

Effectiveness of supervisory activities in mitigating banks' commercial real estate risk

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1. Introduction

- The financial turbulence of March 2023 renewed attention to the central role of effective supervision in safeguarding financial stability.
- **Our contribution:** we assess the impact of supervisory activities on the credit risk of European banks' commercial real estate (CRE) loan portfolios.
- We focus on two types of supervisory activities, namely on-site inspections (OSIs) and targeted reviews (TRs) on CRE portfolios that took place in 2021-2022.
- We employ diff-in-diff models that compare treated groups (OSIs, TRs) to a control group of significant institutions with sizable CRE portfolios, using quarterly confidential supervisory data between 2020 and 2024.

1. Introduction: key findings

- We find that both OSIs and TRs are associated with higher coverage ratios of CRE loan portfolios
- Effects are persistent for OSIs but more short-lived for TRs
- The differences point to the different nature of the exercises:
 - OSIs are intrusive, with detailed follow-up, and stronger enforcement profile.
 - TRs are diagnostic and have a benchmarking orientation.
- Taken together, the results indicate that OSIs and TRs are complementary

1. Introduction: literature

■ **Supervisory effectiveness:**

- Supervision can discipline banks' risk-taking, improve asset quality and strengthen internal governance (Hirtle, Kovner and Plosser, 2016; Altavilla et al., 2020; Kok et al., 2023; van Breemen et al., 2025)
- OSIs promote more conservative bank behaviour (Delis and Staikouras, 2011; Bonfim et al., 2023; Passalacqua et al., 2024)
- Our paper contributes to the literature by analysing the impact of TRs and by showing the complementary role they play to the OSIs.

■ **CRE loans:**

- Weaknesses in capital and risk-management practices can fuel CRE-driven instability (Duca and Ling, 2020; IMF, 2023)
- We add to the debate by providing evidence on the role of supervisory activities in reducing CRE-related risks.

Outline

1. Introduction
2. Institutional background
3. Data and descriptive statistics
4. Empirical strategy
5. Results
6. Concluding remarks

2. Institutional background

- In 2021 the SSM identified exposures to CRE and other COVID-19-vulnerable sectors as a key supervisory concern.
- Under its supervisory priorities, SSM enhanced its scrutiny of CRE portfolios through:
 - A. regular monitoring of banks' exposures to CRE-related sectors
 - B. targeted reviews
 - C. on-site inspections
- What are targeted reviews?
 - off-site, in-depth supervisory exercises
 - conducted in parallel to a sample of banks, thus allowing for benchmarking
 - provide a granular assessment of banks' internal processes, governance arrangements, and risk-management practices in critical domains

3. Data

- Sample: 81 significant institutions (SIs) directly supervised by the SSM with sizable CRE portfolios
 - 22 banks subject to OSIs in 2021-2022
 - 15 banks under TRs (no overlap between the groups)
- Time window: 2020 Q1 - 2024 Q4.
- Data sources: FINREP, and confidential data on supervisory activities
- **Variable of interest:** CRE portfolios' coverage ratio, i.e the ratio of provisions over non-performing exposures of the CRE portfolio.
 - Alessi et al. (2021) argue that coverage ratio captures the prudential dimension of risk-management behaviour more directly than other indicators such as NPLs.
 - It also fits the nature of the supervisory measures that stem from OSIs and TRs.

3. Data

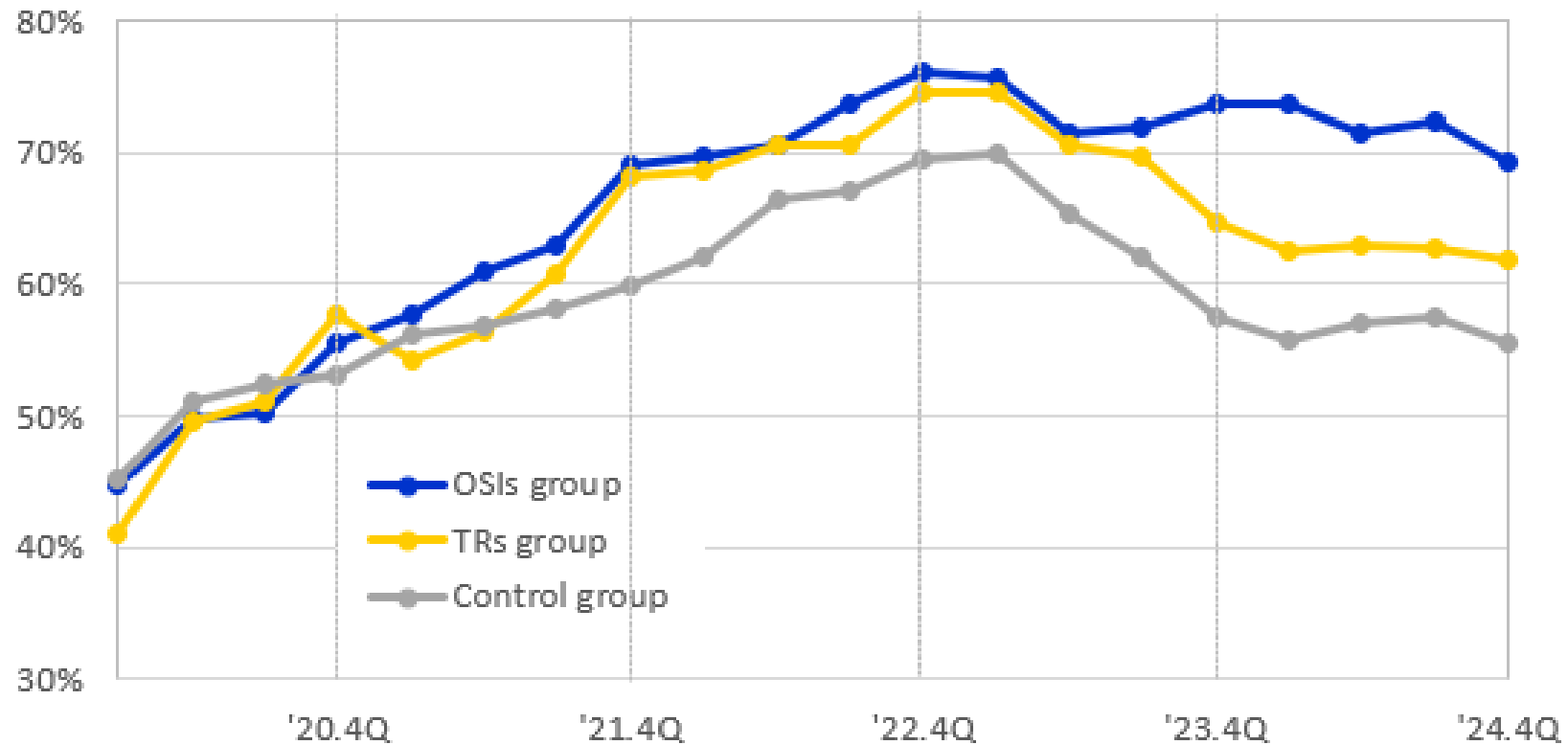


Figure 1: Trend of Coverage ratio by group of banks

4. Methodology

- Targeted Reviews: Two-Way Fixed Effects (TWFE) Difference-in-Differences model

$$Coverage\ Ratio_{j,c,t} = \alpha_j + \delta_t + \beta(Post_t \times TR_j) + \gamma X_{j,t-1} + \zeta Z_{c,t} + \varepsilon_{j,t}$$

$$Coverage\ Ratio_{j,c,t} = \alpha_j + \delta_t + \sum_{k \neq -1} \beta_k (TR_{j,t}^k) + \gamma X_{j,t-1} + \zeta Z_{c,t} + \epsilon_{jt}$$

- On-site inspections: staggered Difference-in-Differences (Sun and Abraham, 2021), as treatment happens in different points in time

$$Coverage\ Ratio_{j,c,t} = \alpha_j + \delta_t + \beta(Post_{j,t} \times OSI_j) + \gamma X_{j,t-1} + \zeta Z_{c,t} + \varepsilon_{j,t}$$

$$Coverage\ Ratio_{j,c,t} = \alpha_j + \delta_t + \sum_{k \neq -1} \beta_k (OSI_{j,t}^k) + \gamma X_{j,t-1} + \zeta Z_{c,t} + \epsilon_{jt}$$

5. Results: static models

OSI effects: Static Difference-in-Differences Estimates

	(1)	(2)	(3)	(4)
post × OSI	0.139 (0.092)	0.143*** (0.045)	0.145*** (0.045)	0.121*** (0.045)
CRE portfolio controls	NO	YES	YES	YES
Bank controls	NO	NO	YES	YES
Macro controls	NO	NO	NO	YES
Number of Obs.	1148	1033	1024	1024
Adjust R ²	0.686	0.762	0.764	0.768
FE: bank	YES	YES	YES	YES
FE: time	YES	YES	YES	YES

Note: Asterisks indicate significance at *** p < 0.01, ** p < 0.05, * p < 0.1. Standard errors are shown in parentheses.

TR effects: Static Difference-in-Differences Estimates

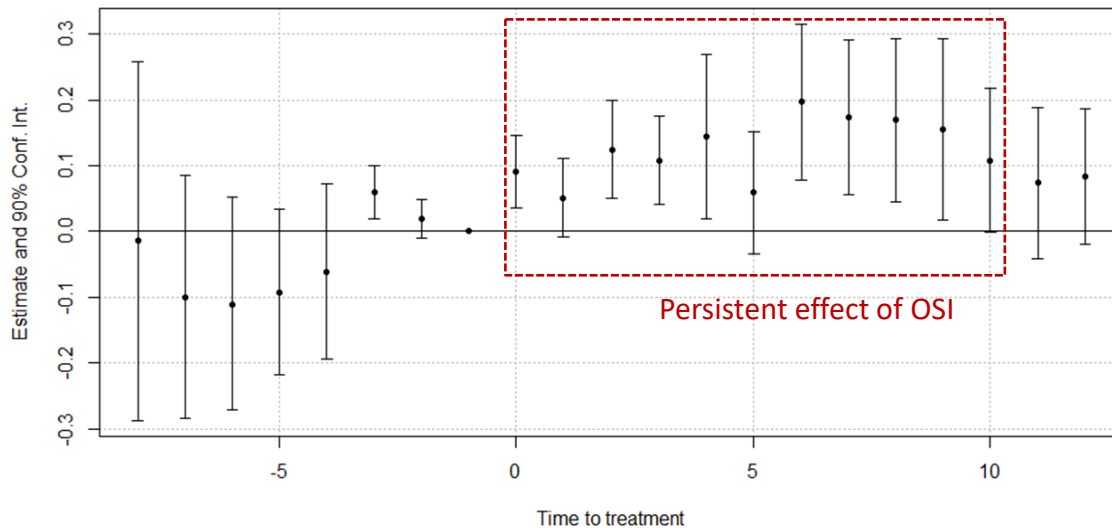
	(1)	(2)	(3)	(4)
post × TR	0.004 (0.077)	0.031 (0.073)	0.036 (0.070)	0.035 (0.071)
CRE portfolio controls	NO	YES	YES	YES
Bank controls	NO	NO	YES	YES
Macro controls	NO	NO	NO	YES
Number of Obs.	1018	936	922	922
Adjust R ²	0.712	0.721	0.730	0.731
FE: bank	YES	YES	YES	YES
FE: time	YES	YES	YES	YES

Note: Asterisks indicate significance at *** p < 0.01, ** p < 0.05, * p < 0.1. Standard errors are shown in parentheses.

5. Results: dynamic models

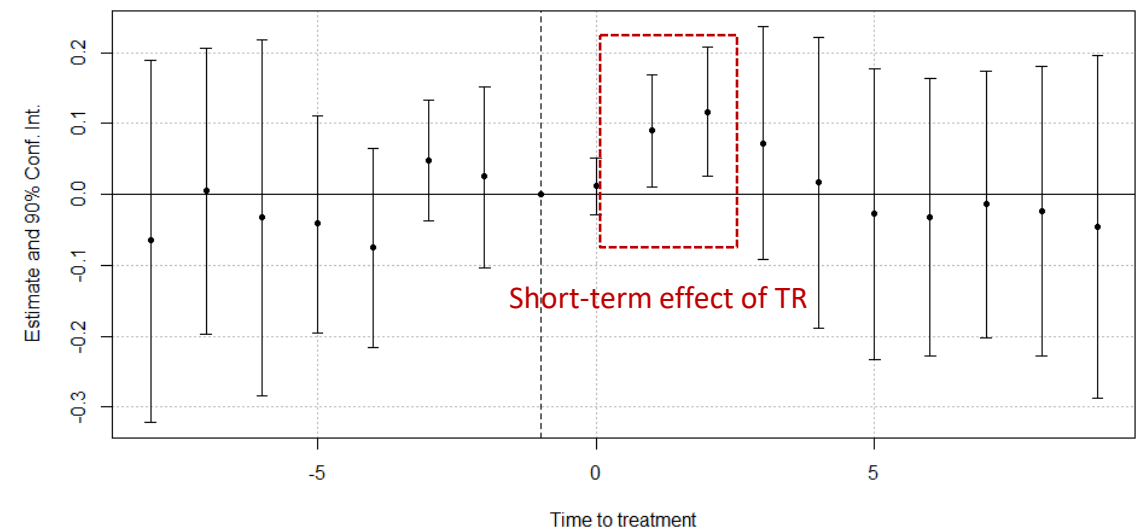
- The **OSI** campaign shows a **gradual and sustained increase** in the coverage ratio, becoming statistically significant from quarter +2 onward.
- The effect peaks 6 quarters after (+20 p.p.) and remains above 10 p.p. in later quarters, indicating a **lasting improvement** in provisioning behavior.

Evolution of OSI impact relative to time to treatment



- The TR campaign satisfies the parallel-trend assumption and shows a **short-term rise** in the coverage ratio during the first two quarters after intervention.
- After attaining **12p.p. rise**, the effect quickly fades, appearing to trigger an **immediate adjustment** in provisioning behavior.

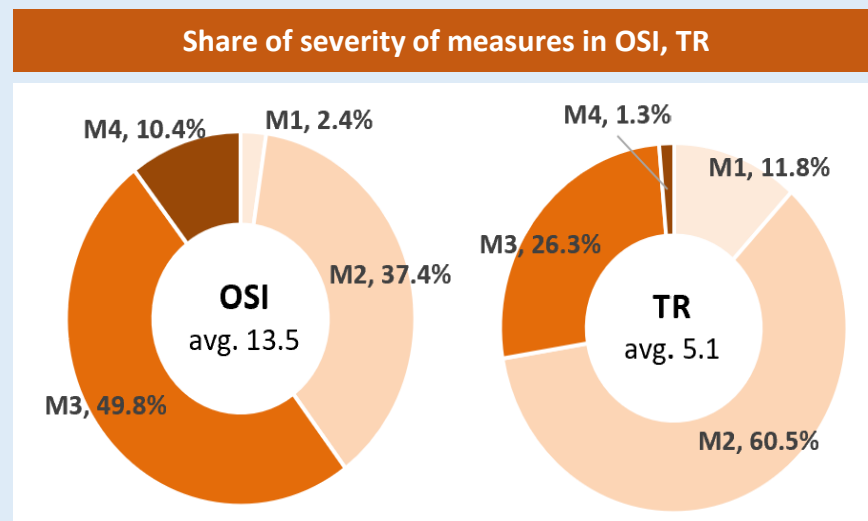
Evolution of TR impact relative to time to treatment



5. Results: why do OSIs and TRs have different effects?

1. Severity of Measures

- OSIs produce **more**, and **more severe** measures. (avg. 13.5 per bank, 60% high/very high).
- TRs yield **fewer** and **milder** actions. (avg. 5.1 per bank, 70% low/moderate).



2. Degree of Enforceability

- OSIs involve intrusive **on-site** assessments and binding **corrective actions**.
- TRs are **desk-based** and mainly provide **benchmarking feedback**.

3. Nature of Measures

- OSIs focus on rating models, **risk classification**, and **provisioning**, directly affecting coverage ratios.
- TRs emphasize **risk monitoring** and **governance**, leading to less persistent quantitative impact.

7. Concluding remarks

- On-site inspections and targeted reviews are related to mitigated commercial real estate (CRE) risks within the Single Supervisory Mechanism.
- OSIs are associated with a persistent increase in coverage ratios, consistent with their intrusive nature, detailed follow-up, and the enforcement of binding remedial measures.
- TRs are followed by an immediate but transient improvements, reflecting their primarily role in horizontal benchmarking and early risk diagnosis rather than bank-specific enforcements in OSI.
- Our results highlight the complementary nature of the two activity types.

Thank you!

Appendix

Table 1: Descriptive Statistics

Panel A : Bank Summary Statistics (full sample)

Variable	Mean	Median	Std	P25	P75
Total loan & advances(mil. €)	172,117	51,028	262,559	27,729	193,837
CET1 ratio	16.39%	15.43%	3.87%	13.63%	18.14%
ROA	0.17%	0.14%	0.32%	0.06%	0.26%
Deposit over total funding	81.66%	85.27%	13.78%	74.25%	91.62%
CRE loan & advances(mil. €)	14,634	7,265	18,058	2,424	21,396
CRE Coverage ratio	85.91%	62.23%	149.15%	44.66%	90.37%
CRE NPL ratio	6.42%	4.32%	6.81%	2.40%	8.37%
CRE Stage 2 ratio	19.20%	16.85%	12.00%	11.24%	24.98%
Share of LTV>80% in CRE loan & advances	22.96%	18.63%	18.67%	10.64%	30.68%

Appendix

Panel B : CRE related variables for OSI Banks

CRE loan & advances(mil. €)	11,670	8,157	10,776	2,142	21,800
CRE Coverage ratio	107.14%	62.60%	251.82%	49.77%	102.31%
CRE NPL ratio	6.48%	4.43%	6.33%	1.94%	8.49%
CRE Stage 2 ratio	17.43%	14.92%	12.92%	10.00%	22.85%
Share of LTV>80% in CRE loan & advances	23.78%	21.93%	15.20%	14.35%	33.37%

Panel C : CRE related variables for TR Banks

CRE loan & advances(mil. €)	29,129	24,155	23,649	8,294	45,383
CRE Coverage ratio	74.91%	70.90%	45.33%	48.35%	92.65%
CRE NPL ratio	4.93%	4.05%	3.41%	2.35%	7.26%
CRE Stage 2 ratio	20.56%	15.72%	14.61%	10.97%	24.96%
Share of LTV>80% in CRE loan & advances	21.97%	17.84%	21.65%	9.84%	24.94%

Appendix

Table 2: Classification of Measures by categories

Category	Total		OSI		TR	
	Freq.	Percent	Freq.	Percent	Freq.	Percent
Credit granting / Origination	33	8.8%	24	8.1%	9	11.8%
Early warning / Monitoring	48	12.9%	35	11.8%	13	17.1%
Rating models	15	4.0%	15	5.1%	0	0.0%
Forbearance / UTP / SICR / NPL	75	20.1%	69	23.2%	6	7.9%
Loan loss provisioning	31	8.3%	29	9.8%	2	2.6%
Collateral management / Valuation	74	19.8%	56	18.9%	18	23.7%
Governance / Strategy / Policy	71	19.0%	45	15.2%	26	34.2%
Reporting / Data quality	17	4.6%	15	5.1%	2	2.6%
Other (IT, audit, compliance)	9	2.4%	9	3.0%	0	0.0%
Total	373	100.0%	297	100.0%	76	100.0%

Note: Category assignments were made by the authors. Categories in bold indicate supervisory measures with direct financial consequences, as they influence the origination of loans, the identification of problem loans, and components of Expected Credit Loss estimations. UTP and SICR stand for Unlikely to Pay and Significant Increase in Credit Risk, respectively.

Source: ECB confidential supervisory data (IMAS).