The Valuation Effects of Geographic Diversification: Evidence from U.S. Banks

Martin Goetz (Boston Fed)
Luc Laeven (International Monetary Fund)*
Ross Levine (Brown University)

Chicago Fed conference, May 9, 2012

The views expressed herein should be attributed to the authors and not to the Federal Reserve Bank of Boston, the IMF, its Executive Board, or its management.
Questions

- How does geographic diversity influence corporate valuations?
  
  - Did the geographic diversification of bank assets through subsidiaries across the US states in the 1980s and 1990s increase or decrease the market’s valuation of banks?
Motivation: Long debate

- Diversity might boost valuations and reduce agency problems
  - Scale economies (Gertner, Scharfstein, and Stein, 1994; Houston, James, and Marcus, 1997)
  - Reduce exposure to idiosyncratic shocks
  - Eases cost of delegated monitoring (Diamond, 1984)

- Diversity might lower valuations and intensify agency problems
  - Facilitate the exploitation of control (Jensen, 1986; Jensen and Meckling, 1986; Scharfstein and Stein, 2000)
  - Insiders will exploit private benefits if those benefits exceed the reduction in the value of their private holdings
We focus on the net effect

- We examine whether an exogenous increase in diversity causes valuations to rise or fall

- We do not examine the components: scale economies, diversification, agency problems
Why study geographic diversity of US BHCs?

- **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

- **Real agenda … contribute to better understanding of the corporate governance of banks**
This builds on past work …

- Laeven and Levine (2007, JFE)
  - Diversification discount in an international cross-section of banks
- But:
  - Identification remains a concern
  - Product, not geographic diversification

- This paper also adds to research on nonfinancial corporate diversification
  - Identification
  - Pure geographic diversification, where risk diversification and scale economies should be large
This paper: 2 new identification strategies

\[ q_{ist} = \beta D_{ist} + X_{ist}' \rho + \delta_i + \delta_{st} + \delta_{ibt} + \varepsilon_{ist} \]

- **Variables:**
  - \( q_{ist} \): Tobin’s \( q \)
  - \( D_{ist} \): measure of the BHCs geographic diversity
  - \( X_{ist} \): matrix of time-varying, state-varying, BHC traits
  - \( \delta’s \): fixed effects

- **Period:** 1986 – 2007, deregulation triggered diversification
- **Identification:** \( X \)-state, \( X \)-time process of deregulation
  - Gravity model of BHC-specific diversification after deregulation
Some preliminaries

Key variables data
Diversification: 4 measures

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. $1 - \text{Herfindahl Index of assets across states}$
Sample construction

- Publicly listed BHCs, within 50 states & DC, 1986 – 2007
- ≈ 28,000 BHC-quarter observations
Some more preliminaries

Patterns
OLS regressions of $q$ on geographic diversification measures

- Conditioning on BHC FEs, the relationship between $q$ and diversity changes, turning negative (Table 3)
- This is consistent with the view that higher valued, more profitable banks diversify, but diversification is associated with a drop in valuations ...
Dynamic relation between diversification and BHC valuations

$q$ before and after geographic expansion

Quarters before/after geographic diversification
Interstate deregulation

An identifying process, not an event
Interstate deregulation: 1978 - 1995

Prior to 1978, BHCs restricted from establishing subsidiaries/branches across states

Deregulation allowed
- BHCs to purchase & establish subsidiaries
- Also, with time, interstate banking through branching, which are not separately capitalized, legal entities

State-specific evolution has been less studied
Is deregulation associated with distance?

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(distance between A and B) and the average ln(distance) between A and all states.
Identification

- 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
Deregulation measures

Measures using start date

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

Measures using process of 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
Between-state differences in $q$ not associated with timing of deregulation

This figure plots the average $q$ (in %) in state 1 against the average $q$ (in %) in state 2 before both states remove their interstate banking. The dashed line represents the linear relationship, computed from an OLS regression.
We employ two IV strategies

The first operates at the state-time level
The second operates at the state-time-BHC level
### Diversity & $q$: State-time IV (Table 5)

<table>
<thead>
<tr>
<th></th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
<th>(9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tobin’s $q$ (second-stage)</td>
<td>1 - Herfindahl index of assets across states</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-22.442**</td>
<td>-17.341***</td>
<td>-12.620***</td>
<td>-11.728***</td>
</tr>
<tr>
<td></td>
<td>(10.405)</td>
<td>(5.151)</td>
<td>(4.842)</td>
<td>(3.185)</td>
</tr>
<tr>
<td>Bank and macro controls</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>State fixed effects</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Quarter fixed effects</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Observations</td>
<td>25,431</td>
<td>25,431</td>
<td>25,431</td>
<td>25,431</td>
</tr>
<tr>
<td>F Test of instruments' joint significance</td>
<td>6.335</td>
<td>19.88</td>
<td>16.58</td>
<td>36.74</td>
</tr>
</tbody>
</table>

Excluded instrument:
- Ln(Market population) ✓
- Ln(Market population - weighted) ✓
- Ln(Market potential) ✓
- Ln(Market potential - weighted) ✓
Deregulation & Diversity: 2

Identification: X-BHC, X-state, X-time
Now, Gravity-Deregulation Model

- 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 method
  - They use a gravity model to estimate bilateral trade
  - They then aggregate to national trade, using this as an instruments for trade in a growth regression
Specifics

\[
Share_{b,i,j,t} = a \cdot \text{Distance}_{b,i,j} + b \cdot \ln\left(\frac{\text{pop}_{i,t}}{\text{pop}_{j,t}}\right) + \delta_b + \delta_i + \delta_j(+\delta_{i,j}) + \delta_t + \epsilon_{b,i,j,t}
\]

① Estimate for state-pair-quarters in which expansion is possible

② Construct projected 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 Share\(_{b,i,j,t}\) values build
   a) 1 - Herfindahl Index of assets across states (predicted)
   b) Which is at the b, i, t level and therefore BHC-specific
Patterns of diversification

An example
Diversification of Capital Bankcorp Ltd. 1990 → 2007
The gravity component of the gravity-regulation mModel

\[ \text{Share}_{b,i,j,t} = a \times \text{Dist}_{b,i,j} + b \times \ln\left(\frac{\text{pop}_{i,t}}{\text{pop}_{j,t}}\right) + c \times X_{b,i,j,t} + \delta_b + \delta_i + \delta_j + \delta_{i,j} + \delta_t + \delta_{i,t} + \varepsilon \]

- Closeness: Distance (in 100s of miles) of county of BHC’s headquarters to other state’s capital \((a<0)\)
- Relative market size: population of BHC’s home state divided by population of foreign state \((b<0)\)
- We find:
  - negative relation between BHC’s holdings in “foreign” state and distance between BHC’s county and “foreign” state
  - BHCs less likely to diversify into comparatively small states
Some advantages of the gravity model

- Concern: Results may be driven by greater competition from out-of-state banks, not by intensification of agency problems from diversification into other states.
- County-level analyses reduce this concern:
  - They account for statewide, unobservable time-varying changes, such as changes in competition within a state, using state-quarter fixed effects.
  - BHC-county-level instruments differentiate among BHCs within the same state and quarter, allowing for sharper inferences about the impact of BHC diversity on valuations.
Comparison of estimated coefficients

<table>
<thead>
<tr>
<th></th>
<th>Tobin's Q OLS</th>
<th>Tobin's Q OLS BHC FE</th>
<th>Tobin's Q S-T Reg IV</th>
<th>Tobin's Q Grav-Reg IV BHC FE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diversity</td>
<td>+1.5***</td>
<td>-0.4***</td>
<td>-11.7***</td>
<td>-33.7***</td>
</tr>
</tbody>
</table>

- 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

- Using two new identification strategies based on the dynamic process deregulation, we find that exogenous increases in geographic diversity reduce BHC valuations.

- Data are consistent with the view that geographic diversification increases organizational “complexity”:
  - 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.
THANK YOU!
## Gravity model: zero-stage (Table 6)

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance (in 100 miles)</td>
<td>-1.165***</td>
<td>-1.100***</td>
<td>-1.912***</td>
<td>-0.243***</td>
<td>-1.948***</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.008)</td>
<td>(0.013)</td>
<td>(0.012)</td>
<td>(0.014)</td>
</tr>
<tr>
<td>Ln(population ratio)</td>
<td>-0.827***</td>
<td>-0.954***</td>
<td>-3.473***</td>
<td>-0.035</td>
<td>-5.829***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.008)</td>
<td>(0.129)</td>
<td>(0.042)</td>
<td>(0.248)</td>
</tr>
<tr>
<td>(County population in state-quarter above 66th percentile) × Ln(Population ratio)</td>
<td>0.257***</td>
<td>0.208***</td>
<td>0.032***</td>
<td>0.369***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.011)</td>
<td>(0.014)</td>
<td>(0.005)</td>
<td>(0.026)</td>
<td></td>
</tr>
<tr>
<td>(County population in state-quarter above 66th percentile) × Distance (in 100 miles)</td>
<td>-0.134***</td>
<td>-0.111***</td>
<td>0.035***</td>
<td>-0.097***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.013)</td>
<td>(0.013)</td>
<td>(0.003)</td>
<td>(0.014)</td>
<td></td>
</tr>
<tr>
<td>County population in state-quarter above 66th percentile</td>
<td>0.002***</td>
<td>0.002**</td>
<td>-0.002***</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
<td>(0.000)</td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>State fixed effects</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quarter fixed effects</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bank holding company fixed effects</td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State-pair fixed effects</td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State-quarter fixed effects</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Observations</td>
<td>1,123,007</td>
<td>1,122,940</td>
<td>1,122,940</td>
<td>1,122,940</td>
<td>1,122,940</td>
</tr>
</tbody>
</table>
### Table 7: Diversity and value: BHC IVs based on gravity-deregulation model

<table>
<thead>
<tr>
<th>Dependent variable: Tobin’s Q</th>
<th>(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Herfindahl Index of assets across states</td>
<td>-33.740***</td>
</tr>
<tr>
<td></td>
<td>(12.237)</td>
</tr>
<tr>
<td>Bank and macro controls</td>
<td>✓</td>
</tr>
<tr>
<td>Bank holding company fixed effects</td>
<td>✓</td>
</tr>
<tr>
<td>State-quarter fixed effects</td>
<td>✓</td>
</tr>
<tr>
<td>Observations</td>
<td>24,524</td>
</tr>
<tr>
<td>F-test of instruments' joint significance</td>
<td>12.84</td>
</tr>
</tbody>
</table>

**Fixed effects in gravity model:**

- Bank holding company fixed effects: ✓
- State-quarter fixed effects: ✓