



Commercial Lending Concentration and Bank Expertise: Evidence from Borrower Financial Statements

Philip Berger

Chicago Booth

Michael Minnis

Chicago Booth

Andrew Sutherland

MIT

September 29, 2016



SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS

Research question

How is a bank's commercial loan portfolio concentration related to information collection from borrowers?

- **Positive:** Concentration → higher risk → higher demand for verified, high quality information
 - Concentration risk “arguably the single most important cause of major problems in banks” (Basel 2006)
 - “Put all your eggs in one basket and then watch that basket” (Twain)
- **Negative:** Concentration → bank expertise → lower demand for verified, high quality information
 - “Banks may want to **capitalize on their expertise in a particular industry** or economic sector. Banks should not necessarily forego booking sound credits solely on the basis of concentration, [and] must be careful **not to enter into transactions** with borrowers or counterparties they do not know or engage in credit activities **they do not fully understand simply for the sake of diversification**” (Basel 2000)



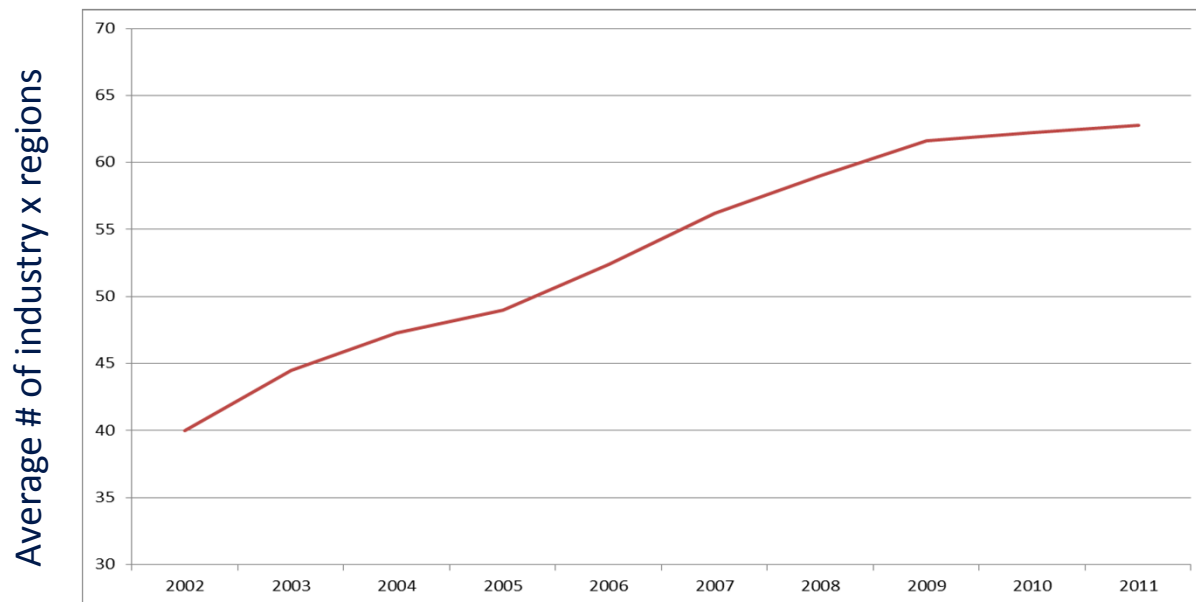
Motivation-Research

- Variation in bank characteristics and monitoring mechanisms
 - Size (Stein 2002; Berger et al. 2005)
 - Larger banks rely on “harder” information
 - Community banks rely on relationships/soft information
 - Concentration? (Winton 1999; Acharya 2006)
- Financial statements have different levels of verification
 - “Audited” are the most verified and most informative
 - But also most costly statements
 - Most firms in the US not required to have audits → market equilibrium
 - Banks are a key provider of capital and demander for audited financial statements



Motivation- Practical

Bank C&I portfolios have become more diversified



- This is a result of consolidation in banking
- Implications for bank-firm interactions?

Source: Only considers banks participating in Annual Statement Studies



CSBS

SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS



Data

- Risk Management Association receives approximately 200,000 financial statements from member banks each year
- Tabulates Annual Statement Studies which aggregate the data according to:
 - Financial report type: audit, review, compilation, tax, other
 - Six digit NAICS (we map to OCC industry definitions)
 - Six US regions
 - Six borrower size groups
- Our dataset:
 - 1.7 million financial reports from 728 banks (3,193 bank years) from 2002-2011
 - Tabulated by bank



SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS

Sample of publicly available RMA report

336413 - Other Aircraft Parts and Auxiliary Equipment Manufacturing 2007-08 Annual Statement Studies National - All Regions							
	0-1MM	1-3MM	3-5MM	5-10MM	10-25MM	25MM and Over	All
Type of Statement							
Unqualified	2		2	1	7	12	24
Reviewed			6	11	14	3	34
Compiled	1	3		8	1	2	15
Tax Returns	2	1	1	5	3		12
Other		6	7	17	17	18	65
							32 (4/1-9/30/06)
Number of Statements	5	10	16	42	42	35	150
ASSETS							
Cash & Equivalents		11.2	10.7	9.7	7.6	7.4	8.9
Trade Receivables - (net)		31.0	20.2	24.4	25.1	21.9	23.6
Inventory		34.9	31.5	37.3	39.1	32.6	34.9
All Other Current Assets		.2	.6	2.1	4.0	4.9	3.6
Total Current Assets		77.4	63.0	73.5	75.7	66.9	71.0
Fixed Assets (net)		18.8	30.5	23.0	18.0	21.0	21.8
Intangibles (net)		1.3	4.2	1.2	2.4	4.2	2.9
All Other Non-Current Assets		2.6	2.3	2.3	3.9	7.9	4.3
Total Assets		100.0	100.0	100.0	100.0	100.0	100.0
LIABILITIES							
Notes Payable-Short Term		11.8	7.4	10.8	9.7	7.8	9.3
Cur. Mat.-L/T/D		2.7	3.9	3.2	2.2	4.0	3.1
Trade Payables		17.0	9.4	12.8	15.2	12.7	13.1
Income Taxes Payable		.0	.4	.3	.6	.3	.4
All Other Current Liabilities		29.4	12.6	7.3	7.9	9.6	9.9
Total Current Liabilities		60.9	33.7	34.4	35.6	34.4	35.7
Long Term Debt		10.8	23.1	12.2	10.1	15.7	14.0
Deferred Taxes		.0	.9	.5	.5	.6	.5
All Other Non-Current Liabilities		25.3	2.2	5.7	3.0	1.8	4.9
Net Worth		3.0	40.0	47.3	50.8	47.4	44.9
Total Liabilities & Net Worth		100.0	100.0	100.0	100.0	100.0	100.0
INCOME DATA							
Net Sales		100.0	100.0	100.0	100.0	100.0	100.0
Gross Profit		38.6	34.5	34.2	30.3	25.9	31.9
Operating Expenses		35.9	25.9	23.8	21.3	15.9	22.6
Operating Profit		2.6	8.6	10.3	9.0	10.0	9.4
All Other Expenses (net)		3.3	1.6	1.1	1.6	1.6	1.6
Profit Before Taxes		-7	7.1	9.2	7.4	8.4	7.8

Data provided to us
for this study

Financial ratio data
used by banks to
benchmark borrowers



SINCE 1902

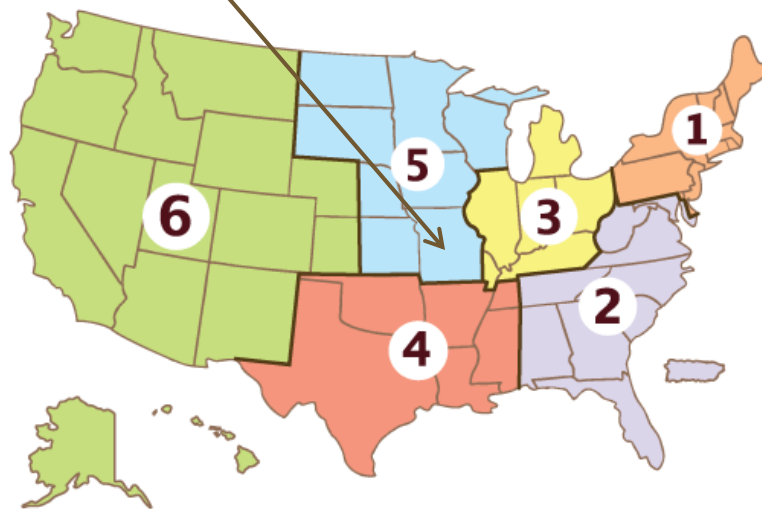
CONFERENCE OF STATE BANK SUPERVISORS



Main idea

Missouri community bank:

	<u>Share</u>	<u>Audit rate</u>
Agriculture	75%	16.0%
Construction	25%	20.0%
Total	100%	17.0%



CSBS

SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS



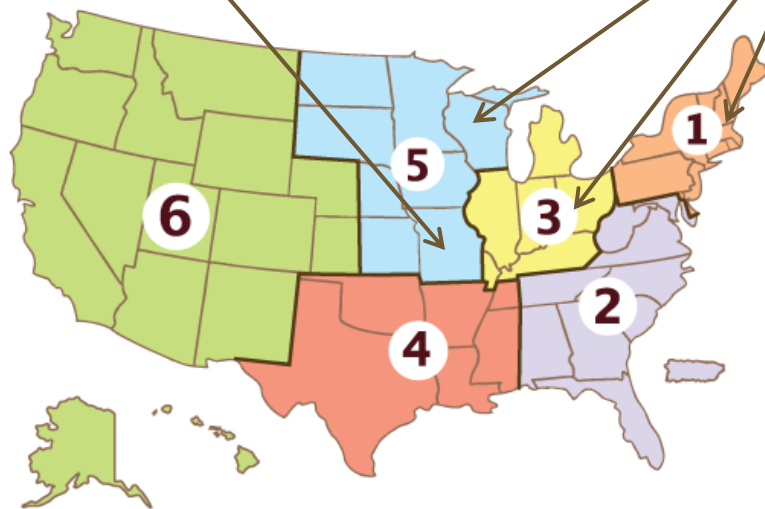
Main idea

Missouri community bank:

	<u>Share</u>	<u>Audit rate</u>
Agriculture	75%	16.0%
Construction	25%	20.0%
Total	100%	17.0%

East coast national bank:

	<u>Share</u>	<u>Audit rate</u>
Retail – NE	25%	17.0%
Construction - NE	15%	22.0%
Wholesale - MW	15%	20.0%
Construction – MW	15%	25.0%
Agriculture - NC	10%	18.0%
Manufacturing – NC	20%	18.0%
Total	100%	19.7%



SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS



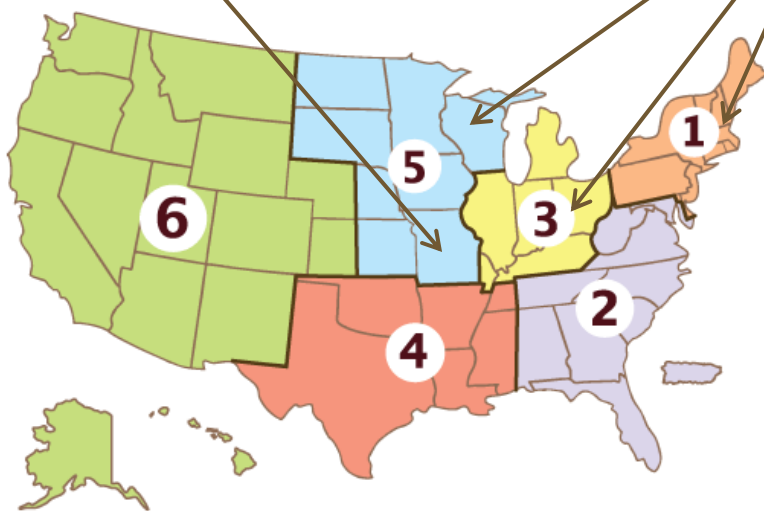
Main idea

Missouri community bank:

	<u>Share</u>	<u>Audit rate</u>
Agriculture	75%	16.0%
Construction	25%	20.0%
Total	100%	17.0%

East coast national bank:

	<u>Share</u>	<u>Audit rate</u>
Retail – NE	25%	17.0%
Construction - NE	15%	22.0%
Wholesale - MW	15%	20.0%
Construction – MW	15%	25.0%
Agriculture - NC	10%	18.0%
Manufacturing – NC	20%	18.0%
Total	100%	19.7%



Key Points

1. Bigger banks are more diversified



SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS



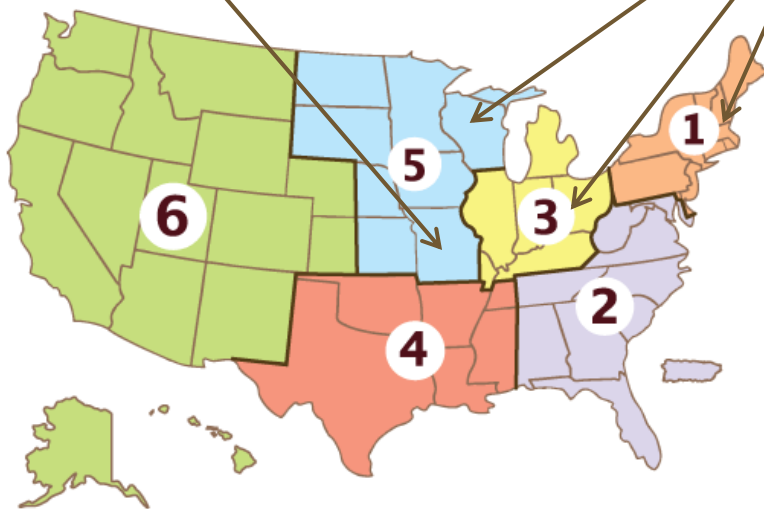
Main idea

Missouri community bank:

	<u>Share</u>	<u>Audit rate</u>
Agriculture	75%	16.0%
Construction	25%	20.0%
Total	100%	17.0%

East coast national bank:

	<u>Share</u>	<u>Audit rate</u>
Retail – NE	25%	17.0%
Construction - NE	15%	22.0%
Wholesale - MW	15%	20.0%
Construction – MW	15%	25.0%
Agriculture - NC	10%	18.0%
Manufacturing – NC	20%	18.0%
Total	100%	19.7%



Key Points

1. Bigger banks are more diversified
2. Bigger banks more likely to collect hard info



SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS



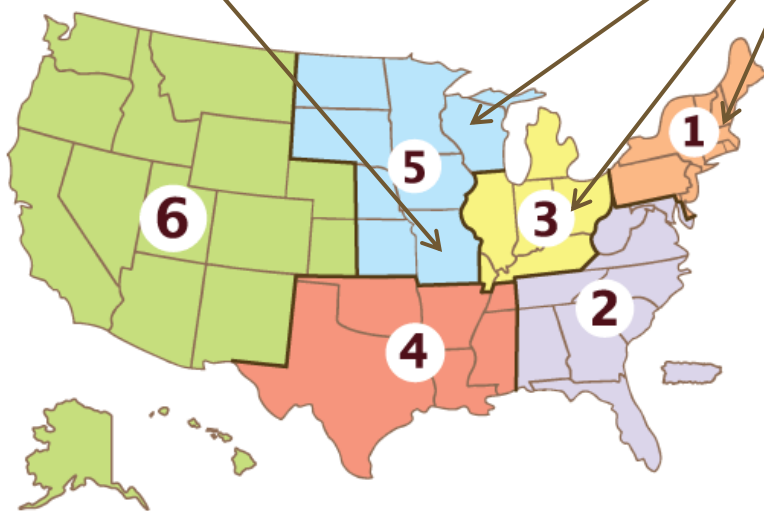
Main idea

Missouri community bank:

	Share	Audit rate
Agriculture	75%	16.0%
Construction	25%	20.0%
Total	100%	17.0%

East coast national bank:

	Share	Audit rate
Retail – NE	25%	17.0%
Construction - NE	15%	22.0%
Wholesale - MW	15%	20.0%
Construction – MW	15%	25.0%
Agriculture - NC	10%	18.0%
Manufacturing – NC	20%	18.0%
Total	100%	19.7%



Key Points

1. Bigger banks are more diversified
2. Bigger banks more likely to collect hard info
3. The most concentrated positions have the lowest audit collection rates



SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS



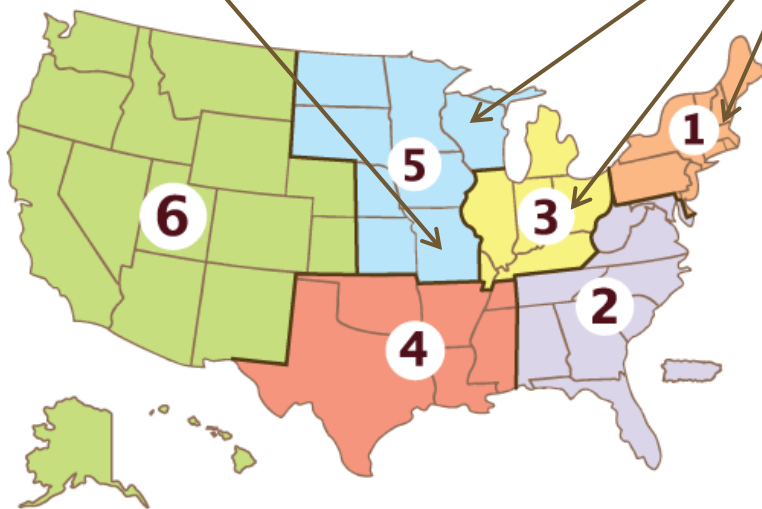
Main idea

Missouri community bank:

	Share	Audit rate
Agriculture	75%	16.0%
Construction	25%	20.0%
Total	100%	17.0%

East coast national bank:

	Share	Audit rate
Retail – NE	25%	17.0%
Construction - NE	15%	22.0%
Wholesale - MW	15%	20.0%
Construction – MW	15%	25.0%
Agriculture - NC	10%	18.0%
Manufacturing – NC	20%	18.0%
Total	100%	19.7%



Key Points

1. Bigger banks are more diversified
2. Bigger banks more likely to collect hard info
3. The most concentrated positions have the lowest audit collection rates

➔ Suggests exposure indicates expertise
However, differences could be because of bank size, borrower size, or regional or industry variation—our testing isolates these potential factors



Summary statistics

	<u>Mean</u>	<u>Std Dev</u>	<u>25%</u>	<u>50%</u>	<u>75%</u>	<u>N</u>
# F/S Collected	527	1,746	27	72	202	3,193
% Unqualified	12.8%	12.6%	4.2%	10.3%	18.2%	3,193
Cumulative Borrower Sales (\$ millions)	160,742	745,408	214	2,111	30,623	3,193
Average Borrower Size (\$ millions)	278.7	1,042.4	6.7	21.1	165.0	3,193
# Unique Industry Exposures	36.1	24.8	17.0	30.0	50.0	3,193
# Unique Region Exposures	2.2	1.7	1.0	1.0	3.0	3,193
# Unique Industry-Region Exposures	51.8	68.6	17.0	31.0	55.0	3,193
HHI	26.5%	22.2%	10.7%	19.0%	34.7%	3,193
Share_bank	6.1%	9.0%	2.0%	3.4%	6.9%	3,193
Share_market	1.4%	3.1%	0.1%	0.3%	1.3%	3,193
Share_statements	6.1%	3.2%	4.4%	4.8%	6.8%	3,193





Across banks: Concentration and audit

	(1)	(2)	(3)
	% Unqualified	% Unqualified	% Unqualified
HHI	-0.108*** [-6.50]		-0.073*** [-3.52]
Log Cumulative Borrower Sales		0.014*** [4.49]	0.009** [2.19]
Log Average Borrower Size	0.026*** [9.71]	0.005 [0.95]	0.014** [2.00]
Adj R2	0.184	0.181	0.191
N	3,193	3,193	3,193
Fixed Effects	Year	Year	Year
Clustering	Bank	Bank	Bank
Obs Level	Bank-Year	Bank-Year	Bank-Year

- One standard deviation increase in bank HHI: 1.6% lower audit rate
- One standard deviation increase in bank size: 2.9% higher audit rate





Portfolio sort

		<u>Bank Size Tercile #1</u>						
% Unqualified		<u><\$1M</u>	<u>\$1M-\$3M</u>	<u>\$3M-\$5M</u>	<u>\$5M-\$10M</u>	<u>\$10M-\$25M</u>	<u>>\$25M</u>	<u>All</u>
Concentration Tercile	1							
	2							
	3							
	All							





Portfolio sort

		<u>Bank Size Tercile #1</u>							
% Unqualified		<u><\$1M</u>	<u>\$1M-\$3M</u>	<u>\$3M-\$5M</u>	<u>\$5M-\$10M</u>	<u>\$10M-\$25M</u>	<u>>\$25M</u>	<u>All</u>	
Concentration Tercile	1	3.5%	5.6%	7.1%	11.1%	20.4%	40.2%	9.1%	
	2	3.0%	5.5%	7.8%	10.3%	16.3%	29.8%	7.1%	
	3	<u>2.5%</u>	<u>3.8%</u>	<u>4.1%</u>	<u>9.0%</u>	<u>13.4%</u>	<u>23.6%</u>	<u>5.2%</u>	
	All	2.9%	4.8%	5.8%	10.0%	16.8%	32.7%	7.0%	



Community Banking in the 21st Century

Research and
Policy Conference



		<u>Bank Size Tercile #1</u>							
% Unqualified		<u><\$1M</u>	<u>\$1M-\$3M</u>	<u>\$3M-\$5M</u>	<u>\$5M-\$10M</u>	<u>\$10M-\$25M</u>	<u>>\$25M</u>	<u>All</u>	
Concentration Tercile	1	3.5%	5.6%	7.1%	11.1%	20.4%	40.2%	9.1%	
	2	3.0%	5.5%	7.8%	10.3%	16.3%	29.8%	7.1%	
	3	<u>2.5%</u>	<u>3.8%</u>	<u>4.1%</u>	<u>9.0%</u>	<u>13.4%</u>	<u>23.6%</u>	<u>5.2%</u>	
	All	2.9%	4.8%	5.8%	10.0%	16.8%	32.7%	7.0%	

		<u>Bank Size Tercile #2</u>							
% Unqualified		<u><\$1M</u>	<u>\$1M-\$3M</u>	<u>\$3M-\$5M</u>	<u>\$5M-\$10M</u>	<u>\$10M-\$25M</u>	<u>>\$25M</u>	<u>All</u>	
Concentration Tercile	1	4.2%	7.0%	9.7%	14.7%	24.2%	45.9%	15.1%	
	2	4.3%	6.6%	10.9%	15.4%	24.2%	47.0%	14.6%	
	3	<u>2.9%</u>	<u>4.4%</u>	<u>7.0%</u>	<u>10.9%</u>	<u>17.6%</u>	<u>36.4%</u>	<u>9.6%</u>	
	All	3.3%	5.3%	8.3%	12.4%	20.0%	40.5%	11.4%	

		<u>Bank Size Tercile #3</u>							
% Unqualified		<u><\$1M</u>	<u>\$1M-\$3M</u>	<u>\$3M-\$5M</u>	<u>\$5M-\$10M</u>	<u>\$10M-\$25M</u>	<u>>\$25M</u>	<u>All</u>	
Concentration Tercile	1	5.7%	8.0%	11.3%	16.8%	28.5%	56.1%	31.8%	
	2	5.5%	7.7%	11.2%	15.9%	25.7%	51.3%	26.8%	
	3	<u>4.0%</u>	<u>7.5%</u>	<u>11.0%</u>	<u>15.0%</u>	<u>23.1%</u>	<u>44.8%</u>	<u>21.6%</u>	
	All	4.2%	7.6%	11.0%	15.2%	23.5%	46.2%	22.5%	



CSBS

SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS



Portfolio sort

Bank Size Tercile #1

<\$1M \$1M-\$3M \$3M-\$5M \$5M-\$10M \$10M-\$25M >\$25M All

Bank size tercile differences (tercile 3 minus tercile 1)

1.3% 2.8% 5.2% 5.1% 6.7% 13.5%

Concentration tercile differences (tercile 3 minus tercile 1) within bank size tercile

Bank size Tercile	Concentration tercile differences (tercile 3 minus tercile 1) within bank size tercile					
	1	2	3	4	5	6
1	-1.0%	-1.7%	-3.1%	-2.1%	-7.0%	-16.5%
2	-1.4%	-2.5%	-2.6%	-3.8%	-6.6%	-9.6%
3	-1.7%	-0.4%	-0.3%	-1.8%	-5.5%	-11.3%



SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS



Within bank: Concentration and audit

	(1)	(2)	(3)	(4)	(5)
	% Unqualified	% Unqualified	% Unqualified	% Unqualified	% Unqualified
Share_bank	-0.235*** [-7.14]	-0.271*** [-8.39]			-0.195*** [-5.48]
Share_market			-0.301*** [-11.08]		
Share_statements				-0.681*** [-9.53]	
Log Average Borrower Size	0.054*** [21.17]	0.056*** [23.01]	0.059*** [24.68]	0.053*** [24.35]	0.040*** [13.48]
Adj R2	0.386	0.409	0.412	0.408	0.615
N	165,374	165,374	165,374	165,374	165,374
Bank FE?	Yes	No	No	No	No
Industry FE?	Yes	No	No	No	No
Year FE?	Yes	No	No	No	Yes
Region FE?	Yes	No	No	No	No
Bank-Year FE?	No	Yes	Yes	Yes	No
Industry-Region-Year FE?	No	Yes	Yes	Yes	No
Bank-Industry-Region FE?	No	No	No	No	Yes
Clustering	Bank	Bank	Bank	Bank	Bank
Obs Level	Bank-Industry- Region-Year	Bank-Industry- Region-Year	Bank-Industry- Region-Year	Bank-Industry- Region-Year	Bank-Industry- Region-Year





Within bank: Conditional on bank size

	(1)	(2)	(3)	(4)
	% Unqualified	% Unqualified	% Unqualified	% Unqualified
	<u>Small Bank</u>	<u>Medium Bank</u>	<u>Large Bank</u>	<u>TBTF Bank</u>
Share_bank	0.020 [0.48]	-0.105** [-2.09]	-0.450*** [-6.68]	-2.557*** [-6.86]
Log Average Borrower Size	0.029*** [7.19]	0.040*** [8.50]	0.058*** [14.24]	0.053*** [6.96]
Adj R2	0.350	0.345	0.374	0.254
N	18,552	23,493	69,245	9,487
Bank-Year FE?	Yes	Yes	Yes	Yes
Industry-Region-Year FE?	Yes	Yes	Yes	Yes
Clustering	Bank	Bank	Bank	Bank
Obs Level	Bank-Industry- Region-Year	Bank-Industry- Region-Year	Bank-Industry- Region-Year	Bank-Industry- Region-Year
Bank Size (Total Assets)	<\$363M	\$363M-\$1.218B	>\$1.218B	>\$100B



Exposure and experience interaction

	(1)	(2)	(3)
	% Unqualified	% Unqualified	% Unqualified
Share_bank	-0.203** [-2.00]	-0.202** [-2.02]	0.344 [1.57]
Years Experience		-0.007*** [-3.70]	-0.006*** [-3.16]
Share * Years Experience			-0.077*** [-3.45]
Log Avg Borrower Size	0.056*** [10.32]	0.057*** [10.44]	0.057*** [10.39]
Adj R2	0.404	0.408	0.409
N	7,068	7,068	7,068
Bank-Year FE?	Yes	Yes	Yes
Industry-Region-Year FE?	Yes	Yes	Yes
Clustering	Bank	Bank	Bank
Obs Level	Bank-Industry- Region-Year	Bank-Industry- Region-Year	Bank-Industry- Region-Year
Sample	2011 only	2011 only	2011 only
Required Reporting Yrs	10	10	10

- Idea: Experience is complementary to amount of exposure. With little experience, concentration (i.e., volume) is not expertise
- Require 10 years of data and measure number of years lending to each industry-region



Within bank: Experience

	(1) % Unqualified	(2) % Unqualified	(3) % Unqualified	(4) % Unqualified
New Exposure This Year	0.064*** [8.37]			
New Exposure Two Years Ago		0.050*** [5.67]		
New Exposure Four Years Ago			0.044*** [4.25]	
New Exposure Eight Years Ago				-0.013 [-0.74]
Log Average Borrower Size	0.051*** [22.07]	0.052*** [22.16]	0.053*** [22.14]	0.053*** [22.14]
Adj R2	0.407	0.406	0.406	0.406
N	136,911	136,911	136,911	136,911
Bank-Year FE?	Yes	Yes	Yes	Yes
Industry-Region-Year FE?	Yes	Yes	Yes	Yes
Clustering	Bank	Bank	Bank	Bank
Obs Level	Bank-Industry- Region-Year	Bank-Industry- Region-Year	Bank-Industry- Region-Year	Bank-Industry- Region-Year



Across banks: Performance

	(1) Scaled C&I Chargeoffs $t+1$	(2) ROA $t+1$
% Unqualified	-0.002 [-0.75]	-0.001 [-0.84]
HHI	-0.001 [-0.21]	0.001 [0.34]
% Unqualified * HHI	0.003 [0.32]	0.005 [1.15]
Adj R2	0.079	0.397
N	2,489	2,489
Fixed Effects	Year	Year
Bank Controls	Yes	Yes
Clustering	Bank	Bank
Obs Level	Bank-Year	Bank-Year

Limitations:

- 1) Noisy, aggregate loan performance measure (loan-level would be ideal)
- 2) No relation between concentration, information collection, and performance *on average*, but could be very strong relation in specific cases (e.g., crisis)





Conclusion

- Conflicting predictions about the relation between concentration, expertise and information collection
- We find:
 - Concentration of a bank's portfolio significantly related to its information collection
 - Suggests that:
 - banks specialize;
 - specialist banks are able to better use soft information;
 - costly verified information most important when banks lack expertise
- Potential implications:
 - Concentration not “bad,” per se, if it implies expertise
 - Continued consolidation of banking may suggest increased demand for information verification



SINCE 1902

CONFERENCE OF STATE BANK SUPERVISORS