Internal Loan Ratings, Supervision, and Procyclical Leverage [1]

Lewis W. Gaul
Office of the Comptroller of the Currency

Jonathan Jones
Office of the Comptroller of the Currency

Stephen A. Karolyi
George Mason University

Pinar Uysal
Federal Reserve Board

4th CEMLA - Dallas Fed Financial Stability Workshop

November 24-25, 2025

[1] The views expressed in this presentation do not necessarily reflect the views of the Office of the Comptroller of the Currency, the U.S. Department of the Treasury, the Board of Governors of the Federal Reserve System or any other person associated with the Federal Reserve System, or any federal agency and do not establish supervisory policy, requirements, or expectations.

Motivation

- Internal loan ratings determine loan loss provisions and book equity
- To avoid provisioning, banks may avoid downgrading loans that would otherwise be expected to perform poorly
- Understated credit risk would boost earnings and capital ratios, providing banks with incentives to inflate loan ratings
- When loan performance deteriorates, banks with inflated ratings must reconcile declining economic values and the ex-ante leniency of risk assessments

$\rightarrow$ **Are internal ratings inflated in a systematic way, and does supervision correct this behavior?**

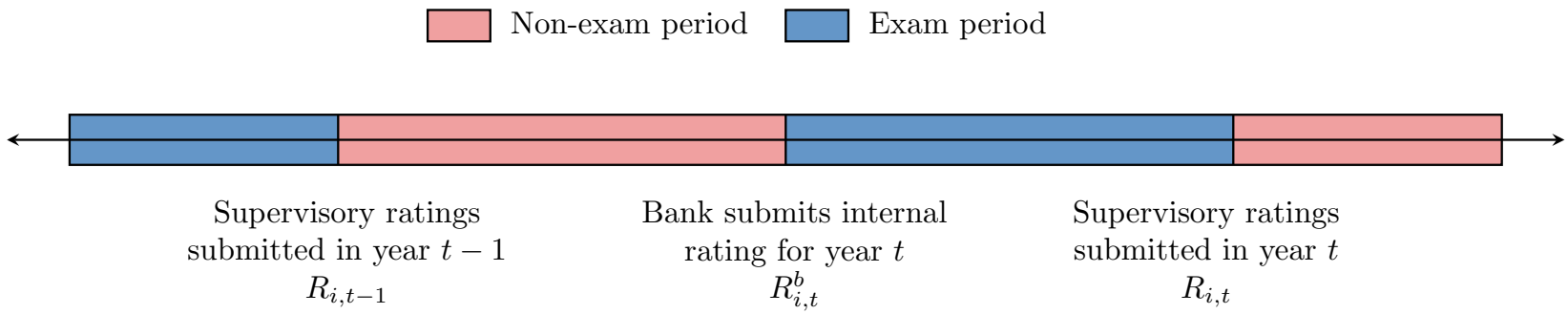
What does this paper do?

1. Is there systematic downward drift in banks' loan ratings, consistent with ratings inflation?
   - Analyze ratings drift conditional on observable information known to banks at loan origination.
2. Can supervision mitigate ratings inflation and its consequences?
   - Use Shared National Credit (SNC) Program loan-level exams to estimate the effect of supervision on ratings inflation and explore external validity
   - Analyze spillover effects of supervision (i.e., "learning") within banks' portfolios

→ **Ratings drift is common and can be mitigated by supervision**

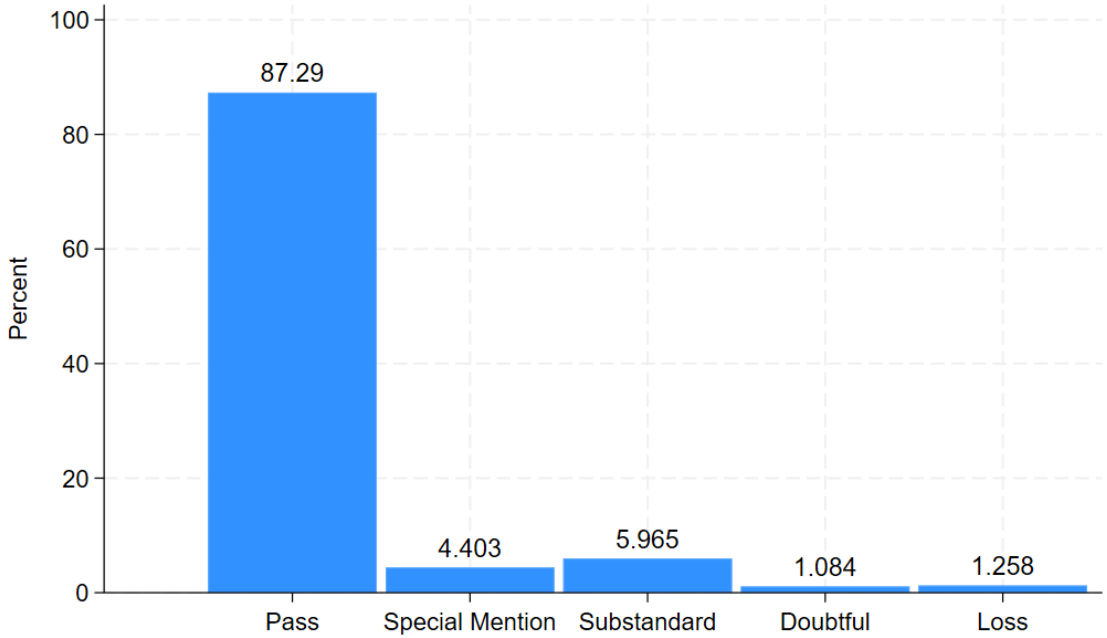
SNC Program

- The SNC Program tracks large and complex credits shared across multiple regulated financial institutions
- SNC exam process



  - Banks send loan-level information and internal ratings to supervisors
  - Loans are selected (targeted or random conditional on observables) for exams, comprising 26.5%-40.9% of SNC loans - Ivanov and Wang '22
  - Two examiners from different supervisory agencies verify the accuracy of bank ratings and collect supporting documents
  - Supervisory ratings are determined through majority vote (a third examiner breaks ties)

SNC Rating categories



	Rating	Category	Description
	1	Pass	In good standing
	2	Special Mention	Potential weaknesses that deserve management's close attention
Classified	3	Substandard	Inadequately protected by obligor paying capacity or collateral pledged
Classified	4	Doubtful	Collection in full, based on available information, is improbable
Classified	5	Loss	Uncollectible; continuance as bankable commitment is not warranted

Loan rating dynamics

- How do loan ratings evolve over time?

$$R_{i,t+1} - R_{i,t} = \alpha + \beta x_0 + \varepsilon_{i,t}$$

- Loan ratings tend to deteriorate as time progresses
- Is drift predictable based on origination characteristics?
- If origination info predicts drift, lenders may not incorporate screening/pricing information into ratings

Data Sources

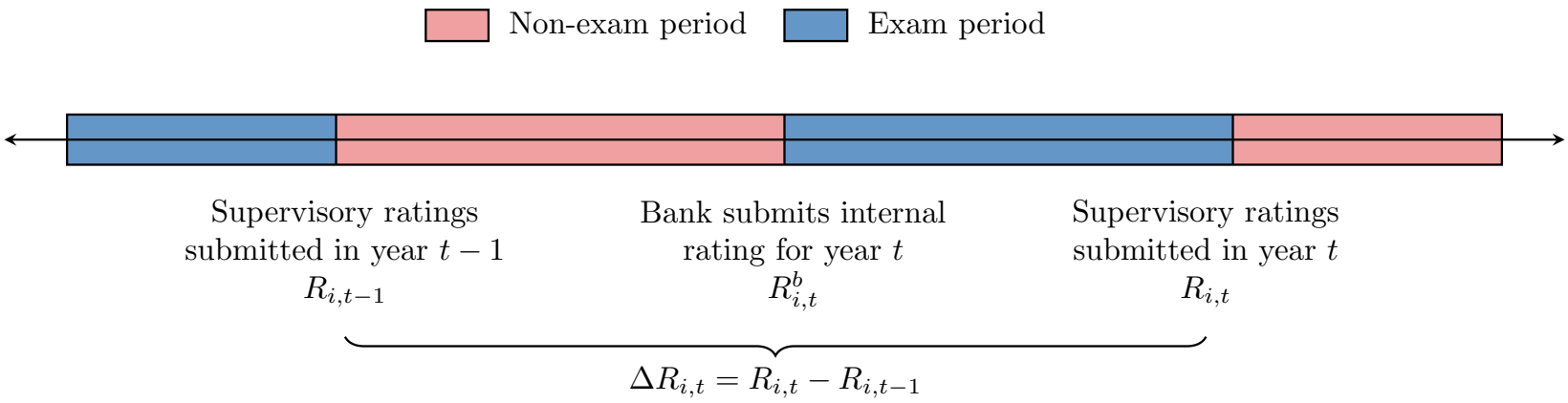
- Shared National Credit Detailed Database
  - Confidential information about commercial credits>\$20M and held by >2 unaffiliated supervised institutions
  - Internal loan ratings, examination schedules, supervisory ratings, loan characteristics, banks' loan shares, etc.
- Loan Pricing Corporation's DealScan Database
  - Match to SNC at facility level for other terms (e.g., all-in-drawn spread)
- COMPUSTAT/CRSP
  - Stock prices and financial statement data (e.g., EBITDA/Total Assets)
- FFIEC 031 and 041 Regulatory Filings (Call Reports)
  - Bank-level balance sheet and income statement data (e.g., loan growth)

Ratings inflation

- Average ratings inflation is about 7% of a rating grade per year
- Investigate ratings inflation heterogeneity based on banks' balance sheet incentives and value-relevant information
  - More ratings inflation for commitments with high utilization rates and utilized amounts
    - Larger exposures translate into larger provisions (i.e. losses) conditional on downgrades
  - Borrower characteristics known at origination and contract terms reflect borrower credit quality
    - Less ratings inflation for larger obligors, obligors with more liquidity, less leverage, higher profitability, and lower stock return volatility, suggesting that ex-ante obligor risk predicts ratings inflation
    - Ratings inflation is monotonically increasing in spread at origination, consistent with pricing information being excluded from ratings

$\Rightarrow$ Information used in screening and pricing loan is omitted from ratings, particularly for larger credit exposures

SNC Program



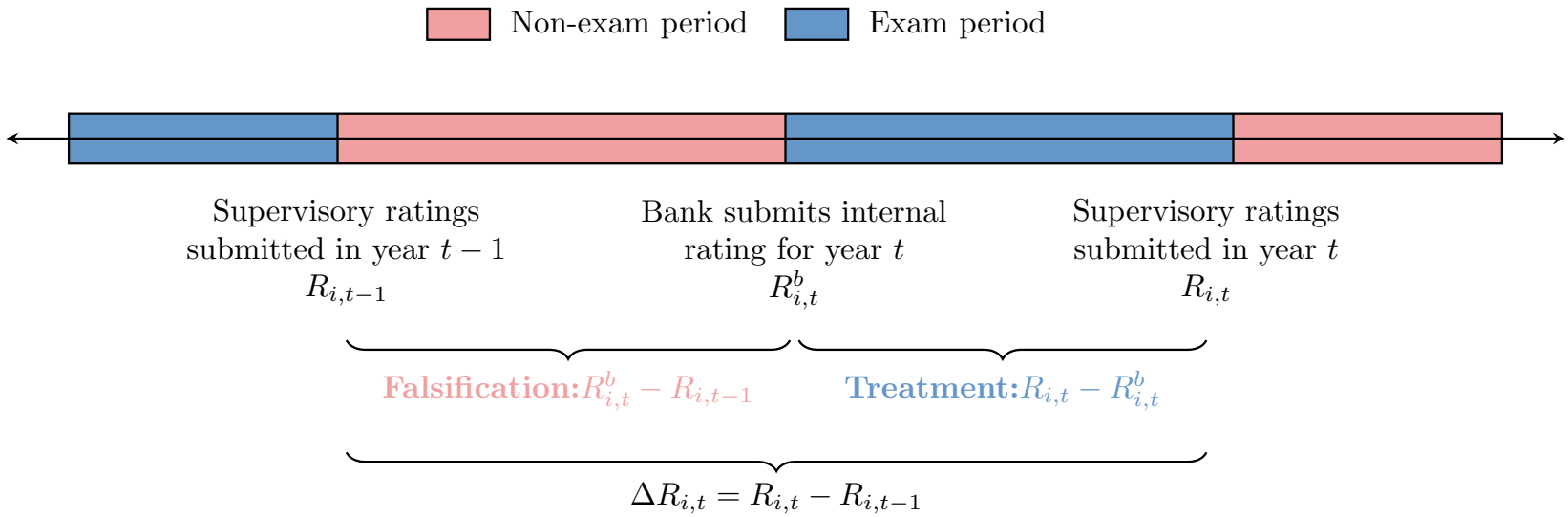
- SNC Program implements a mixed randomized-targeted structure for loan-level exams
  - Credits grouped into "buckets" based on their size, previous rating, lender type
  - Credits are selected at random conditional on their bucket to be examined, or "Read"; sampling probabilities vary by bucket
  - "Mandatory" reads are selected by the SNC Program Office based on borrower and loan characteristics observed prior to the exam

Supervision Effects

	Current Exam Rating – Previous Exam Rating		
	(1)	(2)	(3)
Read	0.046***		0.054***
	(0.001)		(0.000)
Mandatory		-0.088**	-0.098**
		(0.030)	(0.016)
Constant	0.110***	0.136***	0.121***
	(0.000)	(0.000)	(0.000)
No of Obs.	34,113	34,113	34,113
R^2	0.431	0.431	0.432
Fixed Effects	Bank-Bucket-Time	Bank-Bucket-Time	Bank-Bucket-Time
Cluster	Obligor	Obligor	Obligor

- Exams increase timeliness of internal ratings by $\sim$41% ($= 0.046/0.110$)
- Mandatory reads associated with significantly less timely ratings, consistent with selection criteria (i.e., borrower and loan features)

Falsification Test



- Random assignment of "Read" implies that pre-sampling rating changes should not be predicted by future exam status
- Decompose change in rating into falsification and treatment effect:

$$\Delta\text{Rating} = (\text{Bank Rating} - \text{Previous Exam Rating}) + (\text{Current Exam Rating} - \text{Bank Rating})$$

Supervision Effects

	Bank Rating – Previous Exam Rating		
	(1)	(2)	(3)
Read	-0.001		0.010
	(0.952)		(0.385)
Mandatory		-0.150***	-0.152***
		(0.000)	(0.000)
Constant	0.110***	0.131***	0.128***
	(0.000)	(0.000)	(0.000)
No of Obs.	34,113	34,113	34,113
R^2	0.438	0.440	0.440
Fixed Effects	Bank-Bucket-Time	Bank-Bucket-Time	Bank-Bucket-Time
Cluster	Obligor	Obligor	Obligor

- "Read" is not explained by pre-sampling ratings updates
- Mandatory exam selection is associated with significantly less timely internal ratings, consistent with selection criteria

Supervision Effects

	Current Exam Rating – Bank Rating		
	(1)	(2)	(3)
Read	0.047***		0.043***
	(0.000)		(0.000)
Mandatory		0.063***	0.054***
		(0.001)	(0.006)
Constant	0.000	0.006*	-0.006**
	(0.989)	(0.067)	(0.040)
No of Obs.	34,113	34,113	34,113
R^2	0.274	0.273	0.275
Fixed Effects	Bank-Bucket-Time	Bank-Bucket-Time	Bank-Bucket-Time
Cluster	Obligor	Obligor	Obligor

- The entire "Read" effect is driven by within-exam ratings updates
- "Mandatory" reads are associated with *more* timely internal ratings, consistent with a treatment effect during the SNC exam period

Supervision Spillovers

- Examiners may produce new information about risk that is relevant for a broader set of loans
- Spillover effects can bias estimates of causal impacts even when treatment assignment is random
- We adopt the estimation methodology introduced by Berg et al. '21
  - Allow the effect of treatment on treated and control units to depend on the fraction of treated units, in a bank b, at time t: $\overline{Read}_{bg,t}$

$$R_{ibg,t} - R^{b}_{ibg,t} = \alpha + \beta\, Read_{ibg,t} + \beta_T\, Read_{ibg,t} \times \overline{Read}_{bg,t} + \beta_C\, (1 - Read_{ibg,t}) \times \overline{Read}_{bg,t} + \epsilon_{ibg,t}$$

Supervision Spillovers

	Current Exam Rating – Bank Rating	
	(1)	(2)
Read	0.047***	0.038***
	(0.000)	(0.000)
Read * Read %		0.341**
		(0.022)
(1-Read) * Read %		-0.091
		(0.218)
Constant	0.000	-0.002
	(0.989)	(0.514)
No of Obs.	34,113	34,113
R^2	0.274	0.275
Fixed Effects	— Bank - Bucket - Time—	
Cluster	———— Obligor ————	

- Some evidence that intensity of treatment effect scales with fraction of treated units (e.g., learning during exam)
- No evidence of contemporaneous spillover effects on non-examined loans

Supervision Spillovers

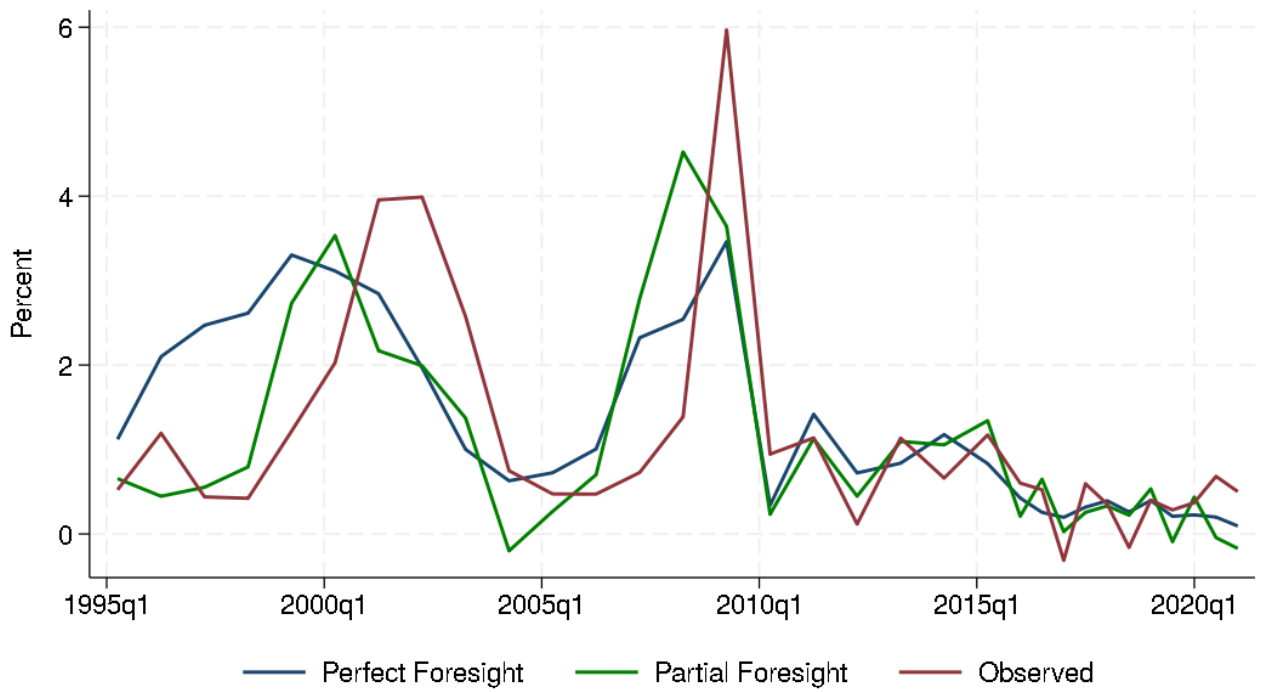
	Future Bank Rating – Current Exam Rating			
	(1)	(2)	(3)	(4)
Read	0.007	0.011		
	(0.673)	(0.534)		
Read * Read %		0.076		
		(0.664)		
(1-Read) * Read %		0.661**		
		(0.024)		
Down			-0.329***	-0.335***
			(0.000)	(0.000)
Down * Down %				0.281
				(0.421)
(1-Down) * Down %				-0.192
				(0.831)
Constant	0.055***	0.050***	0.066***	0.066***
	(0.000)	(0.000)	(0.000)	(0.000)
No of Obs.	21,078	21,078	21,078	21,078
R^2	0.244	0.244	0.251	0.251

- Some evidence of positive spillovers on non-examined credits, potentially consistent with learning (not driven by downgrades)
- No evidence of future drift or reversals, on average, but evidence of reversals for downgraded loans

Counterfactuals

- Guidance for loan loss provisions - Ivanov and Wang '22
  - 20% for "Substandard", 50% for "Doubtful", 100% for "Loss"
- We consider the following three:
  - Observed: Provision per guidance at the time of the loan rating
  - Perfect foresight: Apply loan rating at maturity to rating at origination
  - Partial foresight: Estimate a logistic model to assign ratings

Provisions as a share of Total Lagged Equity



Note: Commitment exposures are used to calculate provisions. C&I loan portfolio is used.

Bank-level outcomes

	Equity$_{t+1}$/Assets$_t$	Asset Growth$_{t+1}$	Loan growth$_{t+1}$	C&I Loan Growth$_{t+1}$
	(1)	(2)	(3)	(4)
$\Delta R_{i,t}$	-0.017**	-0.048***	-0.063***	-0.062**
	(0.011)	(0.003)	(0.001)	(0.048)
Constant	0.109***	0.025***	0.022***	0.020***
	(0.000)	(0.000)	(0.000)	(0.000)
No of Obs.	942	942	942	942
No of banks	44	44	44	44
Adj R^2	0.444	0.062	0.059	0.071
Fixed Effects	Bank	Bank	Bank	Bank
Fixed Effects	Time	Time	Time	Time
Cluster	Bank	Bank	Bank	Bank

- Banks with higher ratings inflation have lower future equity-to-asset ratios, and lower asset and loan growth
- Ratings inflation can tighten capital constraints in downturns, limiting banks' ability to lend when credit is most needed

Conclusion

- Ratings drift is systematic and predictable based on characteristics known to lenders at the time of origination
- Targeted loan-level supervision reduces delayed recognition of loan non-performance, there is some evidence of spillovers

Thank you!

Appendix

Summary Statistics

	P10	P50	Mean	P90	SD	N
Credit:						
Rating	1.00	1.00	1.25	2.00	0.72	203,389
Δ Rating	0.00	0.00	0.07	0.00	0.47	203,389
Read	0.00	0.00	0.30	1.00	0.46	34,113
Mandatory	0.00	0.00	0.14	1.00	0.34	34,113
Downgrade	0.00	0.00	0.03	0.00	0.16	21,078
Utilized %	0.00	0.65	0.56	1.00	0.42	203,283
Log(Utilized Exposure)	15.89	18.07	17.94	19.93	1.74	160,850
All-In-Drawn Spread	45.00	175.00	212.41	425.00	167.14	25,371

Summary Statistics

	P10	P50	Mean	P90	SD	N
Borrower:						
Initial Log(Assets)	5.89	7.87	7.95	10.13	1.62	39,027
Initial Cash/Assets	0.00	0.04	0.07	0.19	0.10	39,023
Initial Market Leverage	0.19	0.43	0.45	0.73	0.20	31,399
Initial EBITDA/Assets	0.06	0.12	0.13	0.22	0.07	36,789
Initial Stock Ret. Vol.	0.09	0.14	0.16	0.25	0.07	34,553
Bank:						
$\text{Equity}_{t+1}/\text{Assets}_t$	0.07	0.10	0.11	0.15	0.05	999
$\text{Asset Growth}_{t+1}$	-0.03	0.01	0.02	0.08	0.06	999
Loan growth_{t+1}	-0.03	0.01	0.02	0.06	0.07	999
$\text{C\&I Loan Growth}_{t+1}$	-0.07	0.01	0.02	0.08	0.11	999

Ratings Inflation

- Annual ratings transition matrix:

Table: Ratings Transition Matrix

	Rating$_t$					
Rating$_{t-1}$	1	2	3	4	5	Total
1	95.04	2.56	2.01	0.22	0.16	100.00
2	25.13	47.13	23.20	2.68	1.85	100.00
3	10.32	5.70	69.55	7.08	7.33	100.00
4	3.05	1.49	17.75	46.07	31.64	100.00
5	2.69	0.70	23.73	14.16	58.72	100.00
Total	86.90	4.51	6.43	1.06	1.10	100.00

- Pass ratings are sticky with $\sim$95% retention
- Multi-step ratings changes do happen, though about an order of magnitude less frequently than one-step changes
- Ratings changes are more common for non-pass credits

Ratings Inflation

Fixed Effects	Coef. (drift) (1)	Time (2)	Bank (3)	Sector (4)	Obligor (5)	Time-Bank (6)	Time-Bank-Sector (7)	Adj. R^2 (8)
Time	0.069***	158.88						0.024
		0.000						
Time+Bank	0.069***	132.96	4.15					0.035
		0.000	0.000					
Time+Bank+Sector	0.069***	132.70	4.11	22.01				0.036
		0.000	0.000	0.000				
Time+Bank+Obligor	0.067***	70.45	1.82		2.55			0.176
		0.000	0.000		0.000			
Time-Bank+Obligor	0.067***				2.56	3.09		0.204
					0.000	0.000		
Time-Bank-Sector+Obligor	0.068***				2.62		2.91	0.257
					0.000		0.000	

- More variation explained by time and obligor than by bank, consistent with common incentives across banks
- Incremental R^2 jumps significantly for obligor fixed effects and time-bank-sector interactive fixed effects, consistent with lender specialization

Ratings Inflation, Explained

	Current Exam Rating – Previous Exam Rating			
	(1)	(2)	(3)	(4)
Utilized % of Loan Commitment	0.096***		0.120***	
	(0.000)		(0.000)	
Log(Utilized Exposure)		0.003***		0.003***
		(0.000)		(0.000)
Lag(Rating)			-0.107***	-0.096***
			(0.000)	(0.000)
Constant	0.015***	0.030**	0.128***	0.147***
	(0.000)	(0.026)	(0.000)	(0.000)
No of Obs.	203,283	160,850	203,283	160,850
R^2	0.0455	0.0448	0.0623	0.0582
Fixed Effects	Bank	Bank	Bank	Bank
Fixed Effects	Time	Time	Time	Time
Cluster	Obligor	Obligor	Obligor	Obligor

- More ratings inflation for commitments with high utilization rates, consistent with balance sheet and income statement impacts of ratings

Ratings Inflation, Explained

	Current Exam Rating – Previous Exam Rating						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Initial Log(Assets)	-0.013***					-0.011***	-0.013***
Initial Cash/Assets		-0.079***				-0.026	-0.025
Initial Market Leverage			0.111***			0.082***	0.127***
Initial EBITDA/Assets				-0.218***		-0.124**	-0.137**
Initial Stock Ret. Vol.					0.580***	0.385***	0.524***
Lag(Reg. Rating)							-0.136***
Constant	0.142***	0.047***	-0.010	0.071***	-0.048***	0.049*	0.171***
No of Obs.	39,027	39,023	31,390	36,785	34,590	28,211	28,211
R^2	0.0509	0.0491	0.0533	0.0471	0.0574	0.0639	0.0856
Fixed Effects	Bank	Bank	Bank	Bank	Bank	Bank	Bank
Fixed Effects	Time	Time	Time	Time	Time	Time	Time
Cluster	Obligor	Obligor	Obligor	Obligor	Obligor	Obligor	Obligor

- Less ratings inflation for larger obligors, obligors with more liquidity, less leverage, higher profitability, and lower stock return volatility, suggesting that ex-ante obligor risk predicts ratings drift

Ratings Inflation, Explained

	Current Exam Rating – Previous Exam Rating			
	(1)	(2)	(3)	(4)
Log(All-in-Drawn Spread)	0.032***		0.042***	
Quintile 2		0.036***		0.040***
Quintile 3		0.043***		0.051***
Quintile 4		0.056***		0.072***
Quintile 5		0.085***		0.108***
Lag Reg. Rating			-0.110***	-0.110***
Constant	-0.108***	0.013**	-0.033	0.128***
No of Obs.	25,371	25,371	25,371	25,371
R^2	0.053	0.054	0.068	0.068
Fixed Effects	Bank	Bank	Bank	Bank
Fixed Effects	Time	Time	Time	Time
Cluster	Obligor	Obligor	Obligor	Obligor

- Ratings inflation is monotonically increasing in spread at origination, consistent with pricing information being excluded from ratings