Bank Liquidity and Leverage: Trends and Cycles of New York State Banks During the National Banking Era

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Federal Reserve System Conference on Economic and Financial History Richmond, Virginia

May 2016

The views expressed in this presentation are those of the authors and are not necessarily reflective of views at the Federal Reserve Bank of Dallas or the Federal Reserve System. Any errors or omissions are the sole responsibility of the authors.
“An improvement in the quality of banks capital needs to be accompanied by a higher aggregate level of capital relative to the size and riskiness of the banking system. The period since the 1960s has seen a trend decline in banks capital buffers. That trend now needs to be reversed.”
Motivation, Lever, and Results

1. Questions
   - How did balance sheets of state banks evolve during the National Banking Era?
   - How did proxies for systemic risk display trends during the NBA era?
   - Is there a role of “off-balance sheet liquidity” during disruptions?

2. Methods
   - Digitize bank-level balance sheets from state banks from New York
   - Quarterly data set, from 1868 – 1900 (with breaks)
   - Development of a novel measure of bank capital in NBA era – net of D&O loans

3. Findings
   - Interconnectedness as measured by due to other FIs rises (6% ⇒ 12%)
   - Asset concentration in the largest state banks falls (55% ⇒ 25% for top 5)
   - Potential vulnerability increases throughout as proxied by capitalization
   - “Off-balance sheet liquidity” by D&O loan repayments during 1884 disturbance
Relation to the Literature

(Small) Sample of Related Papers - Research Focus and Sample Periods

**Research Area**

- **NBA, Network Structure and Systemic Risk**
  - Paddrik, Park, and Wang (2016) +*

- **Panic of 1893, Corporate Governance and Risk**
  - Calomiris and Carlson (2016)**

- **Finance and Growth**
  - Fulford (2015)**

- **Corporate Governance**
  - Bodenhorn and White (2014)*

- **Corporate Governance**
  - Lamoreaux and Glaisek (1991)*

- **Trends in Deposits**
  - Jaremski and Rousseau (2015)+*

- **Corporate Governance**
  - Hilt (2008)*

- **Corporate Governance**
  - Meissner (2005)*

- **Corporate Governance**
  - Bodenhorn (2014)*

- **Trends in Fragility and D&O Loans in 1884**
  - our sample*

**Notes:** *) State Banks Only, **) National Banks Only, +*) State and National Banks.

**Source:** Koch and Van Horn (2016).
Regulatory Constraints ↑ ⇒ Institutional Variation ↓

NOTES: Gray bars indicate recessions. Maximum number of report pages for domestic banks only.


Source: Bordo, Duca, and Koch (2016)
Regulatory Constraints $\uparrow \Rightarrow$ Institutional Variation $\downarrow$


... end up at corner solutions, say for capital, for systemically relevant institutions (typically “given” in models, see Bianchi and Bigio, 2016)
Regulatory Complexity, Risk Shifting and TBTF

... reduce observable variation in governance – harder to answer empirical questions about “counterfactuals”

Timeline of Events

- Bank Holding Company Act 1956
- Banking Act 1935
- Banking Act 1933
- Emergency Banking Act 1933
- Banking Act 1932
- Legislation (blue)
- Depository Institutions Deregulation and Monetary Control Act 1980
- Garn-St. Germain Depository Institutions Act 1982
- FDIC Improvement Act 1991
- Riegle-Neal Interstate Banking Act 1994
- Gramm-Leach-Bliley Act 1999
- Depository Institutions Deregulation and Monetary Control Act 1980
- Lehman Brothers Inc. 2008
- Long-Term Capital Management 1998
- Continental Illinois 1984
- Penn Square 1982
- Franklin National 1974
- Sample Period 1
- Sample Period 2

Source: Koch, Richardson, and Van Horn (2016)
Leverage for SIFIs Bound by Regulatory Minimum

**Figure 1. Prior to the Great Depression**

**Figure 2. Prior to the Great Recession**

**Source:** Koch, Richardson, and Van Horn (2016)
Why Focus on State Banks?

Role of and governance of national banks studied extensively
⇒ Fulford (2015), Calomiris & Carlson (2016)

Relative importance of state banks to the U.S. financial system (James, 1978)

- Lower capital requirements relative to national banks
- Fewer restrictions on loans
- Served in both rural and urban areas

Granularity of the quarterly cross-sectional data

- Details of assets and liabilities unavailable in aggregate data
- Separate out loans to directors from other loan types
- Compare small vs. large and NYC vs. country state banks
- Can’t address networks as Paddrik, Park, and Wang (2016)
Why New York State?

- Both industrial and agricultural
- Served in both rural and urban areas.
- Substantial share of U.S. total banking assets

Structural Transformation
(Goel and Restrepo-Echavarria, 2015)

Spatial Distribution of Activity
(Jaremski and Wheelock, 2015)

Figure 1
Labor Shares in the United States


Notes: The figure displays the location of every national bank in operation in 1914. Banks obtained from Comptroller of the Currency’s Annual Report in 1914. Dot size is proportionate to the number of banks in the city.
New York State Regulatory Policy Regimes

1. Pre-Free Banking (1776 – 1837)

2. Free Banking Era (1837 – 1864)

3. National Banking Era (1864 – 1913)

⇒ The “dual banking system”:
   (i) Office of the Comptroller of the Currency regulates national banks
   (ii) State regulatory agencies regulate state banks

4. The Early Years of the Federal Reserve (1914 – 1935)
NY State Bank Governance in the 19th Century

Prior to the Free Banking Act of 1838

- Investors filed a petition with the state legislature.
- Bribery and monopoly power.
- No state requirements for governance but charters specific.
- Mixed results?

The Free Banking Act of 1838

- Focused on noteholder protection.
- Capital levels, reserve requirement, and secured notes.
- Specifications for president and officers.
Regulatory Environment in the National Banking Era

For national banks

▶ Capital requirements based on population
▶ Double liability on shareholders
▶ Could not establish branches

For state banks

▶ Lightly regulated and highly competitive
▶ Market discipline reinforced by regulation and supervision
▶ Lower capital requirements relative to national banks
▶ Fewer restrictions on loans
▶ Served in both rural and urban areas
The Roles of Bank Capital

1. A buffer against cash flow shortfalls

2. It can be tapped to service unpaid debt

3. High levels of capital can encourage banks to take on less risk.

4. A signal to small investors and depositors that bank owners will assume less risk.

5. Regulation requires banks to hold capital

⇒ plenty papers and popular books by Admati and Hellwig (2013) and Calomiris and Haberer (2014)
Data Sample – New York State

Number of Banks in the Sample

Source: New York Superintendent of Banks; Koch and Van Horn (2016, WP)

Note: Major ticks on the time-axis denote the Q1 of each year, minor ticks denote Q2, Q3, and Q4.
ANNUAL REPORT
OF THE
SUPERINTENDENT
OF THE
BANKING DEPARTMENT
OF THE
STATE OF NEW YORK.

TRANSMITTED TO THE LEGISLATURE JANUARY 6, 1886.

ALBANY:
WEBB, PARRISH & COMPANY, PRINTERS.
1886.

STATE OF NEW YORK.

No. 8.

IN ASSEMBLY,
JANUARY 6, 1886.

ANNUAL REPORT
OF THE SUPERINTENDENT OF THE BANKING DEPARTMENT.

STATE OF NEW YORK:
BANKING DEPARTMENT,
ALBANY, DECEMBER 29, 1885.

To the Honorable the Speaker of the Assembly:

Sir—As required by law, I have the honor to herewith transmit to the Legislature the Annual Report of this Department, in relation to incorporated banks, banking associations, individual bankers and trust, loan, mortgage, security, guarantee and indemnity companies or associations.

I am, very respectfully,
Your obedient servant,
WILLIS S. PAINE,
Superintendent.
# Stylized Bank Balance Sheet

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<tr>
<th><strong>Assets</strong></th>
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### FARMERS' BANK — Fayetteville.

**MYRON BANGS, President.**

(Organized 1870.)

**FRANKLIN M. SEVERANCE, Cashier.**

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans and discounts less due from directors</td>
<td>$63,817</td>
<td>$70,445</td>
<td>$79,645</td>
<td>$74,637</td>
</tr>
<tr>
<td>Due from directors</td>
<td>15,125</td>
<td>16,000</td>
<td>12,550</td>
<td>10,437</td>
</tr>
<tr>
<td>Overdrafts</td>
<td>527</td>
<td>1,555</td>
<td>750</td>
<td>927</td>
</tr>
<tr>
<td>Due from trust companies, State, national and private banks and brokers</td>
<td>5,888</td>
<td>9,100</td>
<td>5,048</td>
<td>12,024</td>
</tr>
<tr>
<td>Real estate</td>
<td>22,350</td>
<td>14,350</td>
<td>13,100</td>
<td>13,100</td>
</tr>
<tr>
<td>Bonds and mortgages</td>
<td>3,976</td>
<td>8,976</td>
<td>9,386</td>
<td>9,386</td>
</tr>
<tr>
<td>Stocks and bonds</td>
<td>7,145</td>
<td>3,751</td>
<td>3,751</td>
<td>3,751</td>
</tr>
<tr>
<td>Specie</td>
<td>1,040</td>
<td>2,222</td>
<td>1,153</td>
<td>648</td>
</tr>
<tr>
<td>U. S. legal tender notes and circulating notes of national banks</td>
<td>2,734</td>
<td>3,903</td>
<td>3,893</td>
<td>3,000</td>
</tr>
<tr>
<td>Cash items</td>
<td>749</td>
<td>474</td>
<td>49</td>
<td>115</td>
</tr>
<tr>
<td>Loss and expense account</td>
<td>1,108</td>
<td>1,090</td>
<td>48</td>
<td>48</td>
</tr>
<tr>
<td>Add for cents</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total resources</strong></td>
<td><strong>$124,461</strong></td>
<td><strong>$131,868</strong></td>
<td><strong>$129,327</strong></td>
<td><strong>$128,076</strong></td>
</tr>
</tbody>
</table>

| LIABILITIES | | | | |
|-------------|-------------|-------------|-------------|
| Capital | $50,000 | $50,000 | $50,000 | $50,000 |
| Surplus fund | 10,000 | 10,000 | 10,000 | 10,000 |
| Undivided profits | 2,643 | 1,113 | 1,419 | 472 |
| Due depositors on demand | 61,817 | 70,370 | 66,755 | 67,561 |
| Due to trust companies, State, national and private banks and brokers | 386 | 1,133 | 42 |
| Add for cents | 1 | | | 1 |
| **Total liabilities** | **$124,461** | **$131,868** | **$129,327** | **$128,076** |
**Balance Sheet Example – Large New York City Bank**

**BANK OF NORTH AMERICA — New York City.**

WILLIAM DOWD, President. (Organized 1869.)

FREDERICK W. WHITTEMORE, Cashier.

<table>
<thead>
<tr>
<th>RESOURCES</th>
<th>Statement of condition, Dec. 11, 1880</th>
<th>Statement of condition, March 12, 1881</th>
<th>Statement of condition, June 18, 1881</th>
<th>Statement of condition, Sept. 21, 1881</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loans and discounts less due from directors</td>
<td>$1,720,355</td>
<td>$1,931,027</td>
<td>$2,612,891</td>
<td>$2,270,665</td>
</tr>
<tr>
<td>Due from directors</td>
<td>574,459</td>
<td>522,089</td>
<td>417,300</td>
<td>440,585</td>
</tr>
<tr>
<td>Overdrafts</td>
<td>21,749</td>
<td>5,682</td>
<td>6,730</td>
<td>11,629</td>
</tr>
<tr>
<td>Due from trust companies, State, national and private banks and brokers</td>
<td>278,172</td>
<td>110,160</td>
<td>144,898</td>
<td>137,853</td>
</tr>
<tr>
<td>Real estate</td>
<td>175,000</td>
<td>175,000</td>
<td>175,000</td>
<td>175,000</td>
</tr>
<tr>
<td>Bonds and mortgages</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
<td>15,000</td>
</tr>
<tr>
<td>Stocks and bonds</td>
<td>10,775</td>
<td>10,775</td>
<td>10,775</td>
<td>10,775</td>
</tr>
<tr>
<td>Specie</td>
<td>471,705</td>
<td>211,067</td>
<td>562,133</td>
<td>176,586</td>
</tr>
<tr>
<td>United States legal tender notes and circulating notes of national banks</td>
<td>201,116</td>
<td>152,607</td>
<td>192,680</td>
<td>301,873</td>
</tr>
<tr>
<td>Cash items</td>
<td>3,514,790</td>
<td>3,148,652</td>
<td>2,907,673</td>
<td>2,052,328</td>
</tr>
<tr>
<td>Loss and expense account</td>
<td>19,538</td>
<td>6,284</td>
<td>16,301</td>
<td>6,882</td>
</tr>
<tr>
<td>Assets not included in either of the above heads</td>
<td>11,703</td>
<td>11,703</td>
<td>10,511</td>
<td>14,511</td>
</tr>
<tr>
<td>Add for cents</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>3</td>
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<tr>
<td><strong>Total resources</strong></td>
<td><strong>$7,015,366</strong></td>
<td><strong>$6,308,950</strong></td>
<td><strong>$7,472,274</strong></td>
<td><strong>$5,658,690</strong></td>
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<tr>
<td>Capital</td>
<td>$700,000</td>
<td>$700,000</td>
<td>$700,000</td>
<td>$700,000</td>
</tr>
<tr>
<td>Undivided profits</td>
<td>294,639</td>
<td>188,724</td>
<td>209,151</td>
<td>198,359</td>
</tr>
<tr>
<td>Due depositors on demand</td>
<td>4,951,424</td>
<td>4,292,270</td>
<td>4,928,992</td>
<td>3,652,635</td>
</tr>
<tr>
<td>Due to trust companies, State, national and private banks and brokers</td>
<td>1,107,142</td>
<td>1,120,869</td>
<td>1,631,760</td>
<td>1,104,373</td>
</tr>
<tr>
<td>Amount due, not included in either of the above heads</td>
<td>2,160</td>
<td>4,055</td>
<td>2,409</td>
<td>3,931</td>
</tr>
<tr>
<td>Add for cents</td>
<td>1</td>
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Evolution of Deposits: NY State Banks

- Larger rise in deposits for country banks after Specie Resumption in 1879
- Trend patterns largely in line with Jaremski and Rousseau (2015)
- Deposits already growing in NYC banks prior to election in 1896

Source: New York State Superintendent of Banks; Authors' Calculation.
Elements of Systemic Risk: (1) Interbank Balances

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Elements of Systemic Risk: (1) Interbank Balances

- Share of liabilities due to other banks more than doubles.
- Steady increase in the interconnectedness of NY state banks.

![Graph showing interbank balances over time with mean, median, and interquartile range lines. The x-axis represents the years from 1868 to 1903, and the y-axis represents the values of the variables. The graph includes a legend indicating the lines for mean, median, and interquartile range.]
Elements of Systemic Risk: (2) Asset Concentration

\[ \Rightarrow (2) \leftrightarrow \text{Assets} \]

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Elements of Systemic Risk: (2) Asset Concentration

- Two large drops in banking asset concentration
- The Specie Act seems to have little effect

*Source: New York State Superintendent of Banks.*
Elements of Systemic Risk: (2) Asset Concentration (Now)

⇒ For power laws in modern banking assets see Fernholz and Koch (2016)
Elements of Systemic Risk: (3) Capitalization Falls

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Elements of Systemic Risk: (3) Capitalization Falls

Capital Ratios Decline, Large State Banks at Contemporary Levels

Source: New York State Superintendent of Banks; Authors’ Calculation.
What Have We Learned Thus Far About Secular Changes?

1. **Interconnectedness rises**
   - Interbank liabilities double during our sample ...
   - ... throughout the distribution

2. **State bank asset concentration falls**
   - In our sample concentration in the largest 5 state banks drop from 55% to 25%
   - **Note:** substantial entry at the end of the sample

3. **Bank capital ratios persistently decline**
   - ... to levels reminiscent of modern day capital ratios
## Stylized Bank Balance Sheet (Again)

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</tr>
<tr>
<td>Overdrafts</td>
<td>Due individuals and corporations</td>
</tr>
<tr>
<td>Specie</td>
<td>Due Treasurer of State of New York</td>
</tr>
<tr>
<td>Cash Items</td>
<td>Due depositors on demand</td>
</tr>
<tr>
<td>Stocks and bonds</td>
<td></td>
</tr>
<tr>
<td>Bonds and Mortgages</td>
<td></td>
</tr>
<tr>
<td>Real Estate</td>
<td></td>
</tr>
<tr>
<td>Legal tender/circulating notes of nat’l banks</td>
<td></td>
</tr>
<tr>
<td>Loss and Expense Account</td>
<td></td>
</tr>
</tbody>
</table>
**Assets**

- Loans and Discounts, less due from directors
- Due from Directors
- Due from trust companies, etc
- Due from Brokers
- Overdrafts
- Specie
- Cash Items
- Stocks and bonds
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- Real Estate
- Legal tender/circulating notes of nat’l banks
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**Liabilities**

- Capital
- Undivided Profits
- Circulation
- Due banks, trust co.’s, etc.
- Due individuals and corporations
- Due Treasurer of State of New York
- Due depositors on demand

⇒ Assets and liabilities of – essentially – the same agents

subject to moral hazard considerations
Loans Due from Directors

Loans to directors matter for

1. bank capital
Loans Due from Directors

Loans to directors matter for

1. bank capital ... yet, apparently also for ...
Loans to directors matter for

1. bank capital ... yet, apparently also for ...

2. bank liquidity

- National banks in the 1890’s (Calomiris and Carlson, 2015).
- Bank capital, loans to directors, and bank survival (Bodenhorn and White, 2015)
- Principal-agent theory and incentives, executive compensation, equity stakes, and the firms debt-equity mix (Haubrich, 1994)
Importance of Loans to Directors – Then and Now

- Previous research focused on liability side of the balance sheet
- Yet, the asset side might matter also in the historic setting

“In today’s banks, strict limits are placed on loans to officers and directors, and providing better terms on loans offered to officers, directors, or other large stockholders is considered inappropriate. Historically, in the United States, banks often acted as loan clubs for insiders, who were often large shareholders with significant formal or informal control rights.”

Calomiris and Carlson (2016)
Loans to Directors – Then and Now

(1) Historical State Bank Sample

Directors Lending as % of Total Assets (Sample 1868 - 1900)

Due From Directors / Total Assets

Size (Log10 Assets)

Due From Dir v. Size

Linear Fit

Source: Superintendent of the Banking Department of New York State; Authors' calculations.

(2) Last Quarter (2016 Q1) all US Banks

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Source: FFIEC 031; Authors’ calculations.
Loans Due from Directors in the National Banking Era

New York state banks lent a lot to their own directors

- Banks in New York City typically lent more to their directors than banks of their same size in other areas of the state.
- The ratio declines as bank size increases.
- Comparable ratios to national banks in early 1890s (Calomiris & Carlson, 2016)
Gross vs. Net Capital Ratio

**Gross Capital Ratio**

- Paid-in capital relative to assets.
- The typical *de jure* amount of equity tied up in paid-in capital for banks measure used in the previous research.

**Net Capital Ratio**

- Paid-in capital minus loans from directors relative to assets.
- Novel *de facto* measure of equity tied up in the bank.
- Bank directors required to pay in a certain amount of capital.
- Bank directors had double liability on that exposure.
- Simultaneously, directors were borrowing from their own banks.
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- Simultaneously, directors were borrowing from their own banks.
- In other words, double leverage meets double liability!
Net Capital Ratio – Example

- Suppose a stylized bank has $100 in assets
- Paid-in capital of the amount $10 from its directors
- A director takes a loan from the bank for $9
- The actual de facto equity in the bank comes down to $1

∴ This peculiar asset structure overstates de facto capital ratios.
Contrasting Cyclical Patterns in 1884 Episode

- Contrast behavior of small versus large banks
- Substantial loan repayment by small bank directors
- “Off-balance sheet liquidity” injected during the crisis?

(a) **Gross** Capital Ratio

Source: New York State Superintendent of Banks; Authors' Calculation.
Constrasting Cyclical Patterns in 1884 Episode

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- Substantial loan repayment by small bank directors
- “Off-balance sheet liquidity” injected during the crisis?

(a) **Gross Capital Ratio**

(b) **Net Capital Ratio**

*Source: New York State Superintendent of Banks; Authors’ Calculation.*
22. The LCR has two components:
(a) Value of the stock of HQLA in stressed conditions; and
(b) Total net cash outflows, calculated according to the scenario parameters outlined below.

A. Stock of HQLA

23. The numerator of the LCR is the “stock of HQLA”. Under the standard, banks must hold a stock of unencumbered HQLA to cover the total net cash outflows (as defined below) over a 30-day period under the prescribed stress scenario. In order to qualify as “HQLA”, assets should be liquid in markets during a time of stress and, ideally, be central bank eligible. The following sets out the characteristics that such assets should generally possess and the operational requirements that they should satisfy. 

\[
\text{Stock of HQLA} \geq 100\% \\
\text{Total net cash outflows over the next 30 calendar days}
\]
Reminiscent of the modern day HQLA concept?

Modern banks (soon) required to hold high-quality liquid assets to fence off ...

- The run-off of a proportion of retail deposits;
- A partial loss of unsecured wholesale funding capacity;
- Partial loss of secured, short-term financing with certain collateral and counterparties;
- Increases in market volatilities that impact the quality of collateral or potential future exposure of derivative positions and thus require larger collateral haircuts or additional collateral, or lead to other liquidity needs;
- Unscheduled draws on committed but unused credit and liquidity facilities that the bank has provided to its clients;
- The potential need for the bank to buy back debt or honour non-contractual obligations in the interest of mitigating reputational risk.
Reminiscent of the modern day HQLA concept?

Required fundamental characteristics of modern day HQLA

- Low risk
- Ease and certainty of valuation
- Low correlation with risky assets

During the Episode of 1884, this is what small banks are doing

- Deposits fall
- Difficult to borrow from other banks
- Increased market volatility and drops in asset prices
- Directors repay loans to infuse liquidity into their banks
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⇒ Injection of “off-balance sheet” liquidity provided by D&O’s
Conclusion

1. Overall, indicators of systemic risk increase

⊕ increases in interbank financial dependence
⊖ less concentration of assets in a few large institutions
⊕ fairly low (net) capital ratios, not unlike capital 2008

2. Loans to directors as off-balance sheet liquidity (∼HQLA)

▶ Disruption of 1884:
⇒ Repayment of loans to directors
⇒ gross capital → net capital ↑