Sentiment in Bank Examination Reports and Bank Outcomes

Maureen Cowhey [†] Seung Jung Lee [*]
Thomas Popeck Spiller [*] Cindy M. Vojtech [*]

[†] UCLA
[*] Federal Reserve Board

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Outline of Presentation

- Motivation
  - Is the bank supervision process meaningful?

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- Analysis
  - Econometric specification.
  - Main results.
  - Results from subsamples.

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  - Main results.
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- Conclusion
  - Bank examinations provide a meaningful role in the surveillance of the banking system.

Why Banks are Supervised

- Banks are important intermediaries in the financial system
    - Receive and manage deposits in order to originate loans and invest in securities.
    - Their safety and soundness integral to the stability of the financial system.

Literature and Contribution

- Supervisory ratings and supervision at commercial banks
  - Significant relationship with abnormal returns (Berger and Davies, 1998).
  - Helps forecast macroeconomic variables (Peek, Rosengren, and Tootell, 1999).
  - Supervisory actions lead to stock market reactions (Jordan, Peek, and Rosengren, 2000).
  - BOPEC ratings forecast problem loans & earnings (Berger, Davies, and Flannery, 2000).
  - Supervisory attention leads to less risky loan portfolios (Hirtle, Kovner, Plosser, 2020).
  - CAMELS ratings have predictive power for bank performance and risk measures (Gaul and Jones, 2021).

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    - CAMELS ratings have predictive power for bank performance and risk measures (Gaul and Jones, 2021).

- Our contribution
    - By looking at bank examination reports, we provide more granular evidence of meaningful private information creation during the bank examination process.

# Comprehensive Full-scope Bank Examination Process

- We look at small and medium-sized state-member banks (SMBs) whose primary regulator is the Federal Reserve.

- Lead examiner alternates between the relevant Federal Reserve Bank and the state-level financial regulator.

- Goal is to assess the safety and soundness of the commercial bank.

- Conducted every 6 to 18 months, main outputs are exam reports and ratings.

Bank Examination Reports in Our Sample

CAMELS Ratings
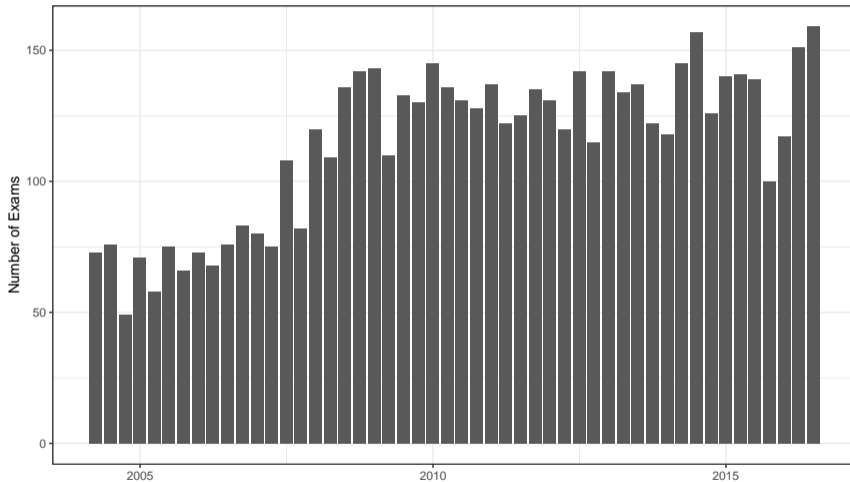
- Capital Adequacy: Ability of the bank to absorb losses.
- Asset Quality: Known and likelihood of losses the bank might face.
- Management: Quality of the management team, compliance function, audit function, and business strategy.
- Earnings: Ability of the bank to provide returns on their activities.
- Liquidity: Ability of the bank to absorb short term funding difficulties.
- Sensitivity to Market Risk (we ignore in our analysis).

CAMELS Ratings Distribution in Our Sample
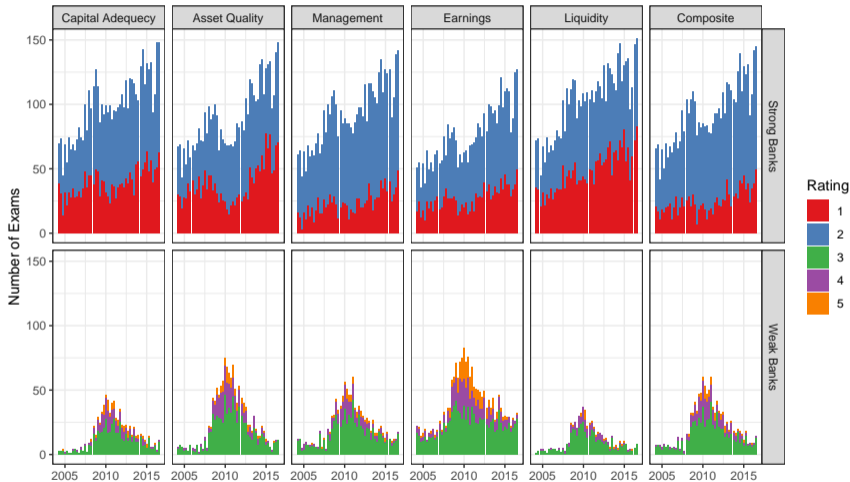
Extracting Sentiment from Bank Exam Reports

- Consider different dictionaries:
  - LM (Loughran and McDonald, 2011).
  - FS (Correa, Garud, Londono, and Mislang, 2017).
  - QDAP (Hu and Liu, 2004).

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- Consider different dictionaries:
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    - QDAP (Hu and Liu, 2004).
- Consider different methodologies:
    - Polar = (# of Positive Words – # of Negative Words)/(# of Positive + Negative Words).
    - TF-IDF = Term Frequency - Inverse Document Frequency.
    - Valance shifter.

Chatterplot for Capital Sections

Chatterplot for Capital Words – LM Dictionary
word frequency (size) ~ average rating (color)

Chatterplot for Earnings Words – LM Dictionary
word frequency (size) ~ average rating (color)
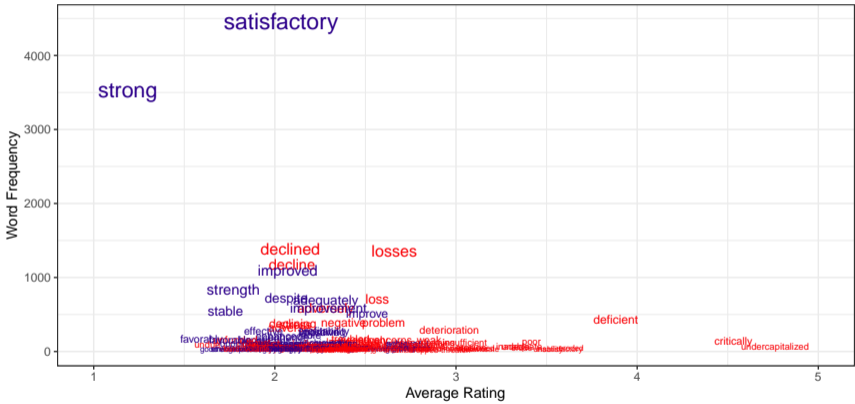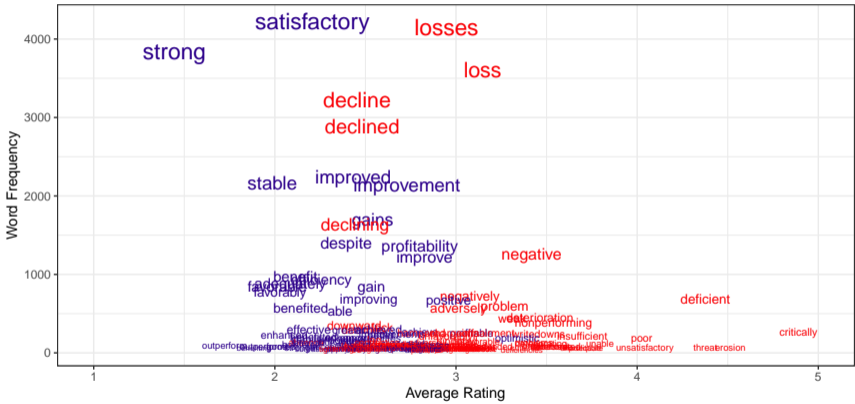
Sentiment Classification a Positive   a Negative

Evaluating Sentiment Scores

Look at how various sentiment scores correlate with Composite and CAMELS Ratings:

$$\text{CAMELS score}_s = \alpha + \beta \text{Sentiment score}_{s,m,l} + \epsilon,$$

where s is the section of the exam, m is the sentiment score method, and l is the sentiment score lexicon, with constant term α and coefficient β and an error term ϵ.

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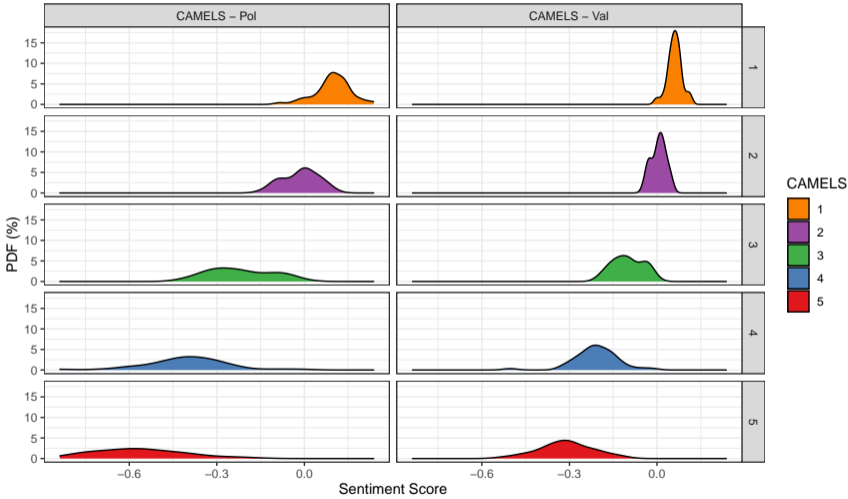
LM Polar and LM Valence Shifter have generally the highest explanatory power!

Sentiment Score Distribution by Composite CAMELS Score

Summary Statistics for LHS Variables

LHS Outcome Variables		Obs	Mean	Std. Dev.	5th Percent.	95th Percent.
Overall/Mgmt	MRIA/MRA sum	5,259	2.931	5.345	0	14
	MRIA/MRA dummy	5,259	0.394	0.489	0	1
Capital	Tier 1 ratio	5,335	15.873	10.556	9.438	28.373
	CET1 ratio	5,332	15.787	10.196	9.388	28.373
Asset Quality	Loan loss provisions/loans	5,332	0.300	0.572	0	1.346
	4-qtr net charge-offs/loans	5,264	0.109	0.187	-0.010	0.482
	Delinquent loans/loans	5,332	2.636	2.634	0.083	7.877
Earnings	4-qtr ROA	5,335	0.311	0.389	-0.348	0.800
	4-qtr PPNR/assets	5,335	0.780	0.527	-0.043	1.523
Liquidity	Securities/assets	5,335	21.126	13.799	2.395	72.293
	(Cash+securities)/assets	5,335	28.254	14.572	8.575	55.864

Econometric Specification

$$\begin{aligned}
\text{outcome}_{i,t} = {} & \rho\,\text{outcome}_{i,t-1} + \beta\,\text{sentiment}_{i,c,t-1} + \gamma\,log(\text{assets}_{i,t-1}) \\
& + \Sigma_{n=1}^{4}\,\psi_n\,\text{CAMEL dummy}_{i,n,t-1} + \theta_i + \phi_t + \epsilon_{i,t},
\end{aligned}$$

for bank i, in period t, for bank exam component c, and where θ_i and ϕ_t are bank and time fixed effects, respectively.

Sentiment in Bank Exams (All Sections) and MRAs/MRIAs

VARIABLES	(1) MRA/MRIA Sum Polar	(2) MRA/MRIA Sum Valence	(3) MRA/MRIA Dummy Polar	(4) MRA/MRIA Dummy Valence
Lag sentiment	-6.161***	-11.89***	-0.792***	-1.597***
	(0.693)	(1.663)	(0.0600)	(0.134)
Lag MRA/MRIA Sum	-0.348***	-0.354***		
	(0.0222)	(0.0221)		
Lag MRA/MRIA dummy			-0.515***	-0.528***
			(0.0179)	(0.0178)
(CAMELS dummies, etc. omitted)				
Observations	5,259	5,259	5,259	5,259
Fixed effects	bank & year	bank & year	bank & year	bank & year
R-squared	0.516	0.514	0.615	0.612
Adj. R-squared	0.400	0.397	0.523	0.519

Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Sentiment in Bank Exams (Capital Adequacy) and Capital Ratios

VARIABLES	(1)	(2)	(3)	(4)
	Tier 1 Ratio		CET1 Ratio	
	Polar	Valence	Polar	Valence
Lag sentiment	0.568***	2.120***	0.539***	2.011***
	(0.190)	(0.642)	(0.185)	(0.636)
Lag Tier 1 ratio	0.343***	0.342***		
	(0.0624)	(0.0628)		
Lag CET1 ratio			0.349***	0.349***
			(0.0630)	(0.0634)
(CAMELS dummies, etc. omitted)				
Observations	5,335	5,335	5,331	5,331
Fixed effects	bank & year	bank & year	bank & year	bank & year
R-squared	0.922	0.922	0.916	0.916
Adj. R-squared	0.903	0.903	0.896	0.896

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Sentiment in Bank Exams (Asset Quality) and Problem Loans

VARIABLES	(1) Loan Loss Provisions/Loans Polar	(2) Loan Loss Provisions/Loans Valence	(3) 4-qtr Net Charge-offs/Loans Polar	(4) 4-qtr Net Charge-offs/Loans Valence	(5) Delinquencies/Loans Polar	(6) Delinquencies/Loans Valence
Lag sentiment	-0.267*** (0.0406)	-0.746*** (0.102)	-0.0969*** (0.0149)	-0.281*** (0.0369)	-0.747*** (0.168)	-2.212*** (0.407)
Lag loan loss provisions/loans	0.211*** (0.0275)	0.207*** (0.0274)				
Lag 4-qtr net charge-offs/loans			0.246*** (0.0282)	0.238*** (0.0282)		
Lag delinquency rate					0.483*** (0.0225)	0.478*** (0.0225)
(CAMELS dummies, etc. omitted)						
Observations	5,332	5,332	5,147	5,147	5,332	5,332
Fixed effects	bank & year	bank & year	bank & year	bank & year	bank & year	bank & year
R-squared	0.523	0.525	0.535	0.538	0.710	0.711
Adj. R-squared	0.407	0.410	0.421	0.425	0.639	0.641

Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Sentiment in Bank Exams (Management) and MRAs/MRIAs

VARIABLES	(1) MRA/MRIA Sum Polar	(2) Valence	(3) MRA/MRIA Dummy Polar	(4) Valence
Lag sentiment	-1.856***	-4.752***	-0.242***	-0.589***
	(0.341)	(0.965)	(0.0273)	(0.0754)
Lag MRA/MRIA Sum	-0.351***	-0.353***		
	(0.0222)	(0.0221)		
Lag MRA/MRIA dummy			-0.534***	-0.537***
			(0.0182)	(0.0182)
(CAMELS dummies, etc. omitted)				
Observations	5,259	5,259	5,259	5,259
Fixed effects	bank & year	bank & year	bank & year	bank & year
R-squared	0.516	0.516	0.601	0.600
Adj. R-squared	0.400	0.399	0.506	0.504

Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Sentiment in Bank Exams (Earnings) and Earnings Ratios

VARIABLES	(1) Weighted 4-qtr ROA Polar	(2) Weighted 4-qtr ROA Valence	(3) Weighted 4-qtr PPNR/Assets Polar	(4) Weighted 4-qtr PPNR/Assets Valence
Lag sentiment	0.235***	0.669***	0.263***	0.693***
	(0.0194)	(0.0544)	(0.0223)	(0.0584)
Lag weighted 4-qtr ROA	0.359***	0.342***		
	(0.0244)	(0.0249)		
Lag weighted 4-qtr PPNR/assets			0.420***	0.414***
			(0.0293)	(0.0295)
(CAMELS dummies, etc. omitted)				
Observations	5,335	5,335	5,335	5,335
Fixed effects	bank & year	bank & year	bank & year	bank & year
R-squared	0.706	0.710	0.782	0.783
Adj. R-squared	0.634	0.639	0.729	0.730

Robust standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Sentiment in Bank Exams (Liquidity) and Liquid Assets

VARIABLES	(1) Securities/Assets Polar	(2) Securities/Assets Valence	(3) (Cash+Securities)/Assets Polar	(4) (Cash+Securities)/Assets Valence
Lag sentiment	0.289	0.959	-0.324	-2.276*
	(0.289)	(1.010)	(0.340)	(1.170)
Lag securities/assets	0.672***	0.672***		
	(0.0176)	(0.0176)		
Lag (cash+securities)/assets			0.647***	0.648***
			(0.0179)	(0.0179)
(CAMELS dummies, etc. omitted)				
Observations	5,335	5,335	5,335	5,335
Fixed effects	bank & year	bank & year	bank & year	bank & year
R-squared	0.929	0.929	0.912	0.912
Adj. R-squared	0.912	0.912	0.891	0.891

Robust standard errors are in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Other Results

- When it comes to management, these results are driven by banks with better ratings;
- When it comes to asset quality and earnings, these results are driven by banks with worse ratings and during the GFC period;
- Interacting (lagged) sentiment with lagged outcome variables indicates that sentiment is even more meaningful when various outcome variables are elevated;
- One exception is earnings, where positive sentiment, for example, tends to attenuate the effects of lagged earnings ratios.

Conclusion

- We investigate to see if supervisory information helps predict future bank outcomes.
- Even controlling for bank ratings themselves, the answer seems to be YES!
- Bank supervisors play a meaningful role in the surveillance of the banking system by creating and sharing information that is embedded in bank examination reports through the bank examination process.