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# **The Valuation Effects of the Geographic Diversification of U.S. Banks**

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Global Research Forum on Int'l Macro and Finance, ECB, 17-18 Dec 2012

The paper's findings, interpretations, and conclusions are entirely those of the authors and do not necessarily represent the views of the Federal Reserve Bank of Boston or the International Monetary Fund, its Executive Directors, or the countries they represent.

## Question

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How does geographic diversity of bank holding companies influence corporate valuations?

- ▶ Did the geographic diversification of bank assets (through subsidiaries) across the US states in the 1980s & 1990s:
  - ▶ increase or decrease the market's valuation of banks?
- ▶ Relevant for the current debate on activity and size restrictions on banks, and the role of financial integration



## Motivation: Long debate

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- ▶ **Diversity might lower valuations and intensify agency problems**
  - ▶ Facilitate the exploitation of control
  - ▶ Insiders will exploit private benefits if those benefits exceed the reduction in the value of their private holdings.
  - ▶ Jensen, Jensen/Meckling, Jensen/Murphy, Scharfstein and Stein
- ▶ **Diversity might boost valuations and reduce agency problems**
  - ▶ Scale economies (Gertner/Scharfstein/Stein, Houston/James/Marcus)
  - ▶ Reduce exposure to idiosyncratic shocks
  - ▶ Ease monitoring in the case of banks (Diamond, 1984)



# Why study geographic diversity of US BHCs?

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- ▶ Identification:

- ▶ Geographic diversity in the 1980s and 1990s provides a natural experiment for examining the causal impact of diversity on valuations and insider lending

- ▶ Sets the bar very high:

- ▶ Benefits of risk diversification and scale economies should be high
- ▶ Therefore, if diversity *still* lowers valuations, then agency problems are probably first-order



## This paper: Two new identification strategies

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- ▶  $q_{ist} = \beta D_{ist} + X'_{ist} \rho + \delta_i + \delta_{st} + \delta_{ibt} + \varepsilon_{ist}$
- ▶ Variables:
  - ▶  $q_{ist}$  = Tobin's q or insider lending/nonperforming loans
  - ▶  $D_{ist}$  = measure of the BHCs geographic diversity
  - ▶  $X_{ist}$  = matrix of time-varying, state-varying, BHC traits.
- ▶ Period: 1986 – 2007, deregulation triggered diversification
- ▶ Identification:
  - ▶ X-state, X-time process of deregulation
  - ▶ Gravity model of BHC-specific diversification after deregulation



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# Some preliminaries

Key variables data



## Diversification: 4 measures

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- ① Diversification = 1 if a BHC has subsidiaries in more than one state, and 0 otherwise.
  - About 25% of BHCs.
  - 50% of these are in 3 or more states.
  - Undiversified banks typically have one subsidiary.
- ② Fraction of assets held in out-of-state subsidiaries
- ③  $\ln(\text{Average distance between HQ and subsidiaries (in miles)} + 1)$
- ④ 1 – Herfindahl Index of assets across states



## Sample construction

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- ▶ **Publicly listed BHCs, within 50 states & DC, 1986 – 2007**
  - ▶ We start in 1986 because that is when domestic BHC started reporting their consolidated balance sheet, income statement, etc to Fed.
  - ▶ From Call reports, we match each bank to its BHC.
  
- ▶ **759 BHC**
  - ▶  $\approx$  250 for the average quarter.
  - ▶  $\approx$  28,000 BHC-quarter observations



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# Some more preliminaries

Patterns



# Diversity & q: $q_{ist} = \beta D_{ist} + \delta_i + \delta_s + \varepsilon_{ist}$

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Diversification Dummy	1.16***				-0.21***			
% of assets held out-of-state		3.23***				-0.26		
1 - Herfindahl Index			1.55***				-0.88***	
ln(Average distance to subs)				0.33***				-0.09***
Quarter fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
State fixed effects	✓	✓	✓	✓				
BHC fixed effects					✓	✓	✓	✓

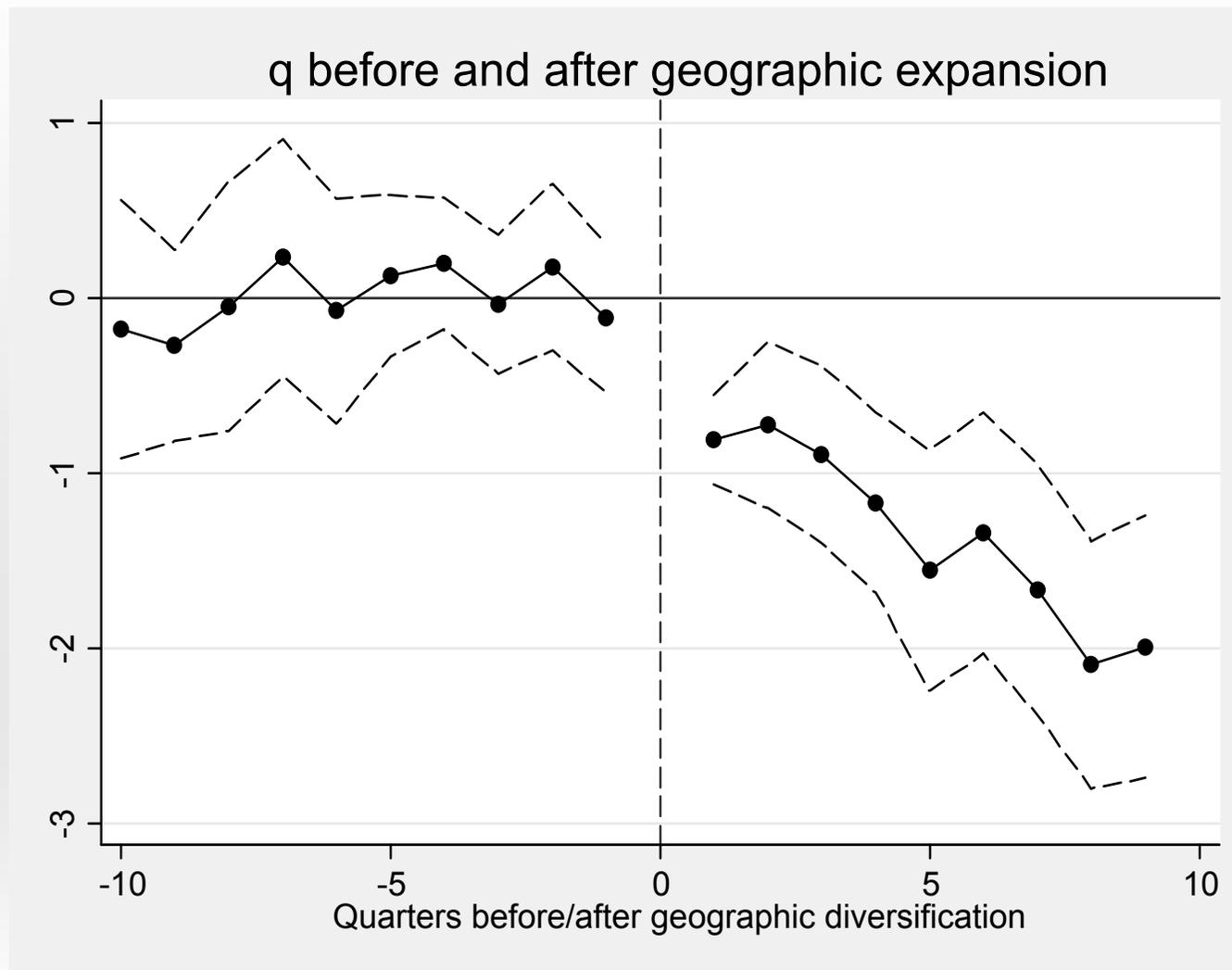
Robust to confounding influences (competition, activity diversity, etc.) and additional fixed effects (state-time, subsidiary-state-time, etc.)

This is consistent with the view that higher valued, more profitable, banks diversify, but diversification is associated with a drop in valuations. For more on this pattern, ...

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## Dynamic relation between diversification and BHC valuations



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# Interstate Banking Deregulation

An identifying process, not an event

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# Interstate deregulation: 1978 - 1995

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- ▶ Prior to 1978, BHCs restricted from establishing subsidiaries/branches across states.
- ▶ National technological innovations and court decisions
  - ▶ State-specific timing
  - ▶ State-specific evolution has not been studied before
- ▶ Deregulation allowed
  - ▶ BHCs to purchase & establish subsidiaries
  - ▶ Also, with time, interstate banking through branching, which are not separately capitalized, legal entities.



# Identification

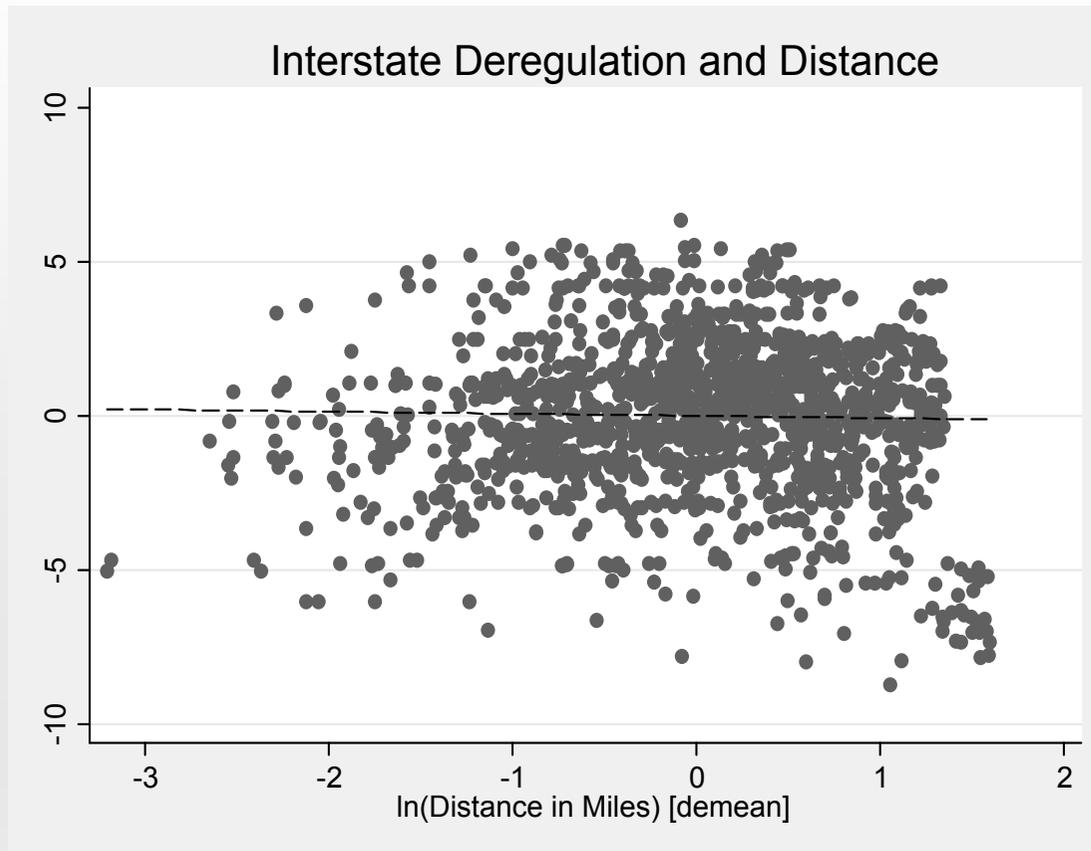
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- ▶ Exploit  $X$ -state,  $X$ -time variation in the *process* of interstate bank deregulation to identify exogenous changes in BHC diversity.
- ▶ The “process” characteristic is unique.



# Interstate Deregulation and Distance...

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For a state pair A-B, the y-axis measures the difference between the year of deregulation and the average year of A's Interstate Banking Deregulation with all states; the x-axis measures the difference between  $\ln(\text{distance between A and B})$  and the average  $\ln(\text{distance})$  between A and all states.

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# Deregulation measures

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## Measures using start date (existing literature)

- ① Years since deregulation (and its square)
- ② Dummies for each year since deregulation
- ✧ When a state first opens

## Measures using process of (outward) deregulation

- ① Ln (number of accessible states)
- ② Ln (Market population)
- ③ Ln (Market population/home population)
- ✧ Each of these done with and without weighting by distance
- ✧ These become our instruments



# Deregulation and differences in q...

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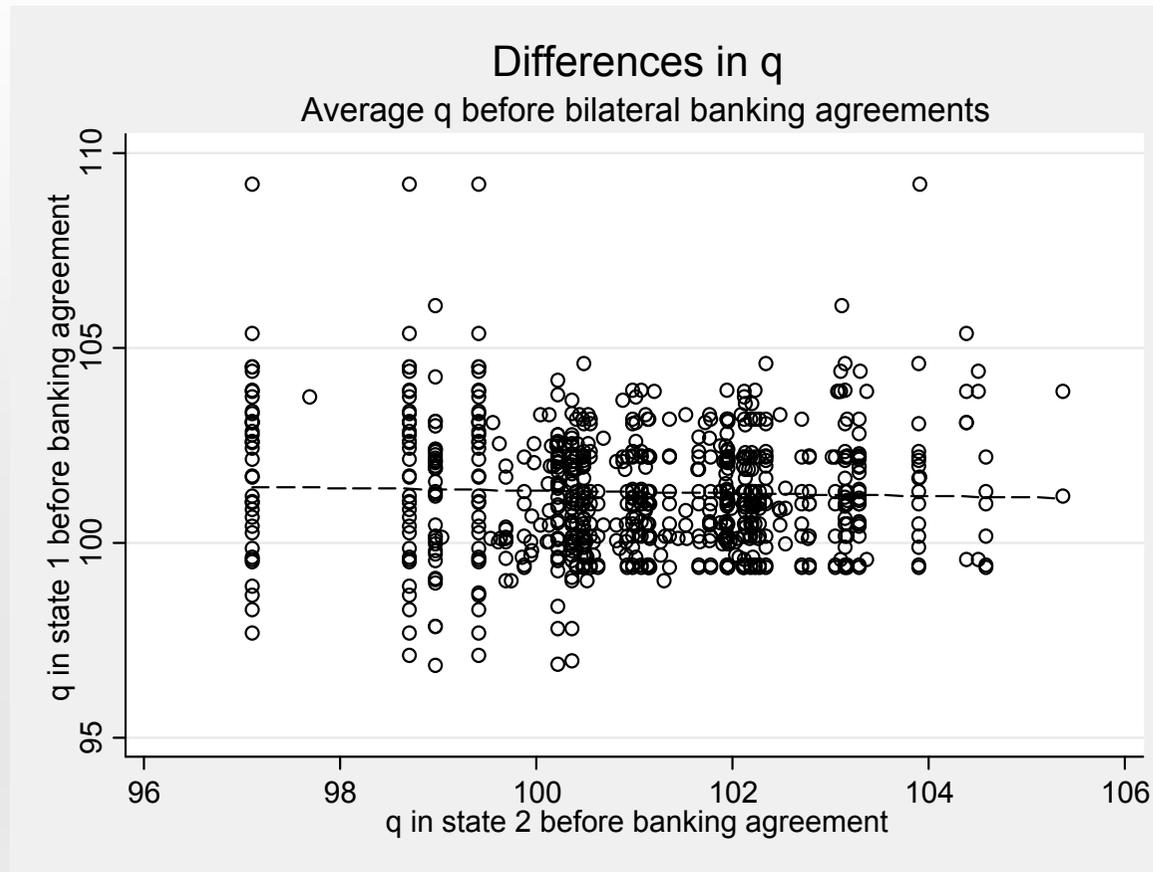


Figure plots average q (in %) in state 1 against the average q (in %) in state 2 before both states remove their interstate banking (dashed line = linear relationship, estimated by OLS ).

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We employ two IV strategies

**The first operates at the state-time level.  
The second operates at the state-time-BHC level.**

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# Diversity & $q$ : State-time IV

Tobin's $q$ (second-stage)	(6)	(7)	(8)	(9)
I - Herfindahl index of assets across states	-22.320** (10.397)	-17.191*** (5.136)	-12.559*** (4.841)	-11.634*** (3.182)
Bank and macro controls	✓	✓	✓	✓
State fixed effects	✓	✓	✓	✓
Quarter fixed effects	✓	✓	✓	✓
Observations	25,432	25,432	25,432	25,432
F Test of instruments' joint significance	6.298	19.82	16.50	36.64
Excluded instrument:				
Ln(Market population)	✓			
Ln(Market population - weighted)		✓		
Ln(Market potential)			✓	
Ln(Market potential - weighted)				✓



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## Deregulation & Diversity: 2

Identification: **X-BHC**, **X-state**, **X-time**

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# Limitations thus far:

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- ▶ We have ...
  - ▶ Focused on a state deregulating over time
  - ▶ Considered the “average” BHC in a state
  - ▶ Tried to:
    - ▶ gauge the “average” distance to other states and
    - ▶ relate “average” market opportunities available to a state’s banks in other states over time.
- ▶ This does not:
  - ▶ Distinguish among BHCs in a state
  - ▶ That is, it is not the “average” BHC that diversifies



# Now, Gravity-Deregulation Model

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- ▶ Combine:
  - ▶ Deregulation:
    - ▶ time-varying
    - ▶ bilateral-state level
  - ▶ Gravity model of
    - ▶ “foreign” direct investment
    - ▶ BHC (county)-bilateral-state level
- ▶ We use insights from the Frankel-Romer (1999)
  - ▶ They use a gravity model to estimate bilateral trade
  - ▶ They then aggregate to national trade
  - ▶ They use this as an instrument in a trade → growth regression



# Specifics

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$$\text{Share}_{b,i,j,t} = a * \text{Distance}_{b,i,j} + b * \text{Ln}(\text{pop}_{i,t} / \text{pop}_{j,t}) + \delta_b + \delta_i + \delta_j (+\delta_{i,j}) + \delta_t + \varepsilon_{b,i,j,t}$$

- ① Estimate for state-pair-quarters in which expansion is possible
- ② Construct projected  $\text{Share}_{b,i,j,t}$  as follows:
  - a) Use the estimated equation for state-pair-quarters in which diversity is possible
  - b) Impose a zero for state-pair-quarters when expansion is impossible because of regulation
- ③ From these projected  $\text{Share}_{b,i,j,t}$  values build
  - a) I - Herfindahl Index of assets across states (Predicted)
  - b) Which is at the b, i, t level and therefore BHC-specific



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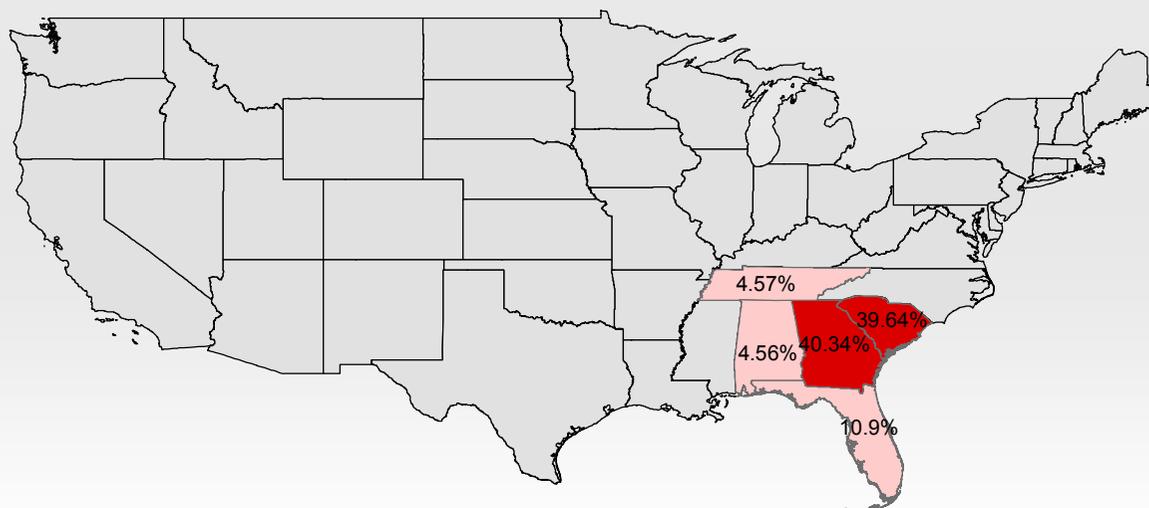
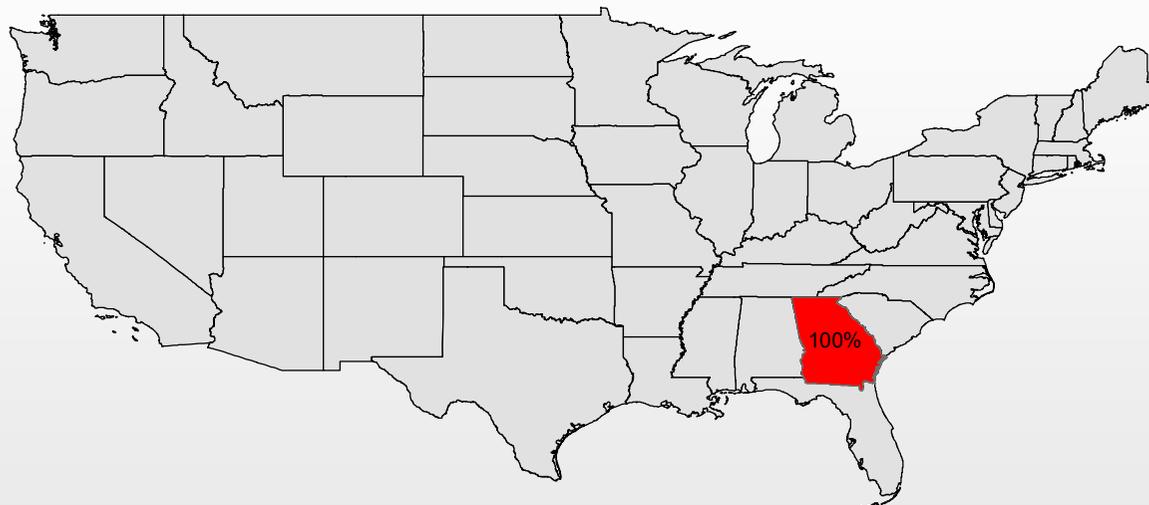
# Patterns of diversification

A few examples ...



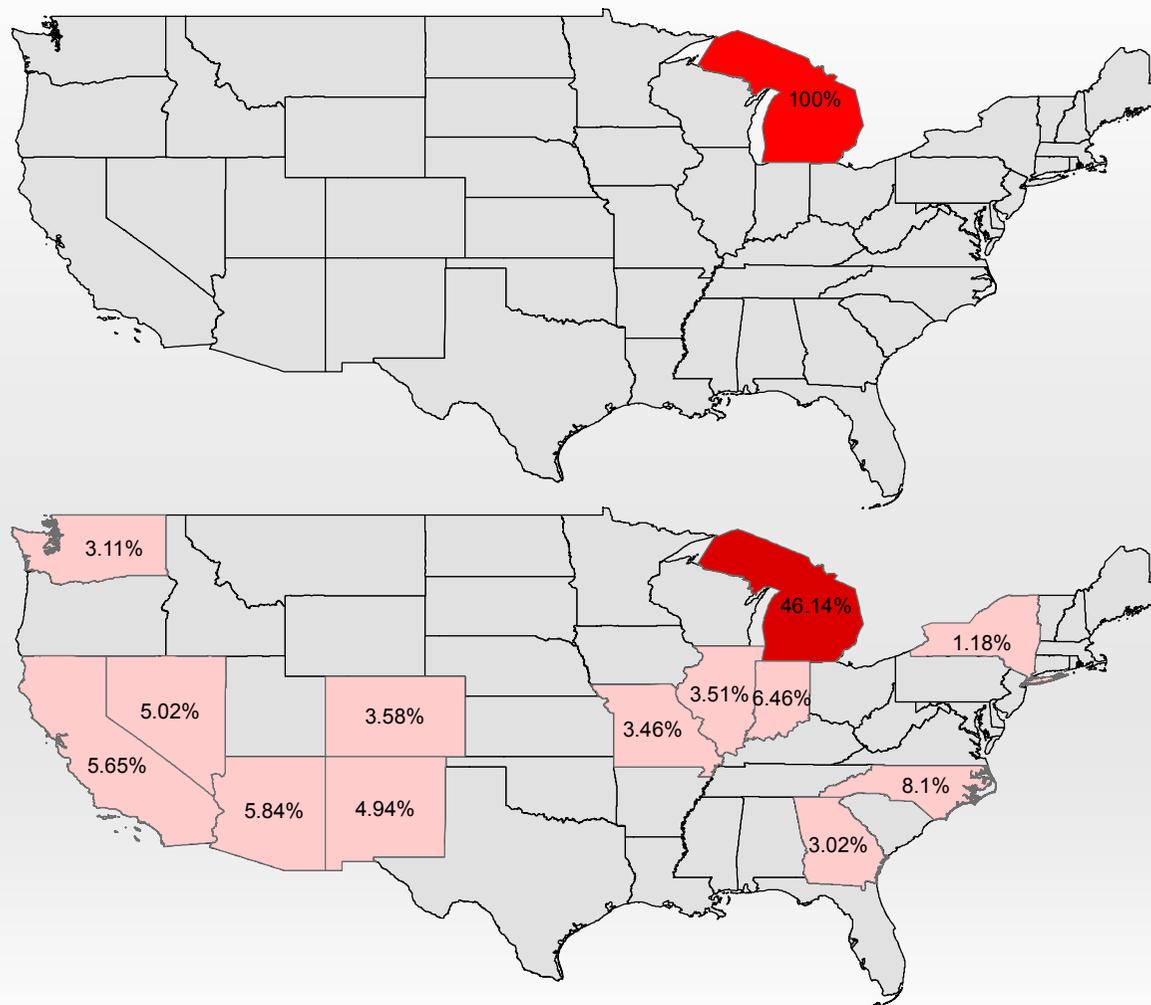
# Synovus Financial Corp. 1986-2007

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# Capital Bankcorp Ltd. 1990-2007

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# Gravity model: “zero-stage”

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	1	2	3	4
Distance (in 100 miles)	-1.056*** (0.006)	-1.798*** (0.012)	-0.236*** (0.017)	-1.823*** (0.012)
ln(Population-ratio)	-0.870*** (0.006)	-3.631*** (0.125)	-0.004 (0.041)	-5.960*** (0.248)
State fixed effects		✓		
Quarter fixed effects		✓	✓	
Bank Holding Company fixed effects			✓	✓
State-Pair fixed effects			✓	
State-Quarter fixed effects				✓
Observations	1,125,775	1,125,775	1,125,775	1,125,775



# Diversity and Q – Gravity-Deregulation Model

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	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Bank Holding Company			Panel B: Subsidiary Level		
	Tobin's q	Market Cap / Total Assets	(Total Liabilities + Pref Stock) / Total Assets	Lending Indicator	ln(Avg Loan Size per Officer)	Share of NPLs
I - Herfindahl Index of assets across states	-16.074*** (6.070)					
Bank and Macro Controls	✓					
BHC fixed effects	✓					
State-Quarter fixed effects	✓					
Observations	24,526					



## Diversity and Q – Components of Q

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	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Bank Holding Company			Panel B: Subsidiary Level		
	Tobin's q	Market Cap / Total Assets	(Total Liabilities + Pref Stock) / Total Assets	Lending Indicator	ln(Avg Loan Size per Officer)	Share of NPLs
I - Herfindahl Index of assets across states	-16.074*** (6.070)	-12.673** (5.621)	-2.262*** (0.707)			
Bank and Macro Controls	✓	✓	✓			
BHC fixed effects	✓	✓	✓			
State-Quarter fixed effects	✓	✓	✓			
Observations	24,526	24,443	24,526			



# BHC Diversity and Subsidiary Behavior (Agency Costs)

	(1)	(2)	(3)	(4)	(5)	(6)
	Panel A: Bank Holding Company			Panel B: Subsidiary Level		
	Tobin's q	Market Cap / Total Assets	(Total Liabilities + Pref Stock) / Total Assets	Lending Indicator	ln(Avg Loan Size per Officer)	Share of NPLs
I - Herfindahl Index of assets across states	-16.074*** (6.070)	-12.673** (5.621)	-2.262*** (0.707)	0.176*** (0.073)	1.652** (0.844)	0.510** (0.254)
Bank and Macro Controls	✓	✓	✓	✓	✓	✓
BHC fixed effects	✓	✓	✓	✓	✓	✓
State-Quarter fixed effects	✓	✓	✓	✓	✓	✓
Observations	24,526	24,443	24,526	59,322	58,569	75,459



# Comparison of estimated coefficients

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	Tobin's Q OLS	Tobin's Q OLS BHC FE	Tobin's Q State-Time Reg IV	Tobin's Q Grav-Reg IV BHC FE
Diversity	+1.5***	-0.4***	-11.7***	-16.1***

- ▶ As the treatment becomes more refined -- moving from a state-time treatment to a county-time instrument, we better identify the impact of an exogenous increase in diversification on BHC's valuations
- ▶ And, the estimated impact has a larger economic magnitude



# Conclusions

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- ▶ Using two new identification strategies based on the dynamic process deregulation, we find that exogenous increases in geographic diversity reduce BHC valuations
- ▶ Geographic diversification leads to diversification discount
  - ▶ making it harder for outside shareholders to monitor
  - ▶ outweighing the valuation benefits of diversification
- ▶ Since this emerges from geographic diversity within U.S., it highlights the governance problems at banks



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Thank you

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# Channels/Robustness: M&As

Sample Selection:	Full sample - no exclusion		Exclude BHC-quarter observations if the BHC ...acquires or sells a subsidiary ...	
			a subsidiary in that quarter	... up to four quarters after a acquisition/ sale.
I - Herfindahl Index of assets across states	-14.952*** (5.134)	-14.435*** (4.967)	-10.188** (4.042)	-14.218** (5.699)
Acquisition	0.578 (0.499)	0.490 (0.470)		
Acquisition * (Subsidiary in same state as BHC)		-0.089 (0.204)		
Sale	1.572*** (0.429)	1.788*** (0.462)		
Sale * (Subsidiary in same state as BHC)		-1.339*** (0.327)		
Bank and Macro Controls	✓	✓	✓	✓
Bank Holding Company fixed effects	✓	✓	✓	✓
State-Quarter fixed effects	✓	✓	✓	✓
Observations	24,526	24,526	20,811	16,370

