EUROPEAN CENTRAL BANK

BANKING SUPERVISION

Drivers of Supervisory Capital Add-Ons in Banking Supervision

Signal versus Noise in Internal Ratings-Based Models

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Agenda

1. Background and Motivation
2. Data
3. Results
4. Robustness test
5. Supervisory implications

Majority of RWA are calculated with IRB models

Background

The facts

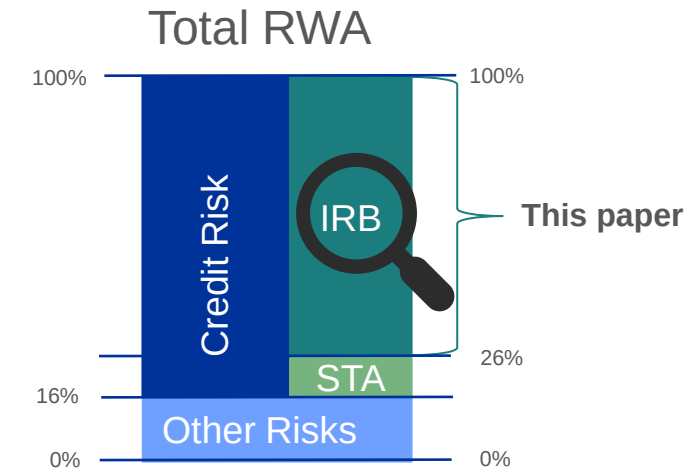
- **84 % of SSM SIs' RWA stem from credit risk.**
- **In our sample, 88 % thereof are computed with internal models.**
- Risk underestimations in these models must be addressed by supervisory capital add-ons (Limitations).

The implications

Limitations are a powerful supervisory tool:

- **267 Limitations** for a total of **EUR 64.29 bn** EUR CET1 capital-equivalent.
- **20 Sanctions** for a total of **EUR 0.06 bn** CET1 capital-equivalent.
- **SREP:** SREP P2R impact can be less than a single internal model decision.

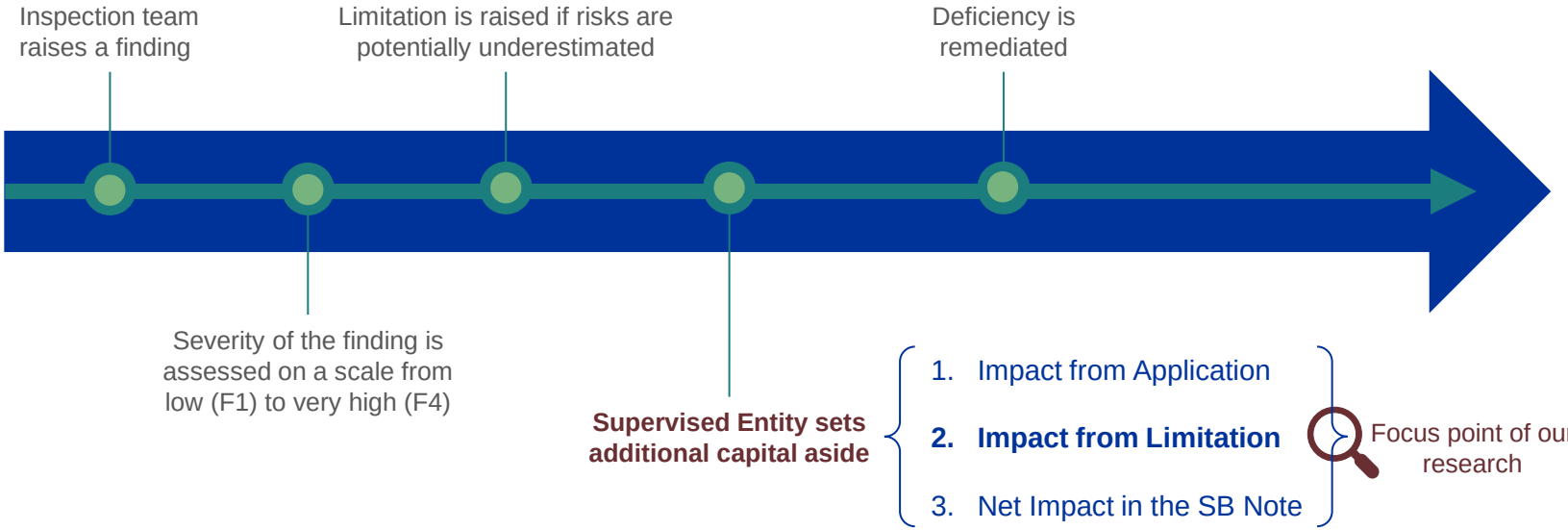
Motivation



Note: Percentages to scale.

How do we govern those RWA?

Lifecycle of a Limitation: the supervisory data generating process



Note: Abbreviated for illustrative purposes. Individual steps, such as quality assurance, and Supervised Entity's right to comment and object omitted.

Variable of interest: supervisory action

Overview table[3]

Banking group name		Country
General details	IMI number	
	Responsible	
	JD process	Not applicable.
Model related details	Risk type	Credit Risk
	Model type	Internal Ratings Based Approach - Foundation
	Model name	
	Exposure class	▪ Institutions ▪ Central banks and central governments ▪ Corporate – Other
Approval request details	Type of procedure	Approval of material change
	Legal basis	Art. 143(3) CRR - IRB - Credit Risk
	Date of initial approval	
	Date of application	

Mission dates & duration	Kick-off meeting	Exit meeting	Report finalised	Mission duration, weeks	
				28 w	

Materiality and impact, based on 2019-Q3 figures[4]	RWA covered by model		RWA impact of decision		CET1 impact of decision	
	absolute in EUR	in %	absolute in EUR mn	rel. to model scope, in %	abs. change, in bps	new ratio, in %
			-384.16			

Legal entities affected	Legal entities (names)	Model usage	Country Code	OUID

Misleading figure because it looks at the aggregate model change.

Impact of the decision

The quantitative impact of this decision is caused by the model change application as well as the change of the limitation proposed with the draft decision.

The application of the Supervised Entity provided an impact calculation that reflects the model change with regard to (i) the exclusion of obligors without exposures, and (ii) the inclusion of additional years in the calibration based on the portfolio data Q3 2019. These two aspects reduce the RWA of the rating system by EUR 721.90 million, which translates to an additional 13.25 bps of CET1 supply such that the final CET1 ratio is 14.78 %.

Based on these figures, the proposed Limitation 1 (multiplier of 1.15 to the PD estimates) of this mission is estimated by adding an additional third of the factor of the RWA of performing exposures in scope of the PD model of EUR 8,810.49 million. This corresponds to an impact of EUR +337.74 million RWA.

The combination of these figures, based on portfolio figures provided in the application package as of Q3 2019, yields an overall reduction of the RWA by EUR 384.16 million, equivalent to an improvement of the CET1 ratio by 7.03 bps on consolidated level of the Supervised Entity, such that the final CET1 ratio is 14.72 %.

RWA Impact	
Model Change	-721.90
Limitation	337.74
Overall	-384.16

Distilling the actual impact of the limitation

Different effects are disentangled.

What do we investigate?

- Relationship between RWA impact from an ECB limitation on internal models[1)], and the number of findings with respective severities (i.e. F1 – F4).
- **Research question:** does the stock of findings explain the quantitative RWA impact of the limitation?
- **Identification** by looking for each bank at each quarter at the stock of open findings and associated CRR articles.
- **Result:** Statistically significant impact only from F4 findings.

1) More specifically exclusively the RWA impact from a limitation, standardised by total assets. We do not standardise by RWA, as this measure would be biased by the limitation, which we investigate in the first place.

Results and their interpretation

	Dependent variable: EUR impact of limitation over total assets				
	(1)	(2)	(3)	(4)	(5)
F1 (#)	0.0002	0.0002	0.0002	0.0001	0.0001
F2 (#)	0.0001	0.0001	0.0001	0.0000	-0.0000
F3 (#)	-0.0001	-0.0001	-0.0001	-0.0000	-0.0000
1. F4 (#)	0.0005**	0.0006*	0.0006*	0.0005*	0.0005*
low severity × F3 (#)		-0.0000	-0.0000	-0.0000	-0.0000
low severity × F4 (#)		-0.0000	-0.0000	-0.0000	-0.0000
ROA (%)			-0.0451	-0.0716	-0.0206
Size (ln)			-0.0026	-0.0025	-0.0029
2. Headroom (%)			0.1339**	0.1051**	0.1004**
2. COR (%)			-0.2213*	-0.2191*	-0.2069*
3. ROID ($\epsilon[0;1]$)			0.0004*	0.0002	0.0002
3. CRR-prevalent ($\epsilon[0;1]$)				0.0071*	0.0067*
4. TRIM ($\epsilon[0;1]$)					0.0044**
Intercept	-0.0020	-0.0030	0.0507	0.0483	0.0582
Bank-fixed effects	Yes	Yes	Yes	Yes	Yes
N	1,180	1,180	1,130	1,130	1,130
R^2	0.3337	0.3486	0.3927	0.4199	0.4334

Story 1: F4 findings are the biggest drivers of RWA

- Focus supervisory resources to where they have the biggest impact (i.e. F4 findings).

Story 2: ECA: "[…] ECB did not impose proportionately higher capital requirements on higher-risk banks."

- Seems that ECB is stricter with well-capitalised banks.
- Conversely, less strict with riskier banks.
- **Alternatively:** riskier banks observe more defaults of obligors but yield more reliable models due to more data.

Story 3: Possible early warning signal

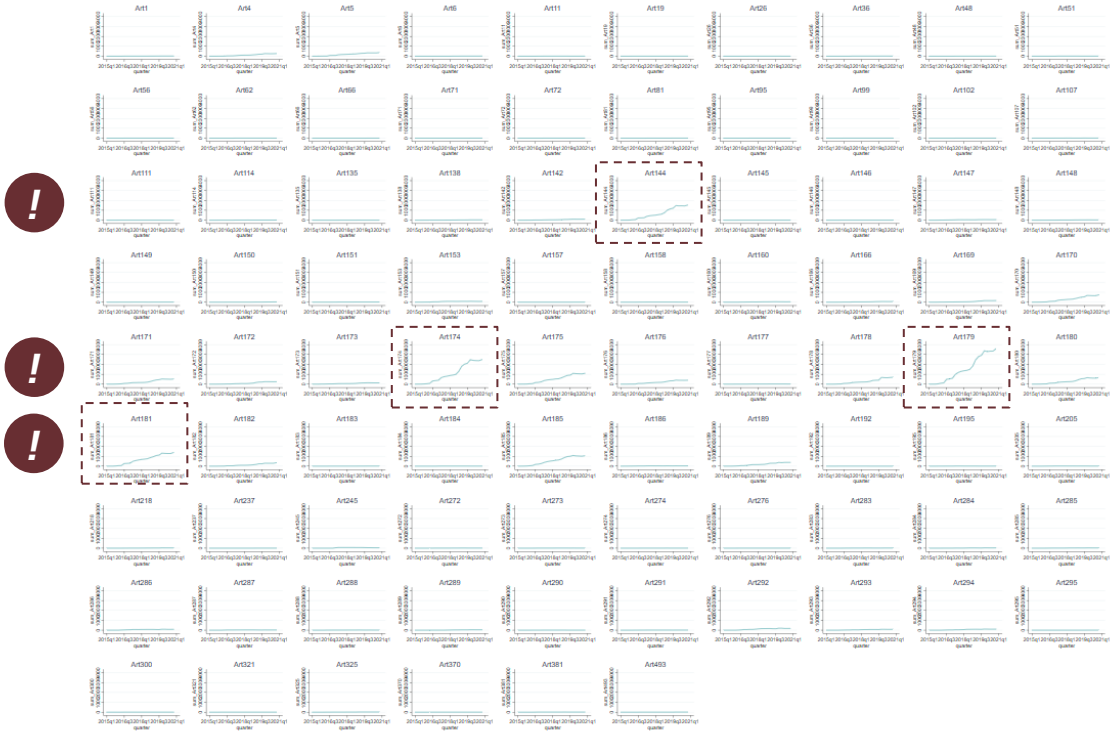
- There is a subset of references to CRR articles that has a stronger impact than all other references.

Story 4: Missions after TRIM are associated with a higher impact of limitations.

- Playing field was levelled after material models were systemically reviewed by the ECB.

N.B.: A coefficient of 0.0005 for the F4 findings translates to a marginal impact of EUR 800 mn additional RWA across the sample of SSM banks. Significance is denoted at the 5 % (*), 1 % (**), and 0.1 % (***) level. All independent variables are lagged by one quarter.

Zooming-in highlights particular CRR articles

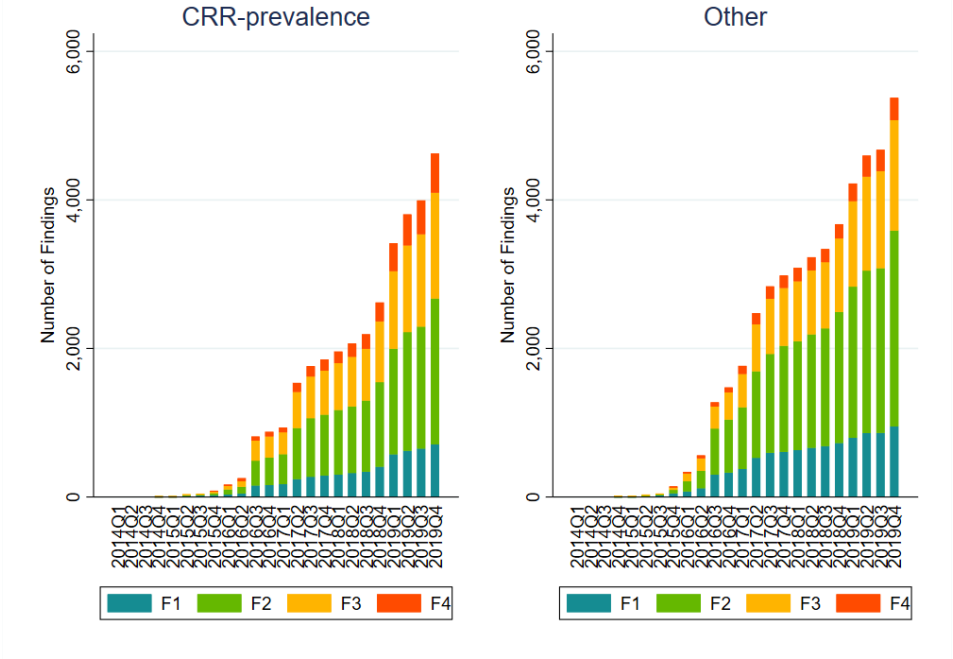


Four CRR articles with prevalent contribution stand out

- **Article 144:** Assessment of an application to use an IRB Approach
- **Article 174:** Use of models
- **Article 179:** Overall requirements for estimation
- **Article 181:** Requirements specific to own-LGD estimates.

Cluster of CRR articles drives finding severity

Could the explanation come from the severity?



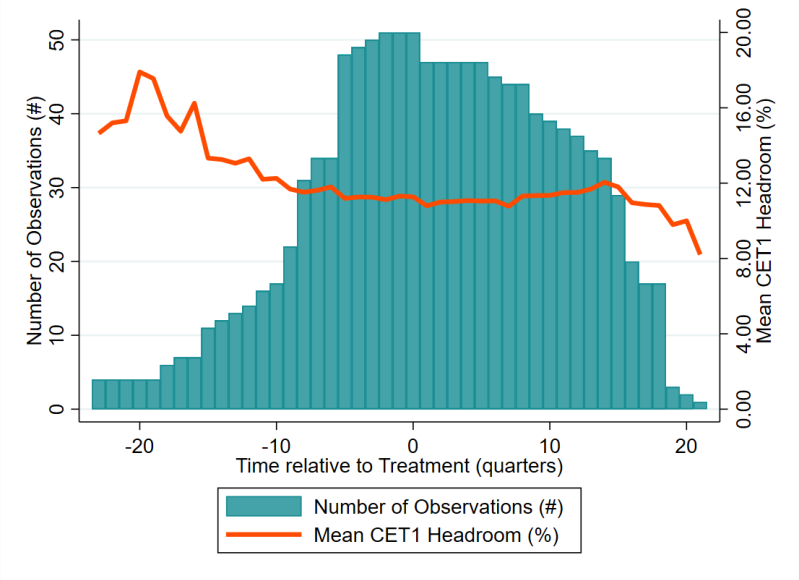
- These four prevalent articles contribute less frequently to F1/2/3 findings, but significantly more to F4s.

	Average Findings		
	CRR-prevalence	Other	p-value
F1	351.0556	574.0000	0.0000
F2	1,001.0560	1,465.7220	0.0000
F3	757.6944	839.0833	0.0001
F4	260.2778	175.4444	0.0002

- F2 finding is a “standard severity”.

Robustness: Reverse Causality Refuted

Concern: Better capitalised banks only receive higher limitations, because they were only better capitalised from their underestimation of the actual risks.



Interpretation

- Capital Headroom before and after IMI (t = 0) does not differ significantly.
- Differences occur in the tails.
- Too far away to have causal relationship.
- Driven by lack of observations in the first place.
- Generally: only one model investigated at a time.

Observations and supervisory implications

1. Early warning: close attention to particular findings warranted

Despite being less frequent in the aggregate, a set of CRR articles is more likely to be associated with high severity findings. Against the constraint of supervisory resources, **missions with such findings may receive greater attention.**

2. Focus on being risk-sensitive when setting the limitation

All else equal, better capitalised banks appear to receive comparatively higher relative limitations than weakly capitalised banks (as evidenced by CET1 headroom and Cost of Risk) from an internal model-point of view. **This could contrast the idea of a level playing field.** At the same time, riskier banks can more reliably calibrate their models.

3. Simplification of the finding follow-up is backed-up by statistics

From the analyses, it shows that **F1 and F2 findings have no statistically significant impact on the limitation. This may inform choices and decisions with regard to supervisory priorities.**

Annex

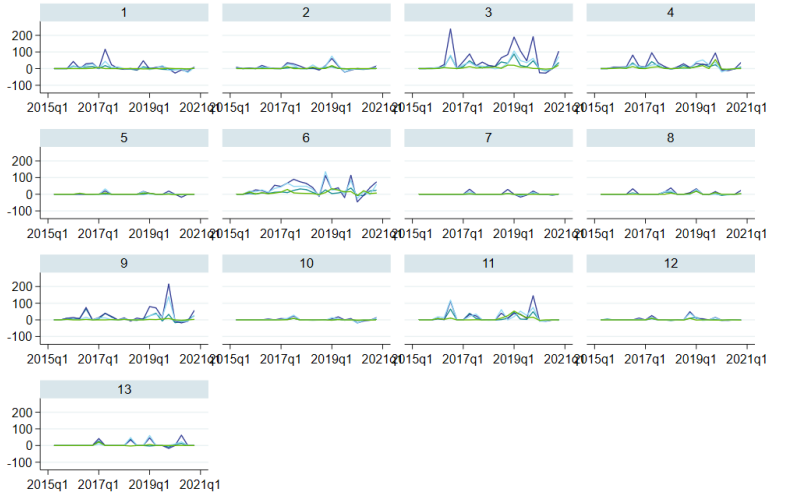
Constant inflow of new findings

- CRR Articles grouped into buckets based on similar topics;
- Generally, a **monotonic increase in the stock of open findings** with reference to the respective articles.

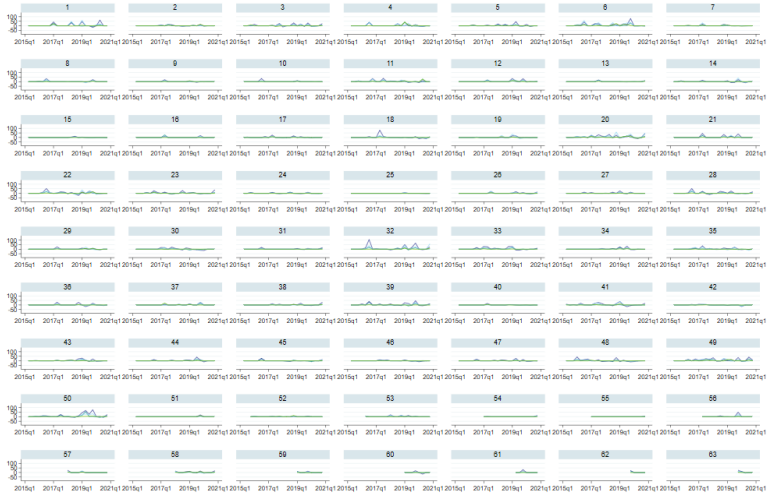
Observation can be generalised

Net inflow of new findings on both, the country- and bank-level, respectively.

countries

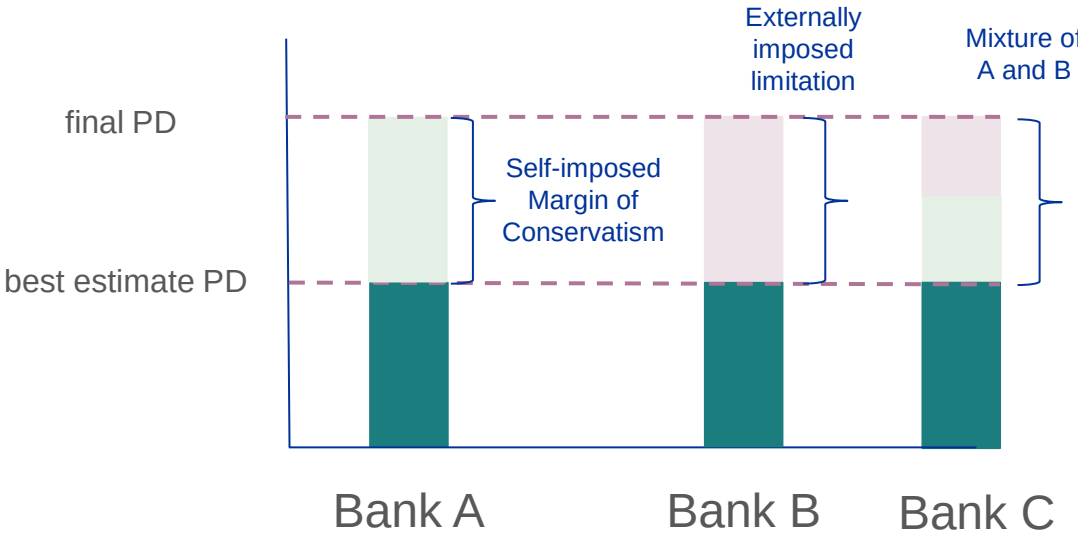


banks



What is the issue at hand?

Internal and external safeguards to ensure reliable estimates of Probabilities of Default

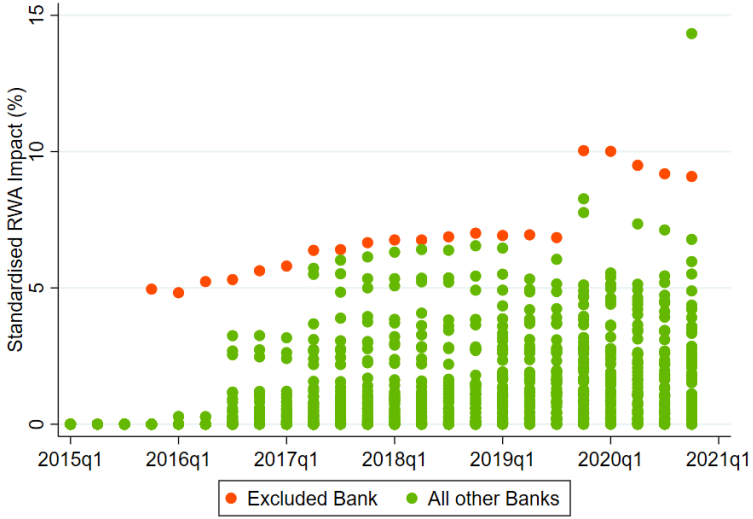


Note: For illustrative purposes only, assuming all else equal, for a common obligor with no constraints in data availability.

- Estimation of Probability of Default is subject to uncertainty;
- Margin of conservatism as an add-on to account therefore;
- Application however varies between banks;
- IMIs to enforce ‘conservatism‘ alternatively through limitations;
- Ideal outcome: level playing field all else equal.
- Reality: bank-level heterogeneity

All banks are equal, but some are more equal

Growing dispersion of RWA impacts from limitations



Bank-level observations

- One bank always lies at the top of the curvature, i.e. is an outlier.
- It was thus excluded from the analysis, as it uniquely drives the results.

Robustness: Outliers

	(1)	(2)
F1 (#)	0.0001	0.0001
F2 (#)	0.0000	-0.0000
F3 (#)	-0.0000	-0.0000
F4 (#)	0.0005*	0.0004*
low severity ∨ F3 (#)	0.0000	0.0000
low severity ∨ F4 (#)	-0.0000	-0.0000
ROA (%)	-0.0345	-0.0327
Size (ln)	-0.0053	-0.0083
COR (%)	-0.2106*	-0.1094
Headroom (%)	0.1158*	0.1011**
ROID ($\epsilon[0;1]$)	0.0052	0.0049
CRR-prevalent ($\epsilon[0;1]$)	0.0064*	0.0070*
TRIM ($\epsilon[0;1]$)	0.0044**	0.0044**
Intercept	0.1128	0.1859
Bank-fixed effects	Yes	Yes
N	1,130	1,154
R^2	0.4349	0.4638

Application of winsorization at the 1st and 99th percentile to not drop the outlier bank

Interpretation

- Column 1: Original results.
- Column 2: After winsorization.

Sign, Significance and Magnitude of coefficients remains similar, with the exception of COR.

Remains significant at the 10 % level though.