependent variable:** Deposit HHI

<table>
<thead>
<tr>
<th>Net States In</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-0.142***</td>
<td>(0.018)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.040***</td>
<td>(0.008)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-0.031***</td>
<td>(0.005)</td>
<td></td>
</tr>
</tbody>
</table>

Fixed Effects:
- Bank: YES, YES, YES
- Year-Quarter: NO, YES, YES
- County: NO, NO, YES
- R-Squared: 0.631, 0.676, 0.880
- Obs.: 4,559,205

- A one-state *Net States In* increase is associated with a 0.03 percentage points drop in HHI
- A 50-state *Net States In* increase is associated with 1.5 p.p. drop in HHI
  - ~7% of the sample mean HHI
  - Suggests *Net States In* is a good proxy for competition
### Competition and NIM

<table>
<thead>
<tr>
<th>Dependent variable: NIM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>States In</strong></td>
</tr>
<tr>
<td>-0.101***</td>
</tr>
<tr>
<td>(0.02)</td>
</tr>
<tr>
<td>-0.191***</td>
</tr>
<tr>
<td>(0.05)</td>
</tr>
<tr>
<td>-0.489***</td>
</tr>
<tr>
<td>(0.05)</td>
</tr>
<tr>
<td><strong>States Out</strong></td>
</tr>
<tr>
<td>0.245**</td>
</tr>
<tr>
<td>(0.10)</td>
</tr>
<tr>
<td>0.231**</td>
</tr>
<tr>
<td>(0.11)</td>
</tr>
<tr>
<td><strong>Net States In</strong></td>
</tr>
<tr>
<td>-0.172***</td>
</tr>
<tr>
<td>(0.04)</td>
</tr>
<tr>
<td>-0.174***</td>
</tr>
<tr>
<td>(0.04)</td>
</tr>
<tr>
<td><strong>K-S Deregulation</strong></td>
</tr>
<tr>
<td>1.019</td>
</tr>
<tr>
<td>(1.20)</td>
</tr>
<tr>
<td>1.119</td>
</tr>
<tr>
<td>(1.10)</td>
</tr>
<tr>
<td><strong>i, s, and t fixed effects:</strong></td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td>YES</td>
</tr>
<tr>
<td><strong>R-Squared</strong></td>
</tr>
<tr>
<td>0.501</td>
</tr>
<tr>
<td>0.501</td>
</tr>
<tr>
<td>0.501</td>
</tr>
<tr>
<td>0.501</td>
</tr>
<tr>
<td>0.501</td>
</tr>
<tr>
<td><strong>Obs.</strong></td>
</tr>
<tr>
<td>4,558,911</td>
</tr>
</tbody>
</table>

- 50-state increase in *Net States In* → 9 bps decrease in NIM
- Results robust to inclusion of Kroszner-Strahan deregulation measures
## Deposit Market Power

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Interest Income</th>
<th>Interest Expense</th>
<th>Deposit Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Earning Assets</td>
<td>Earning Assets</td>
<td>Earning Assets</td>
</tr>
<tr>
<td>Net States In</td>
<td>0.001</td>
<td>0.074***</td>
<td>0.082***</td>
</tr>
<tr>
<td></td>
<td>(0.02)</td>
<td>(0.02)</td>
<td>(0.02)</td>
</tr>
</tbody>
</table>

Fixed Effects:
- Bank: YES, YES, YES
- Year-Quarter: YES, YES, YES
- State: YES, YES, YES

R-Squared: 0.796, 0.894, 0.873

Obs.: 4,531,895, 4,531,895, 4,512,026

- Drop in NIM due to competition from increased deposit expenditure, not lower interest on loans
  - Supports view that banks earn deposit rents (Berger and Hannan 1989, 1997; Neumark & Sharpe 1992; Drechsler et al 2017, 2018)
Deregulation and Bank Characteristics

- NIM reductions are smaller for:
  - Banks with ex-ante higher market power
  - Ex-ante larger banks

- Suggests deregulation penalized small banks in competitive areas

<table>
<thead>
<tr>
<th>Dependent variable: NIM</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Net States In × Market Power</em></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><em>Net States In × Large</em></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

i, s, and t Fixed Effects: YES YES

R-Squared: 0.492 0.492
Obs.: 4,274,480 4,322,686
Bank Profitability

- Drop in NIM leads to drops in profitability
  - One-state increase in *Net States In* $\rightarrow$ 3 b.p. drop in ROE
  - Similar effects for ROA
How Do Banks Respond?

» We document three main responses to increased competition:

1. Banks merge with each other

2. Banks increase risk-taking (e.g., Keeley 1990)
   » Income volatility increases
   » Loan loss provisions, charge-offs increase

3. Banks change their business models
   » Reduction in loans-to-assets
   » Activity in secondary loan markets increases
## Bank Mergers

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>1[Bank acquired]</th>
<th>1[Bank fails]</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Net States In</em></td>
<td>0.041***</td>
<td>-0.004</td>
</tr>
<tr>
<td></td>
<td>(0.01)</td>
<td>(0.03)</td>
</tr>
</tbody>
</table>

- *Net States In* increases acquisition propensity by 2%
  - Effect is stronger when acquired bank’s state is larger
- No evidence of competition effects on bank failure

- *Dependent variable:*
  - 1[Bank acquired]
  - 1[Bank fails]
  - *Net States In* 0.041*** -0.004
  - (0.01) (0.03)
  - i, s, and t fixed effects YES YES
  - R-Squared 0.256 0.187
  - Obs. 4,559,205 4,559,205
Risk-taking
## Bank Business Models

<table>
<thead>
<tr>
<th>Dependent variable:</th>
<th>Loans</th>
<th>Total Assets</th>
<th>1[Loan Sales Gain/Loss]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net States In</td>
<td>-0.020*</td>
<td>(0.01)</td>
<td>0.096**</td>
</tr>
<tr>
<td>Net States In (lag 1)</td>
<td>-0.052***</td>
<td>(0.01)</td>
<td>0.155***</td>
</tr>
</tbody>
</table>

- *i, s, and t fixed effects*  
  - YES  
  - YES  
  - YES  
  - YES

- R-Squared  
  - 0.696  
  - 0.696  
  - 0.419  
  - 0.419

- Obs.  
  - 4,555,480  
  - 4,555,480  
  - 4,559,205  
  - 4,559,205

- **Net States In**-driven competition:
  - Decreases loan retention on balance-sheet
  - Increases incidence of gains/losses on loan sales

- Suggestive of shift to originate-to-distribute model
Conclusion

- We build network-based deregulation measures to estimate the effects of interstate banking deregulation
  - Network arises from interstate deregulation of the 1980s/1990s
  - Formulation isolates competition vs. investment opportunities shocks

- Consistent with early motivating theory, we show that increased competition leads to:
  - Lower profitability
  - Higher risk-taking
  - Changes in bank business models

- Our findings reconcile prior conflicting theories and empirical evidence on deregulation and market structure, and have implications for banking sector regulation and consolidation