SMALL BANKS AND BIG BOXES
REAL SECTOR INDUSTRIAL ORGANIZATION AND FINANCIAL CONSOLIDATION

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Stefan Jacewitz
Jonathan Pogach

Federal Deposit Insurance Corporation

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The analysis, conclusions, and opinions set forth here are those of the author alone and do not necessarily reflect the views of the Federal Deposit Insurance Corporation, the Consumer Financial Protection Bureau, or the United States.
DECLINE IN SMALL BANKS AND SMALL FIRMS

Figure 1: Source: Quarterly Workforce Indicators (Firm Shares). Summary of Deposits (Deposit Shares). Small Firms: < 250 emp. Small banks: < $1 bn in assets.
Banking Consolidation

- Consolidation of the banking system, driven by:
  - **Technological changes** (ATMs (Radecki et al 1997), advances in credit scoring (Berger & Frame 2007))

- Small banks have comparative advantage in lending to small businesses ("relationship banking")

- Common narrative: Banking consolidation ⇒ loss of small businesses
Existing Literature on Real/Financial Consolidation

County C

- Small Firm 1
- Small Firm 2
- Small Firm 3
- National Firm

- Small Bank 1
- Small Bank 2
- Small Bank 3
- National Bank
EXISTING LITERATURE ON REAL/FINANCIAL CONSOLIDATION

County C

- Small Firm 1
- Small Firm 2
- Small Firm 3
- National Firm

- Small Bank 1
- Small Bank 2
- National Bank
**Real-side Consolidation**

- Consolidation of real industry (Grullon et al (2019), CEA (2016), Jia (2008))
  - **Technological changes** (e.g. supply chain management (Holmes 2008), e-commerce (Goldmanis et al 2010))
  - **Regulatory** (e.g. Antitrust (Gutierrez & Philippon 2017))
- Small banks have comparative advantage in lending to small businesses (“relationship banking”)
- Our narrative: Loss of small business $\Rightarrow$ changes to viability of small banks
County C

Small Firm 1
Small Bank 1

Small Firm 2
Small Bank 2

National Firm
Small Bank 3

National Bank

Capital Markets
County C

Small Firm 1
Small Bank 1
Small Firm 2
Small Bank 2
National Firm
What now?
National Bank

Capital Markets
WHAT WE DO

- Estimate effect of small business performance on small bank performance using:
  - Census Quarterly Workforce Indicators (QWI) data on county employment by firm size
  - FDIC Summary of Deposit (SOD) data on bank deposits by bank size

- Use a Bartik instrument to estimate effect of real industry growth patterns by industry-firm size on bank deposit (and branch) growth by bank size 2002-2017.
  - Rely upon 2000 county-industry shares as differential exposures to national trends by industry-firm size.
  - Use Goldsmith-Pinkham, Sorkin, Swift (2019) to unpack assumptions of our instrument
Summary of Results

- A one standard deviation change in small-firm employment growth is associated with a 0.3 standard deviation change in small-bank deposit growth.
- Large-firm employment growth has no effect on small-bank deposit or branch growth.
- Small-firm employment growth has no effect on large-bank deposit or branch growth.
- Decreases in small-bank deposit growth from negative shocks to small-firm employment growth driven by propensity of small banks to be acquired.
- Small banks exposed to small-firm employment declines: small business lending $\Rightarrow$ residential real estate lending.
Data: 2002-2017

- QWI - small <250 emp, large ≥500 emp.
  - (Endogenous) County-level employment growth by firmsize (not establishment size): \( x_{c,\text{size},t-1\rightarrow t} \)
  - County-level employment by industry: \( z_{c,i,2000} \)
  - National-level employment by firmsize-industry: \( g_{i,\text{size},t-1\rightarrow t} \)
  - Instrument: \( Bartik_{c,\text{size},t-1\rightarrow t} = \sum_i z_{c,i,2000} g_{i,\text{size},t-1\rightarrow t} \)

- SOD - small <$1 billion asset, large >$50 billion
  - Location of bank branches and deposits
  - \( y_{c,\text{size},t-1\rightarrow t} \) is growth of deposits (or branches) in county \( c \) by bank size
**Methodology**

- Interested in estimating small-bank growth variables \((y)\) on small-firm growth variables \((x)\), vector of controls \(D\)

\[
y_{ct} = \rho D_{ct} + x_{ct} \beta_0 + \epsilon_{it} \tag{1}
\]

- Endogeneity problem ⇒ use Bartik instrument \(B_{ct}\) as national small-firm industry growth weighted by year 2000 county-industry shares:

\[
x_{ct} = D_{ct} \tau + B_{ct} \gamma + \eta_{ct}. \tag{2}
\]

- Controls: =

\(\{Pop_{2000}, Inc_{2000}, SmBkShare_{2000}, Brch_{2000}, unemp_{2000}, urban_{2000}, YearFE\}\)

- Controls next version: County FE
### Table 1: Multivariate regressions of small bank deposit growth. Errors clustered at the state level.

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔLn(Sm Emp)</td>
<td>0.165**</td>
<td>0.161**</td>
<td>0.169**</td>
<td>0.161**</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(0.0654)</td>
<td>(0.0644)</td>
<td>(0.0634)</td>
<td>(0.0637)</td>
<td></td>
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<tr>
<td>ΔLn(Lg Emp)</td>
<td></td>
<td></td>
<td>-0.00121</td>
<td>0.000365</td>
<td>0.000982</td>
<td>0.000893</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.0117)</td>
<td>(0.0119)</td>
<td>(0.0121)</td>
<td>(0.0122)</td>
<td></td>
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<tr>
<td>R-squared</td>
<td>0.000</td>
<td>0.002</td>
<td>0.002</td>
<td>0.006</td>
<td>0.000</td>
<td>0.001</td>
<td>0.002</td>
<td>0.006</td>
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<td>YES</td>
</tr>
<tr>
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<td>OLS</td>
<td>OLS</td>
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<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
<td>OLS</td>
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<tr>
<td>YEAR</td>
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<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
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<tr>
<td>STATE FE</td>
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<td>NO</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
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</table>
Table 2: Baseline Bartik Regressions. Errors clustered at the state level.

<table>
<thead>
<tr>
<th></th>
<th>( \Delta \ln(\text{Small Bank Deposits}) )</th>
<th>( \Delta \ln(\text{Small Bank Branches}) )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>Bartik (Small Firm Emp Gr)</td>
<td>1.342** (0.560)</td>
<td>0.339** (0.131)</td>
</tr>
<tr>
<td>( \Delta \ln(\text{Small Firm Emp}) )</td>
<td>1.191** (0.583)</td>
<td>0.311** (0.142)</td>
</tr>
<tr>
<td>( \Delta \ln(\text{Large Firm Emp}) )</td>
<td>0.491* (0.283)</td>
<td>0.0976 (0.0741)</td>
</tr>
<tr>
<td>Observations</td>
<td>39,432 39,341 39,341 39,432 39,341 39,341</td>
<td></td>
</tr>
<tr>
<td>REG</td>
<td>OLS 2SLS 2SLS OLS 2SLS 2SLS</td>
<td></td>
</tr>
<tr>
<td>Controls</td>
<td>YES YES YES YES YES YES</td>
<td></td>
</tr>
<tr>
<td>YEAR FE</td>
<td>YES YES YES YES YES YES</td>
<td></td>
</tr>
</tbody>
</table>
Other Specifications

- Population weights - Results Hold
- Other Outcome Variables
  - Change in HHI - No Result
  - Large Bank Deposit Growth - No Result
  - Large Bank Branch Growth - No Result
- Future iterations of paper
  - County FE - Results Hold
  - Large and Small Firm Growth Simultaneously - Results Hold
  - Contemporaneous County Population and Income Growth - Results Hold
**Additional Analysis in Paper**

1. What drives county small-bank performance differences?
   - Are small banks acquired?
   - Do small banks fail?
   - Do small banks “grow out” of small by acquiring other banks or through organic growth?

2. Do banks change on internal margin?
   - Change in loan composition?
   - Change in funding sources?

3. Relating firm employment to small business loan demand using CRA data

WHAT DRIVES SMALL-PERFORMANCE

- Construct proportion of county-year small-bank deposits associated with:
  - Small banks being acquired
  - Small banks failing
  - Small banks that acquire other banks

- Example: Bank A with Branch X in County $C_X$ and Branch Y in $C_Y$ is acquired in year $t$
  - Branch X represents 10% of deposits in $C_X$, Branch Y represents 2% of deposits in $C_Y$
  - Use 0.10 and 0.02 as LHS variables for $C_{X,t}$, $C_{Y,t}$. 
Table 3: Drivers of Small Bank Deposit Changes. Errors are clustered at the state level.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1) Acquired</th>
<th>(2) Acquired</th>
<th>(3) Acquiring</th>
<th>(4) Acquiring</th>
<th>(5) Failed</th>
<th>(6) Failed</th>
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<tbody>
<tr>
<td>∆Ln(Sm Emp)</td>
<td>-0.0187***</td>
<td>-0.281***</td>
<td>0.0131**</td>
<td>-0.0360</td>
<td>-0.00757</td>
<td>-0.295</td>
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<td></td>
<td>(0.00609)</td>
<td>(0.108)</td>
<td>(0.00522)</td>
<td>(0.101)</td>
<td>(0.00653)</td>
<td>(0.187)</td>
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<tr>
<td>Observations</td>
<td>39,341</td>
<td>5,748</td>
<td>39,341</td>
<td>5,651</td>
<td>21,037</td>
<td>717</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.007</td>
<td>0.012</td>
<td>0.012</td>
<td>0.010</td>
<td></td>
<td></td>
</tr>
<tr>
<td>REG</td>
<td>OLS</td>
<td>Tobit</td>
<td>OLS</td>
<td>Tobit</td>
<td>OLS</td>
<td>Tobit</td>
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<tr>
<td>Controls FE</td>
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<td>YES</td>
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<tr>
<td>YEAR FE</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
</tbody>
</table>

*** p < 0.01, ** p < 0.05, * p < 0.1
**Do Banks Change on the Internal Margin?**

- Decreased demand for financial services from small businesses can lead to change in bank business strategy

- **Challenge:** Bank balance sheets exist at legal entity level, not geography

- Evidence suggests (e.g. FDIC (2018)) that more than 70% of small banks focus small business lending operations at the county level
  - Focus on small banks with branches within a single county

- Estimate relationship between small-firm employment growth and bank portfolios
Table 4: Bank Level Regressions of Bank Portfolios on Small Business Growth. Errors are clustered at the bank level.

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
<th>(7)</th>
<th>(8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>∆Ln(SmEmp)</td>
<td>0.0151***</td>
<td>0.121*</td>
<td>0.0128***</td>
<td>0.180**</td>
<td>0.0153***</td>
<td>0.0971</td>
<td>-0.0113**</td>
<td>-0.205***</td>
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<td></td>
<td>(0.00490)</td>
<td>(0.0723)</td>
<td>(0.00495)</td>
<td>(0.0746)</td>
<td>(0.00427)</td>
<td>(0.0630)</td>
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<td>Obs</td>
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<tr>
<td>R-squared</td>
<td>0.348</td>
<td>0.102</td>
<td>0.017</td>
<td>0.017</td>
<td>0.017</td>
<td>0.019</td>
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<tr>
<td>Banks</td>
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<td>5,381</td>
<td>5,381</td>
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<td>YES</td>
<td>YES</td>
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</tbody>
</table>
Goldsmith-Pinkham, Sorkin, Swift (2019)

- Bartik instrument is a “black box”
- Show that the Bartik instrument is equivalent to a weighted average of just-identified instruments
  - Each Year 2000 county-industry variable is its own instrument
- Construct Rotemberg weights to understand:
  - Industry-years that drive results
  - Heterogeneity of estimates
- Visual diagnostics
Figure 3: Industry Rotemberg Weights and First Stage F-statistics from just-identified county-industry-share instruments.
Figure 4: Heterogeneity of $\beta_k$ for just-identified county-share instruments by first stage F-statistic (reporting only for those with F-stat > 5. Shape sizes reflect Rotemberg weights.
Conclusions

- Consolidation of banking industry not only causes, but is also a cause of industrial firm consolidation

- A 1% decline in small-firm employment growth associated with a similar size decline in small-bank deposit growth and a 0.3% decline in small-bank branch growth

- Differences in small-bank performance mainly driven by acquisitions (as targets)

- Declines in small-business employment associated with shift of small-bank loan portfolios from small business lending and into residential real estate lending