

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

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October 2019

**Community Banking in the 21<sup>st</sup> 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
    - ▶ Shadow banking - Greenwood et al. 2010, Gorton et al. 2012
  - ▶ 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

- ▶ Identifying variation from deregulation period (1984–1995)
- ▶ 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**



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- ▶ 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





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  - ▶ *States In<sub>m,t</sub>*:
    - ▶ Number of states that state-*m* banks can access in year *t*
    - ▶ Captures changes in *investment opportunities* for state-*m* banks due to deregulation
  - ▶ *States Out<sub>m,t</sub>*:
    - ▶ Number of states that state-*m* banks cannot access in year *t*
    - ▶ Captures changes in *investment opportunities* for state-*m* banks due to deregulation

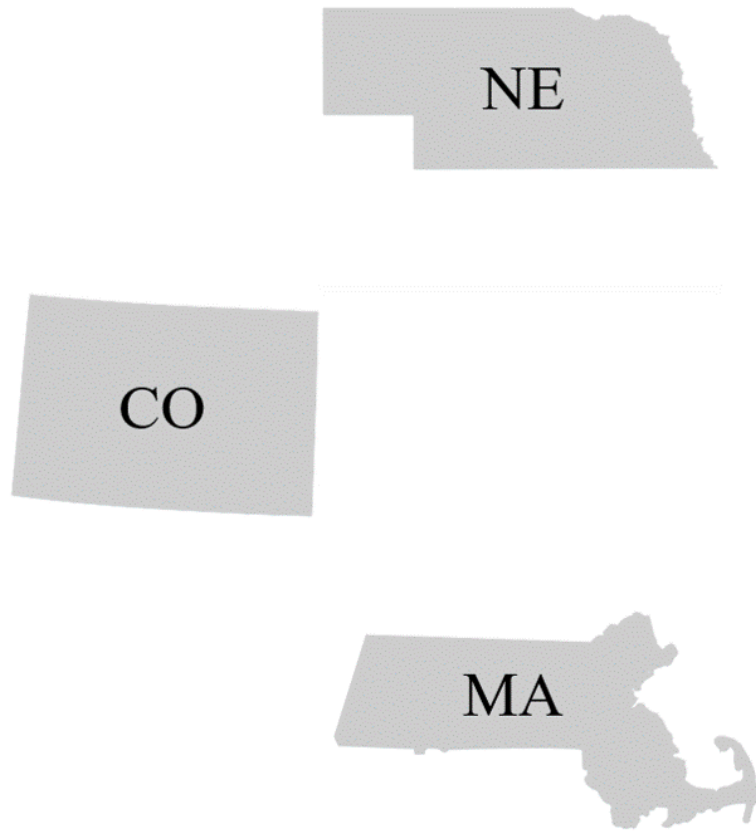


# Thinking about Deregulation in Network Terms

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- ▶ Our network approach allows us to disentangle these effects
  - ▶ *States In<sub>m,t</sub>*:
  - ▶ *States Out<sub>m,t</sub>*:
  - ▶ *Net States In<sub>m,t</sub>* (our main competition measure):
    - ▶ Captures *net competition shocks*
    - ▶ Ensures no aggregate trends in treatment intensity

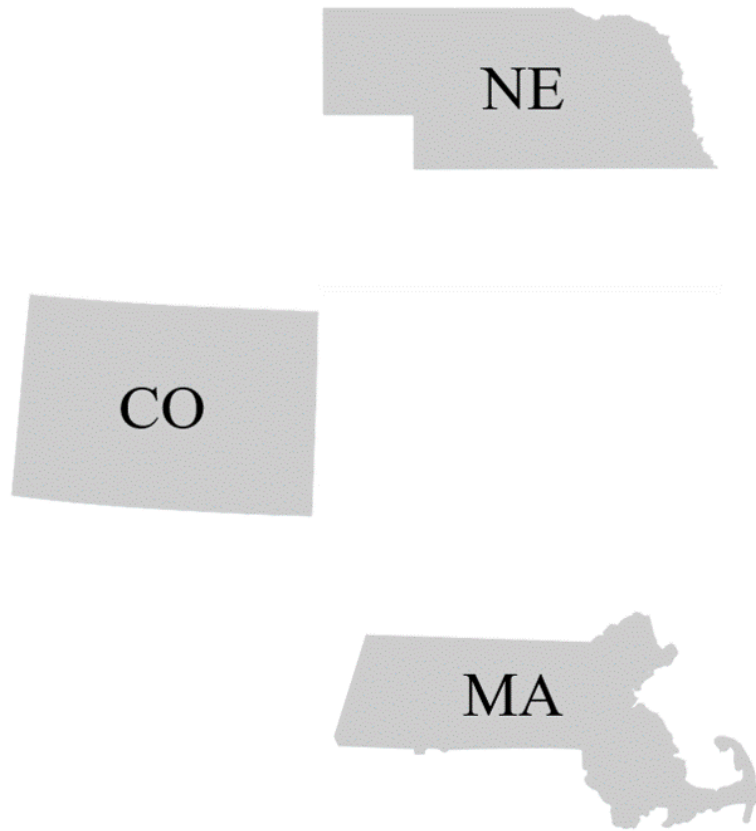


# Example: Colorado, Nebraska, Massachusetts



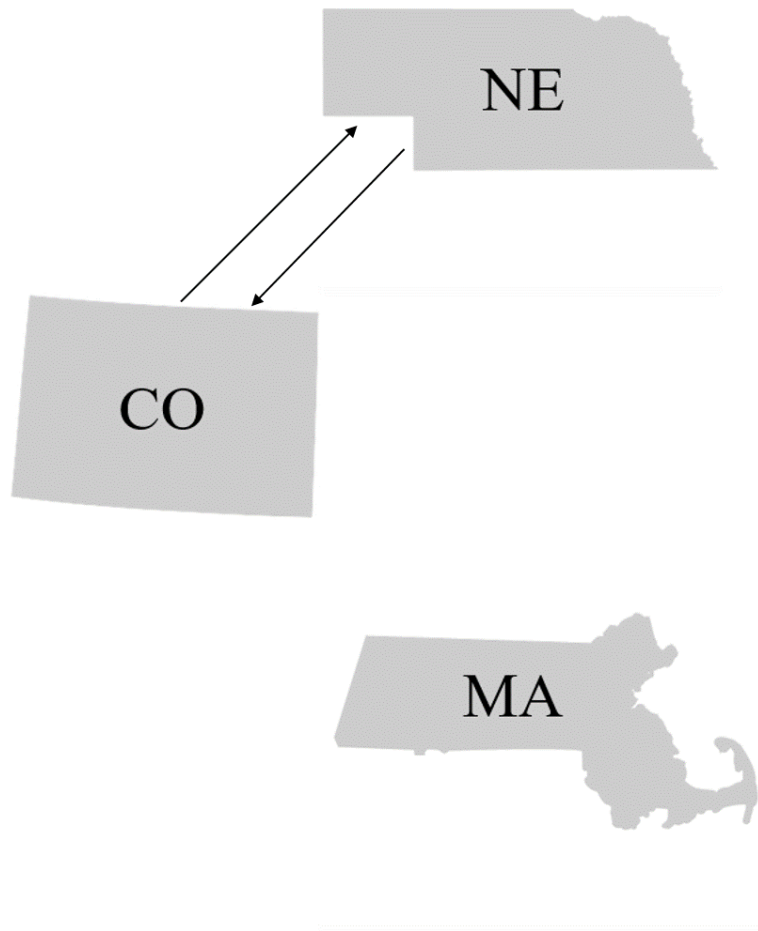
- ▶ In 1981, no state has signed interstate agreements
- ▶ CO, NE, MA are isolated
  - ▶ *CO States In* = 0; Banks from other states cannot enter CO
  - ▶ *CO States Out* = 0; CO banks cannot enter other states

# Colorado-Nebraska Reciprocals (1988, 1991)



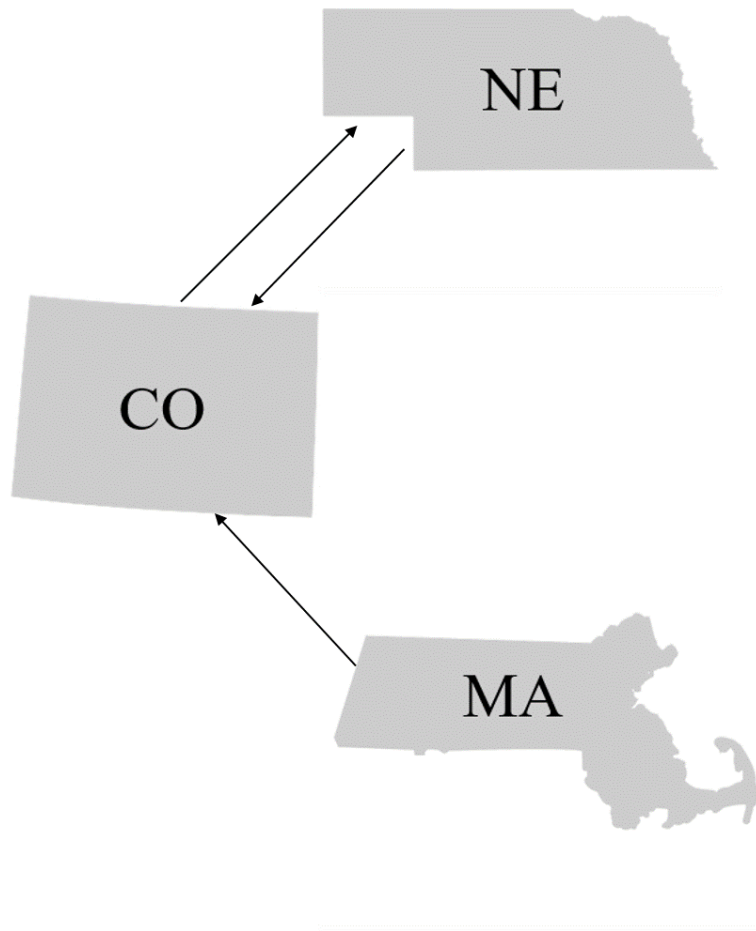
- ▶ In 1988, CO signs regional reciprocal agreement with NE
- ▶ However, NE does not reciprocate
- ▶ Literature usually codes 1988 as CO deregulation year, yet CO is still isolated

# Colorado-Nebraska Reciprocals (1988, 1991)



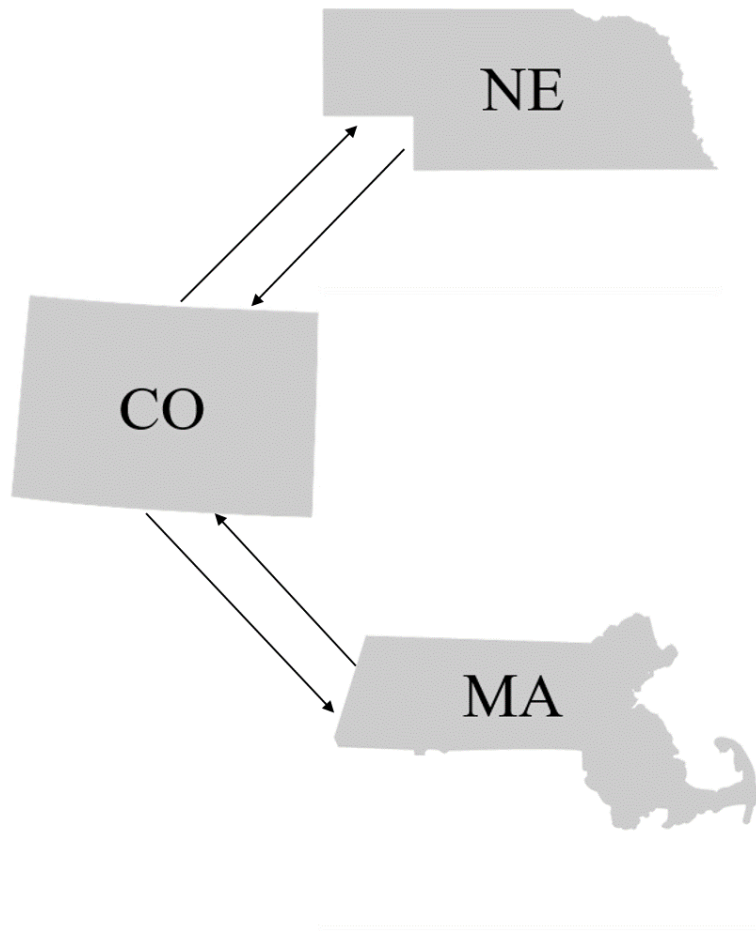
- ▶ In 1991, NE reciprocates CO
- ▶ CO banks can access NE and vice-versa
  - ▶ CO *States In* +1; More competition
  - ▶ CO *States Out* +1; more investment opportunities

# Colorado Non-Reciprocal Agreement (1991)



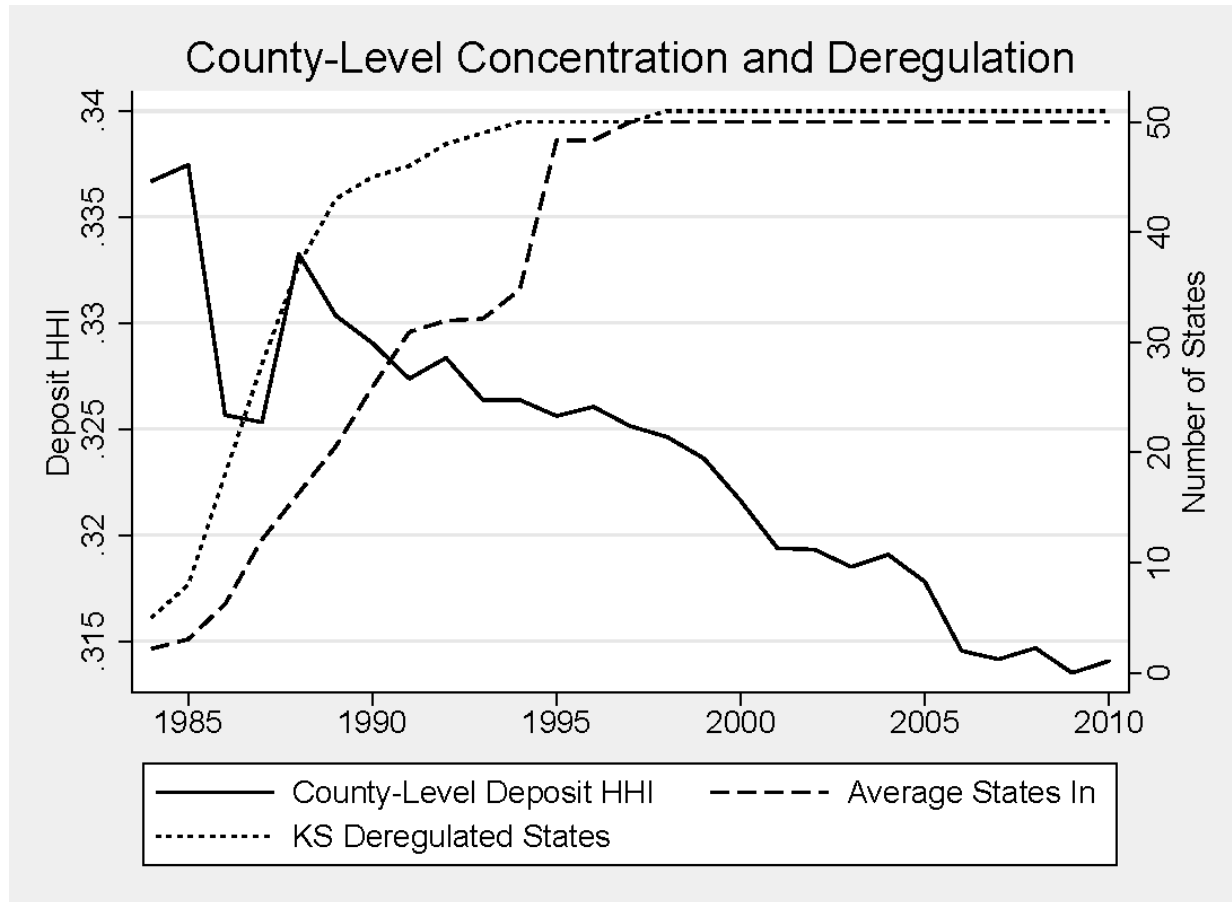
- ▶ In 1991, CO signs national non-reciprocal agreement
- ▶ MA banks can access CO, but CO banks cannot access MA
  - ▶ *CO States In* +1
  - ▶ *CO States Out* unchanged
- ▶ Competition shock without investment opportunities shock
  - ▶ This is our main departure from the deregulation literature

# 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

# Deregulation Events and Local Competition

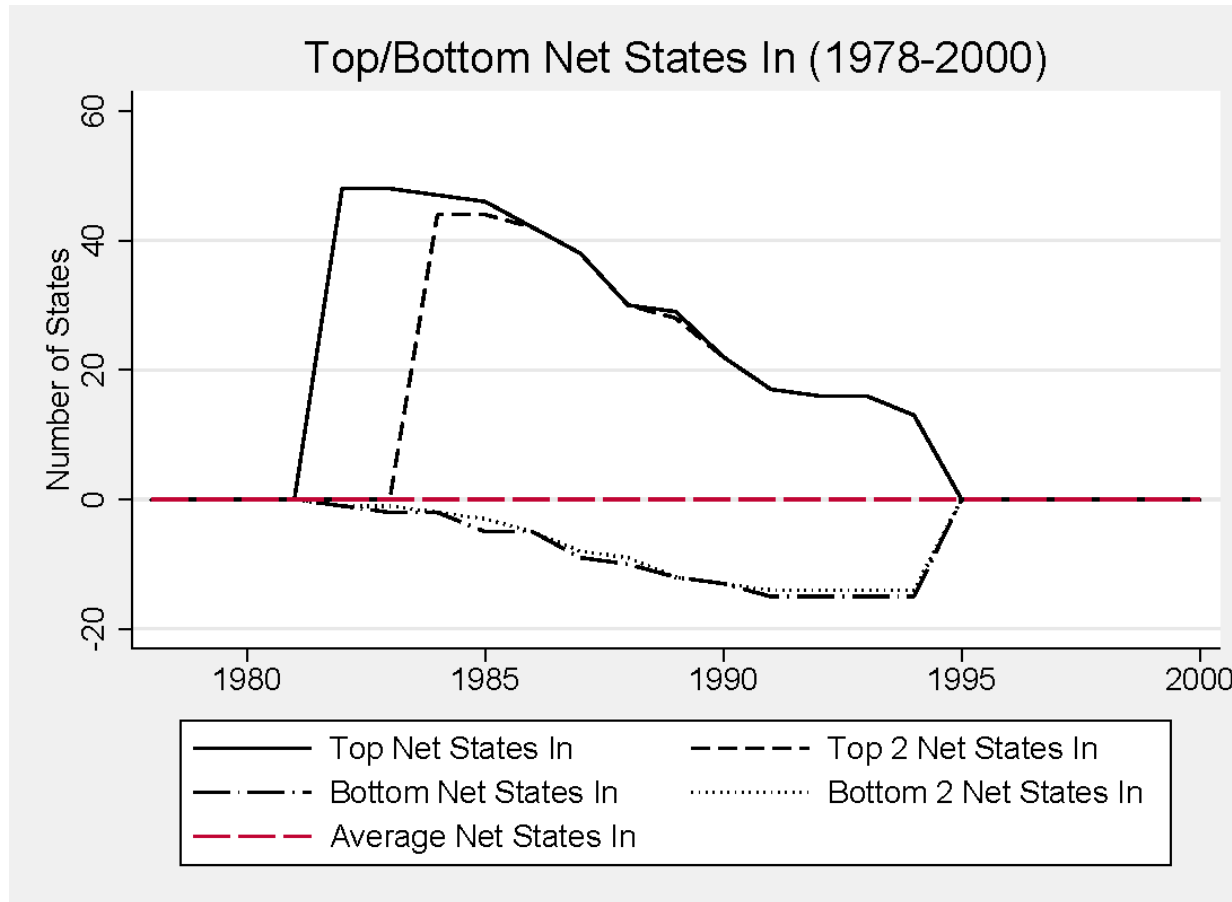


- ▶ On average, Kroszner & Strahan (1999) deregulation indicator leads average *States In* by ~3 years





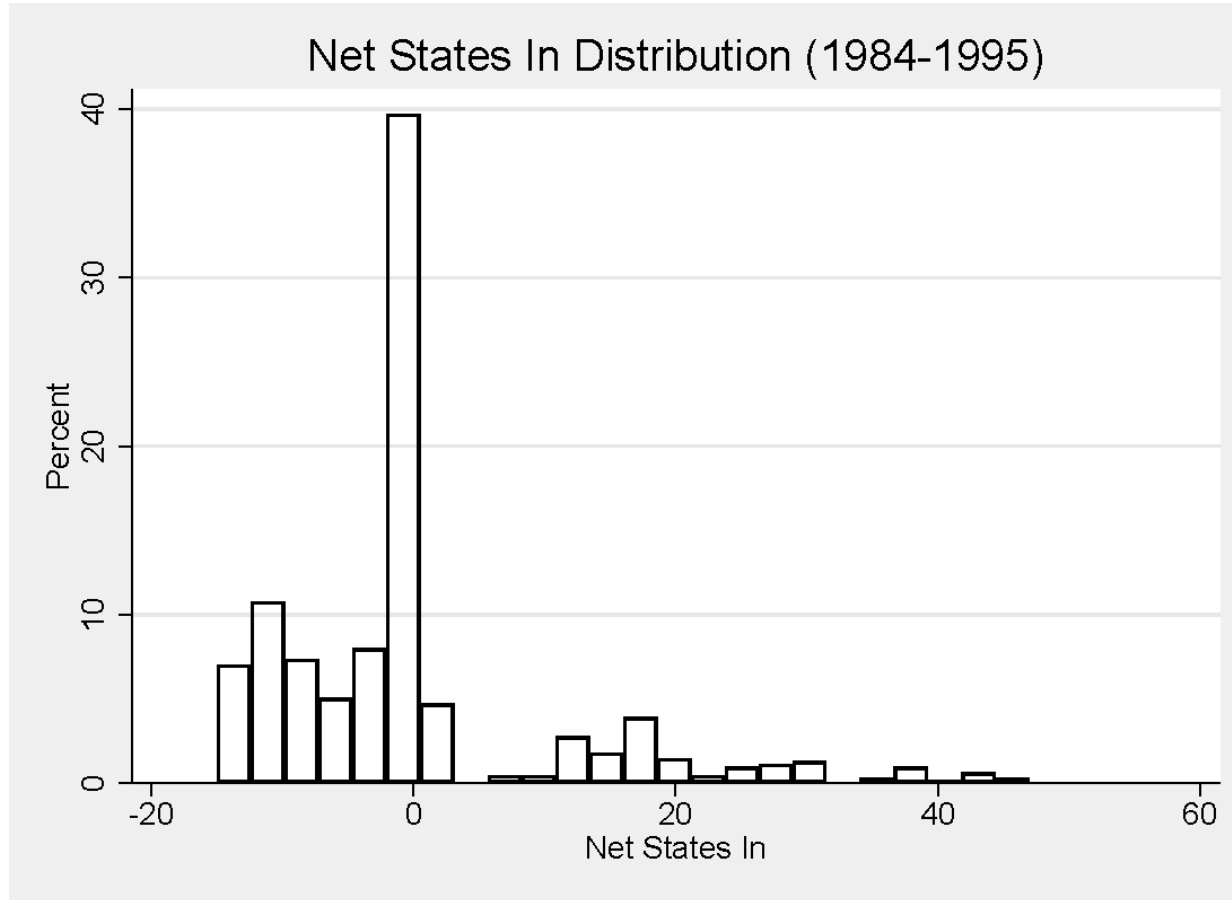
# Time Series Evolution of *Net States In*



- ▶ *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*

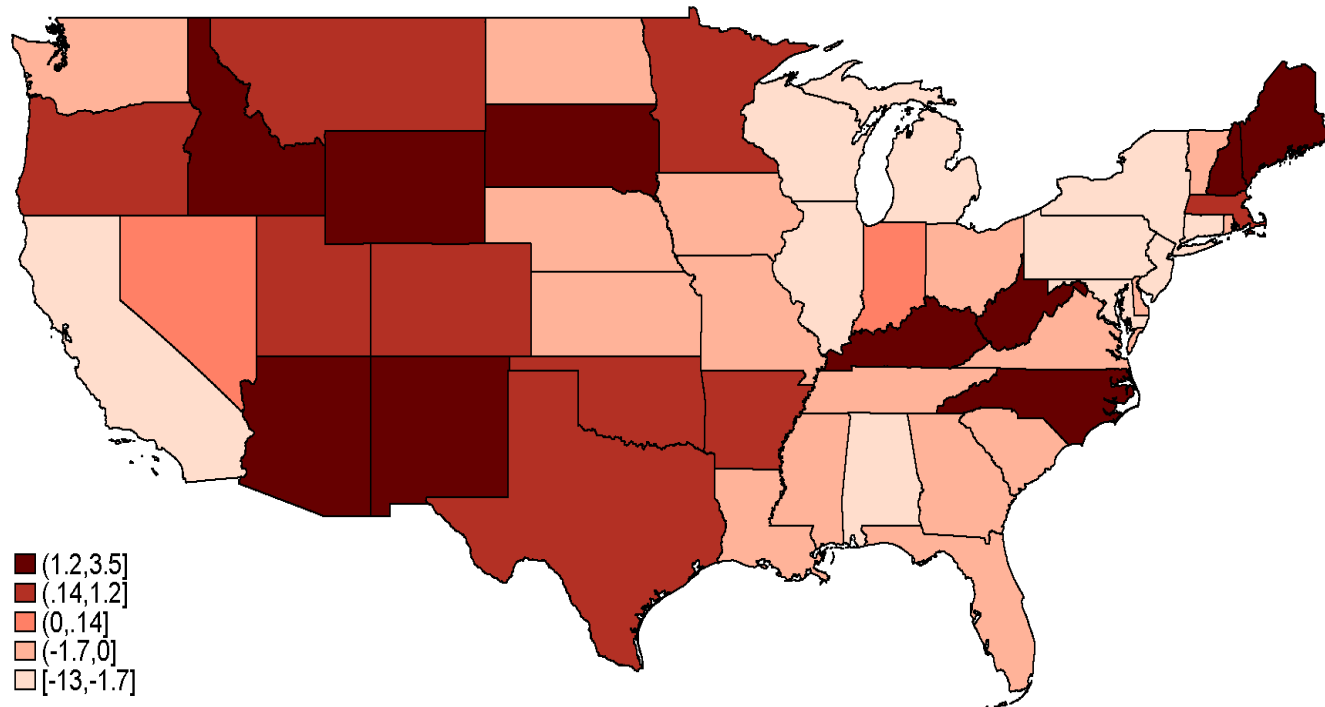


- ▶ *Net States In* is zero on average
  - ▶ Sufficient deviations from 0 for identification



# Distribution of *Net States In* Changes

Panel B: Average *Net States In* Additions, 1984-1994



- ▶ 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

<b>Dependent variable: <i>Deposit HHI</i></b>			
<i>Net States In</i>	<b>-0.142***</b>	<b>-0.040***</b>	<b>-0.031***</b>
	<b>(0.018)</b>	<b>(0.008)</b>	<b>(0.005)</b>
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

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

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



# Deposit Market Power

Dependent variable:	<i>Interest Income</i>	<i>Interest Expense</i>	<i>Deposit Interest</i>
	<i>Earning Assets</i>	<i>Earning Assets</i>	<i>Earning Assets</i>
<i>Net States In</i>	<b>0.001</b>	<b>0.074***</b>	<b>0.082***</b>
	<b>(0.02)</b>	<b>(0.02)</b>	<b>(0.02)</b>
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**

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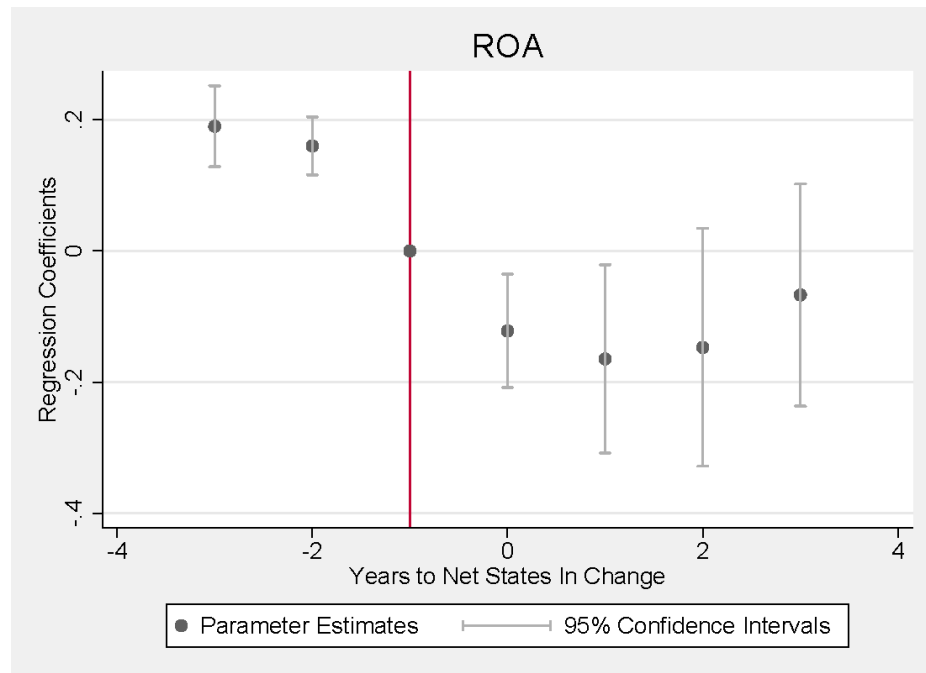
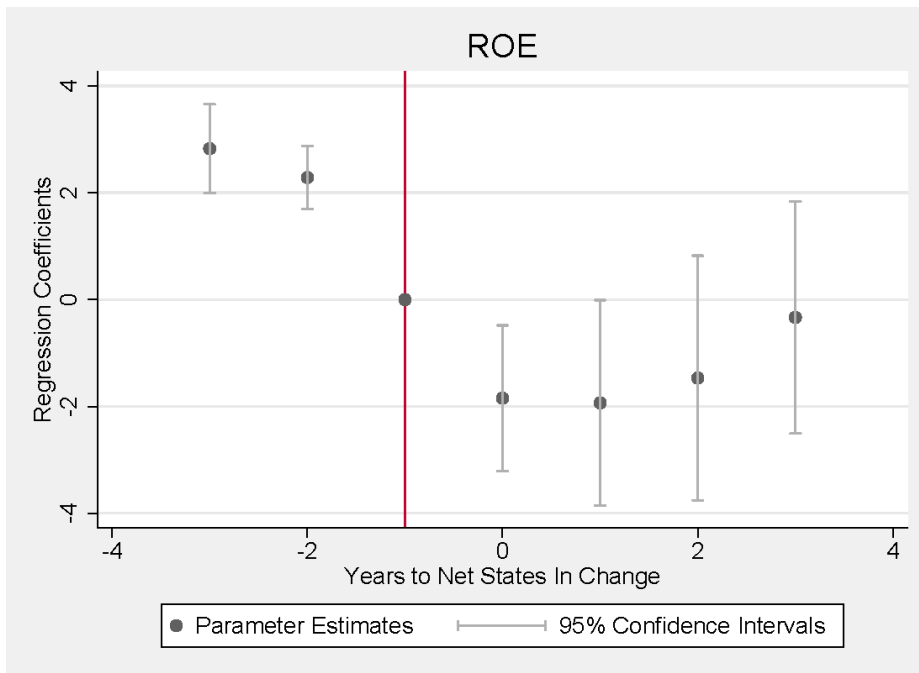
<b>Dependent variable: <i>NIM</i></b>		
<i>Net States In × Market Power</i>	0.415*** (0.06)	
<i>Net States In × Large</i>		0.099* (0.05)
<i>i, s, and t Fixed Effects:</i>	YES	YES
R-Squared	0.492	0.492
Obs.	4,274,480	4,322,686

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# Bank Profitability

- ▶ Drop in NIM leads to drops in profitability
  - ▶ One-state increase in *Net States In* → 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



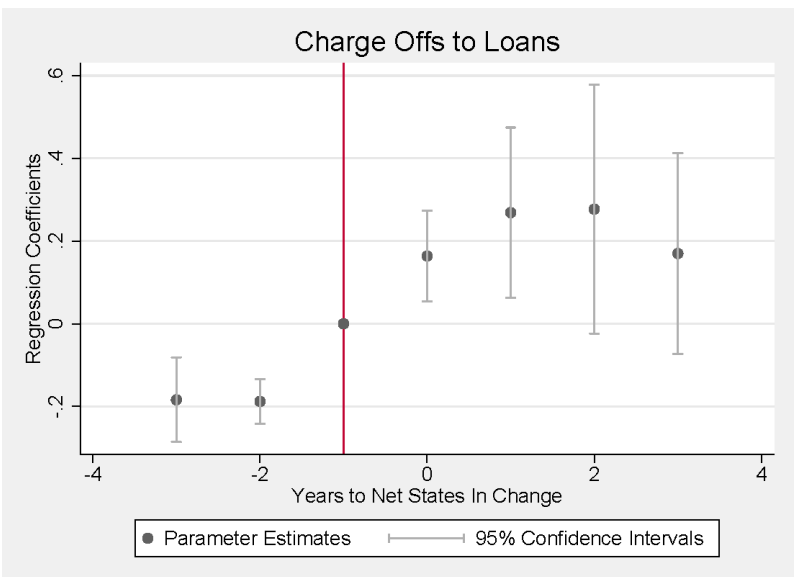
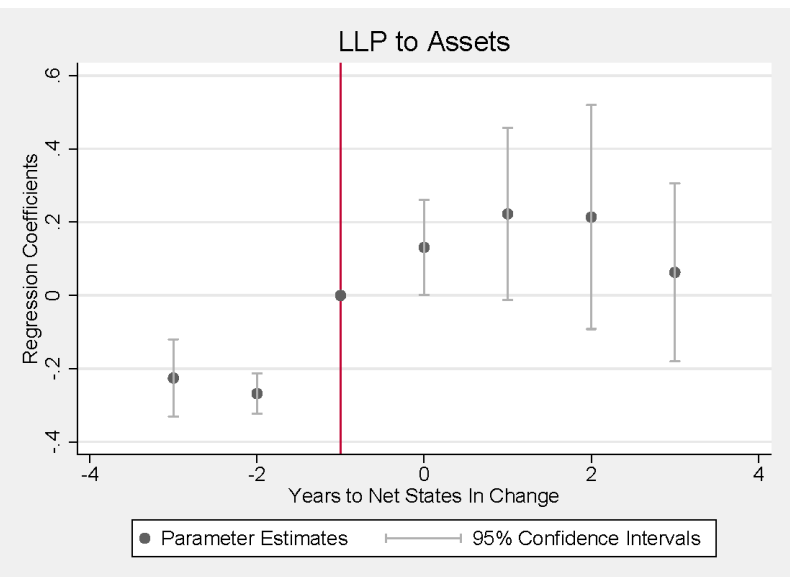
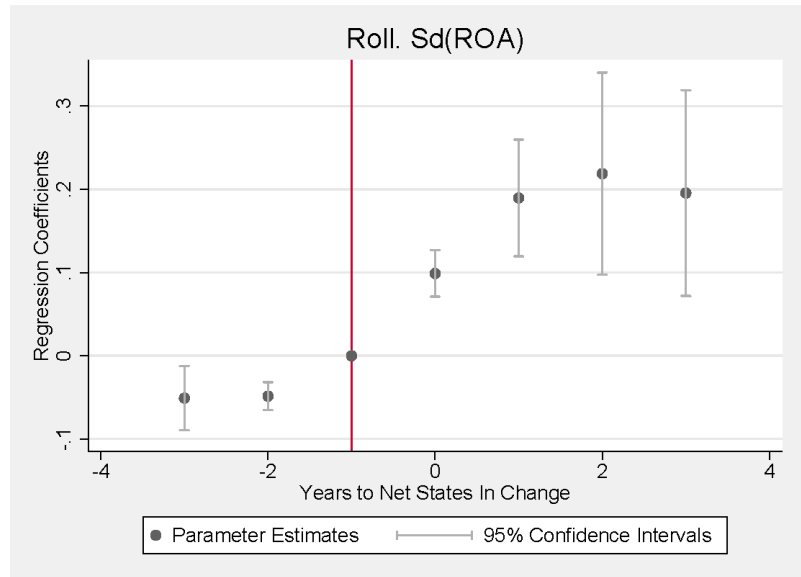
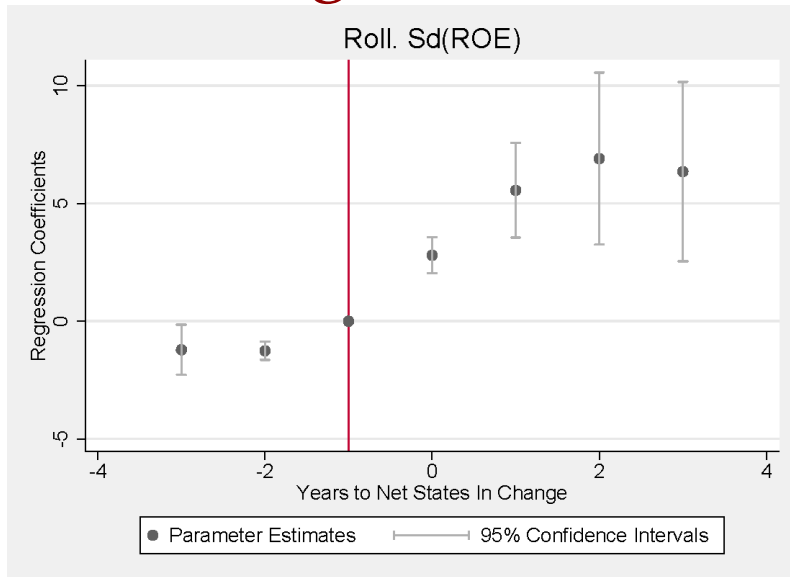
# Bank Mergers

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

- ▶ 50-state increase in *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



# Risk-taking



# Bank Business Models

Dependent variable:	<i>Loans</i>		1[ <i>Loan Sales Gain/Loss</i> ]	
	<i>Total Assets</i>			
<i>Net States In</i>	-0.020*		0.096**	
	(0.01)		(0.04)	
<i>Net States In (lag 1)</i>		-0.052***		0.155***
		(0.01)		(0.04)
<i>i, s, and t</i> 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

