Releasing Bank Capital

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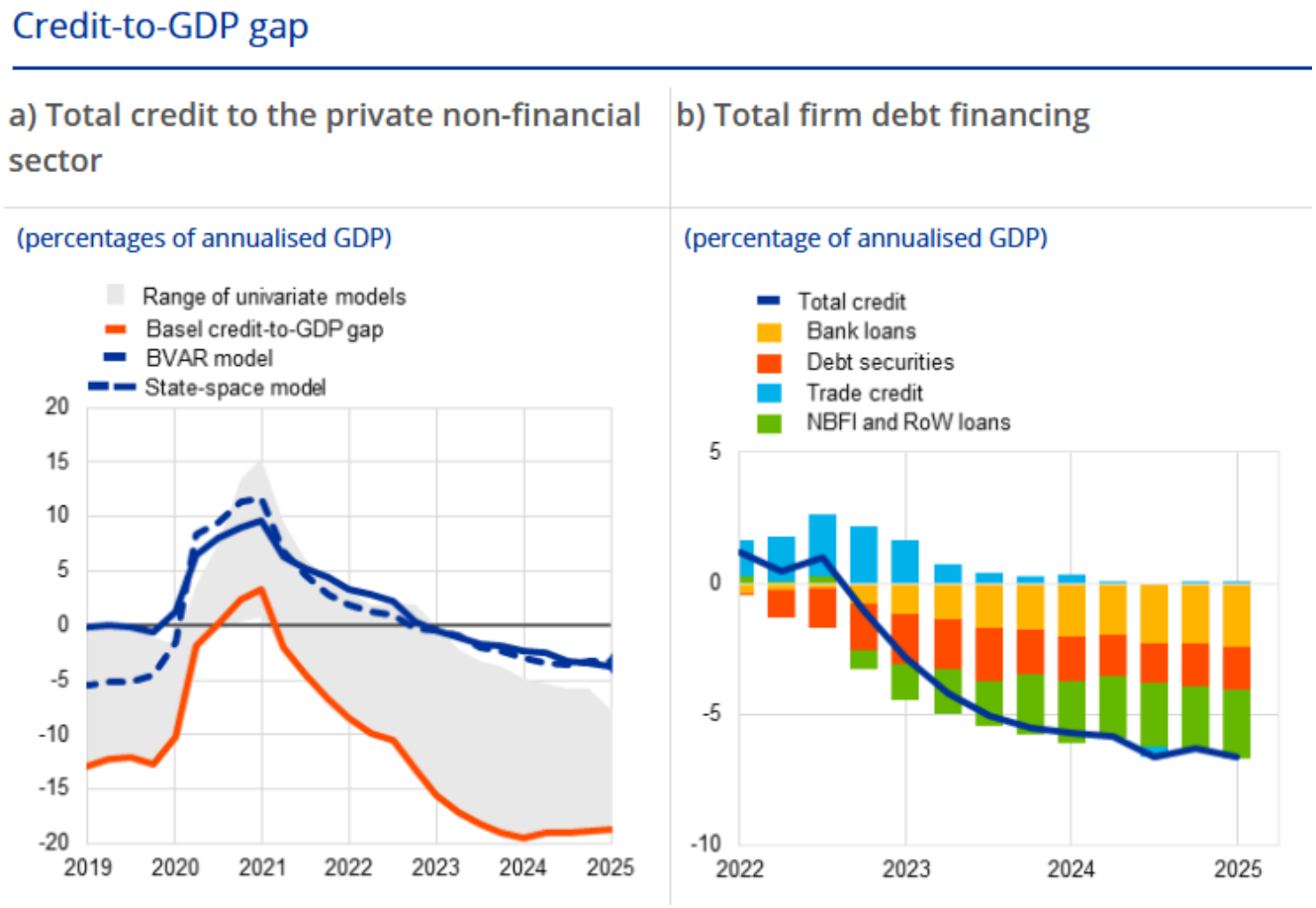
The views expressed in this article are those of the authors and not necessarily reflect those of European Central Bank or the Eurosystem.

The paper in a nutshell

- How do banks adjust lending when regulatory capital requirements change? $\Rightarrow$ central for understanding micro- and macro-prudential policy transmission
- A sharp, plausibly exogenous reduction in capital requirements for Greek banks $\Rightarrow$ triggered by the July 2024 ICAP-CRIF rating upgrade (ECAI $\rightarrow$ CQS mapping)
- AnaCredit loan-level data $\Rightarrow$ granular identification of credit supply responses within firm–bank pairs
- Empirical strategy:
  - Standard difference-in-differences
  - Repeated cross-section regressions
  - Staggered DiD & residualised specifications
- **Main findings:**
  - Treated banks expand granted credit by **4–13%**
  - Loan terms ease: interest rates fall by **56 bps**, maturities lengthen
  - No evidence of increased risk-taking or sectoral reallocation
  - Securities: treated banks reduce sovereign bond holdings and rebalance toward shorter-maturity securities, with no change in yields

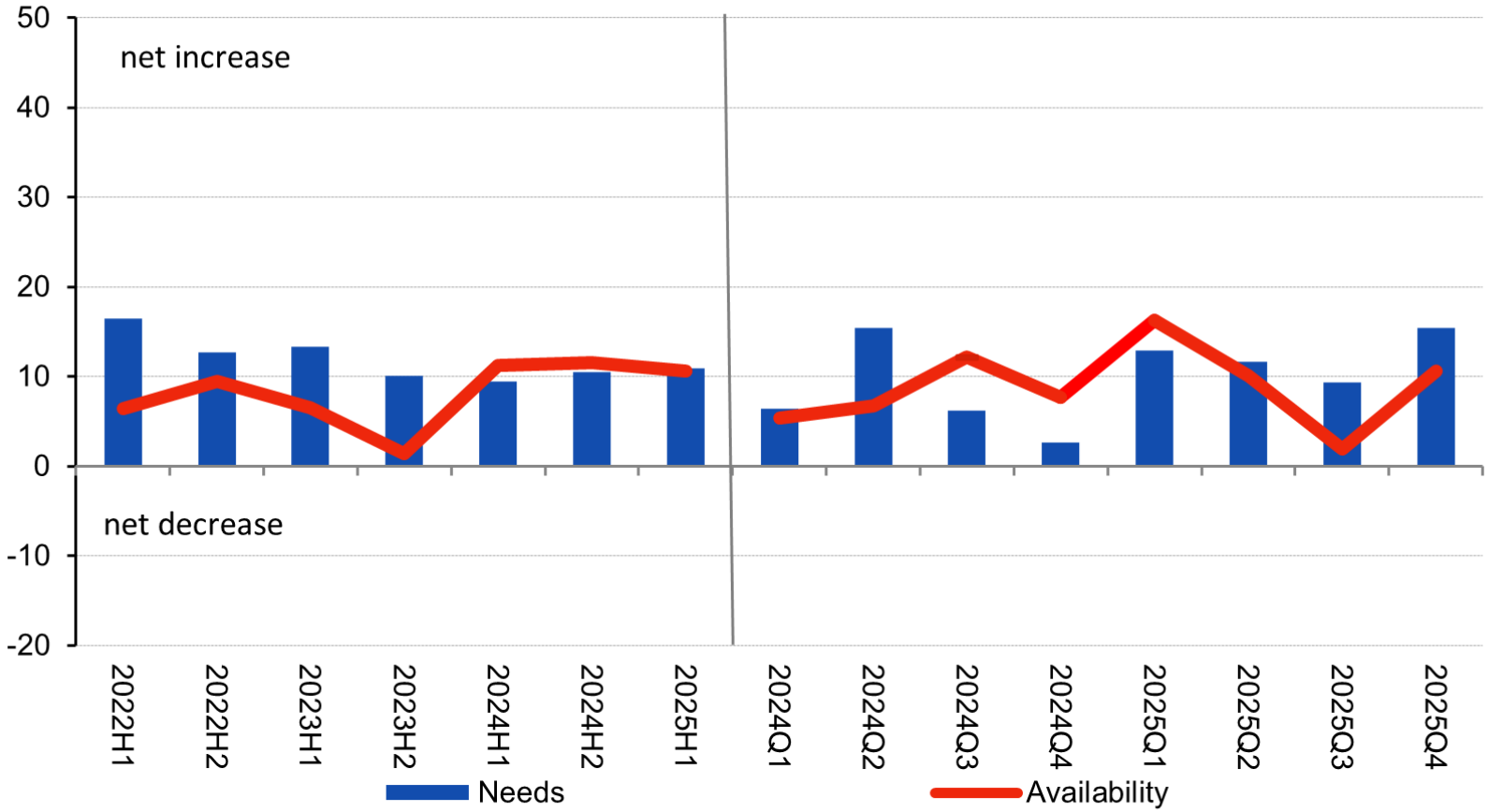
The context: Sluggish credit in EA after Covid



Source: Di Casola, P., Mendicino, C., Nicoletti, G. and Skoblar, A. (2026), ECB Blog

Same in Greece: supply did not keep up with demand

Chart – Change in the needs and the availability of bank term loans to SMEs in Greece (net percentage of firms*)

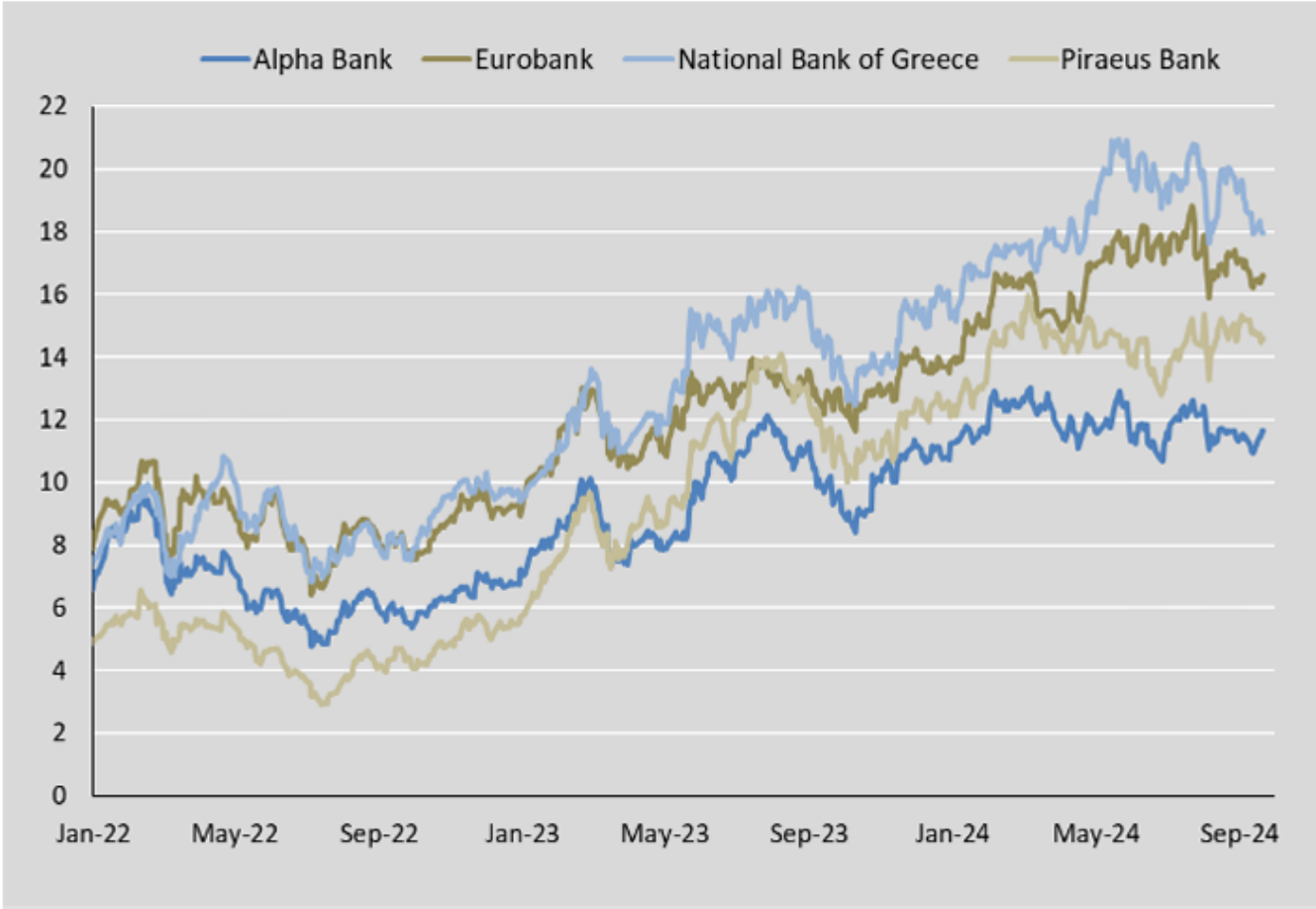


* Net percentage of firms is defined as the difference between the percentage of firms which replied that their needs/the availability of bank loans increased minus the percentage of firms which replied that their needs/the availability of bank loans decreased.

Source: EC/ECB, Survey on the access to finance of enterprises in the euro area

Chart II.9 Greek banks' capitalisation index as a percentage of weighted assets

(1.1.2022-30.9.2024, daily prices, %)



Sources: Athens Exchange and Bank of Greece

Regulatory shock: The July 2024 CQS Upgrade

- ⇒ **1 July 2024**: EC published Implementing Regulation 2024/1872, updating the mapping between ECAI ratings and Credit Quality Steps (CQS) under the Capital Requirements Regulation
- ⇒ **25 July 2024**: Regulation enters into force
- ⇒ ICAP CRIF ratings receive a mapping that now includes CQS1
- ⇒ Credit exposures to Greek companies rated AAA or AA by ICAP CRIF will now be treated at the 'very low risk' level of CQS1
- ⇒ The upgrade lowered the applicable risk-weight bucket
- ⇒ Lower RWA → lower capital requirements for the same exposures

NEW ICAP Mapping

Credit assessment	Credit Quality Step	RW
AAA	1	20%
AA	1	20%
A	2	50%
BBB	3	100%
BB	4	100%
B	5	150%
CCC	5	150%
CC	6	150%
C	6	150%
D	6	150%

OLD ICAP Mapping

Credit assessment	Credit Quality Step	RW
AAA	2	50%
AA	2	50%
A	3	100%
BBB	3	100%
BB	4	100%
B	4	100%
CCC	5	150%
CC	5	150%
C	6	150%
D	6	150%

Mechanics of the ICAP CRIF mapping change

Impact of the new ICAP mapping on risk weights

- **Largest RWA relief comes from upgrades of high-quality exposures:**
  - AAA/AA ratings: **50% → 20%**
  - A ratings: **100% → 50%**
- **RWA increases arise only for weaker ratings:**
  - B ratings: **100% → 150%**
- Implications for banks:
  - ✓ Portfolios with many AAA/AA/A exposures → large RWA relief
  - ✓ Portfolios with many B exposures → RWA increase
  - ✓ Portfolios concentrated in BBB/BB exposures → limited effect

Quasi-experimental shock

- **Why this matters**
  - ⇒ The upgrade is external, rating-driven, and plausibly exogenous to bank behaviour
  - ⇒ Sizeable effect, in the order of 100bps of CET1 ratio, same order of magnitude of macro pru releasable buffers

- **Three sources of heterogeneity across banks**
  - ⇒ **Portfolio composition**: banks differ in their exposure to Greek corporates and in their reliance on standardized versus internal ratings-based risk weights
  - ⇒ **Timing of RWA recalculation**: banks incorporate updated risk weights at different points in the year, depending on internal processes and supervisory cycles
  - ⇒ **Reliance on standardized versus internal ratings-based risk weight**

- **Resulting heterogeneity**
  - ⇒ **Bank 1**: receives the largest reduction in RWA
    - → incorporated ICAP-CRIF ratings for Pillar I RWAs with reference date **31.12.2024**
  - ⇒ **Bank 2 and Bank 3**: moderate capital relief
    - → relief recognised earlier (from **September 2024**)
  - ⇒ **Other Banks (including one of the top-4)**: minimal relief
    - → serves as the control group

Bank 1 — Pillar III evidence of the ICAP CRIF effect

	June 2024	Dec 2024	
Total RWAs (m)	37,869	37,368	–501
Credit RWAs (m)	31,781	30,423	–1,358
CET1 ratio (%)	18.20	18.31	+0.11 pp

Migration across key risk-weight buckets

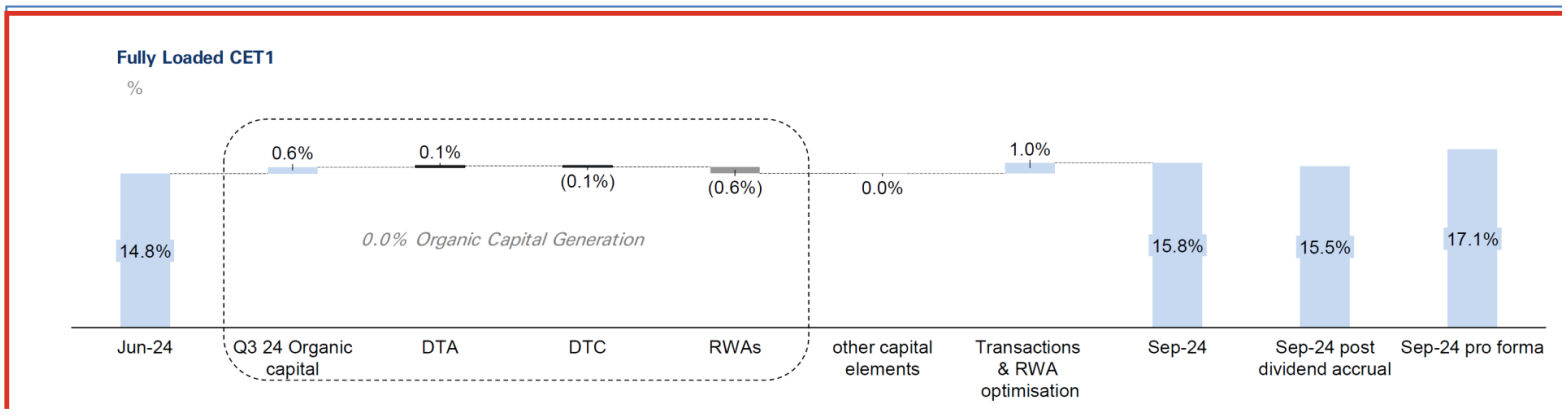
Risk Weight Bucket	June 2024 (m)	Dec 2024 (m)	Change (m)
20%	421	3,215	+2,794
50%	6,213	0	–6,213
100%	25,418	22,000	–3,418
150%	696	883	+187

- One-off RWA relief of –2.6bn; pronounced shift from 50% bucket toward 20%
- Consistent with the ICAP-CRIF mapping change for AAA/AA exposures
- Limited increase in 150% exposures: minimal exposure to low-rated borrowers

Bank 2 - Shareholders' Report Q3 2024

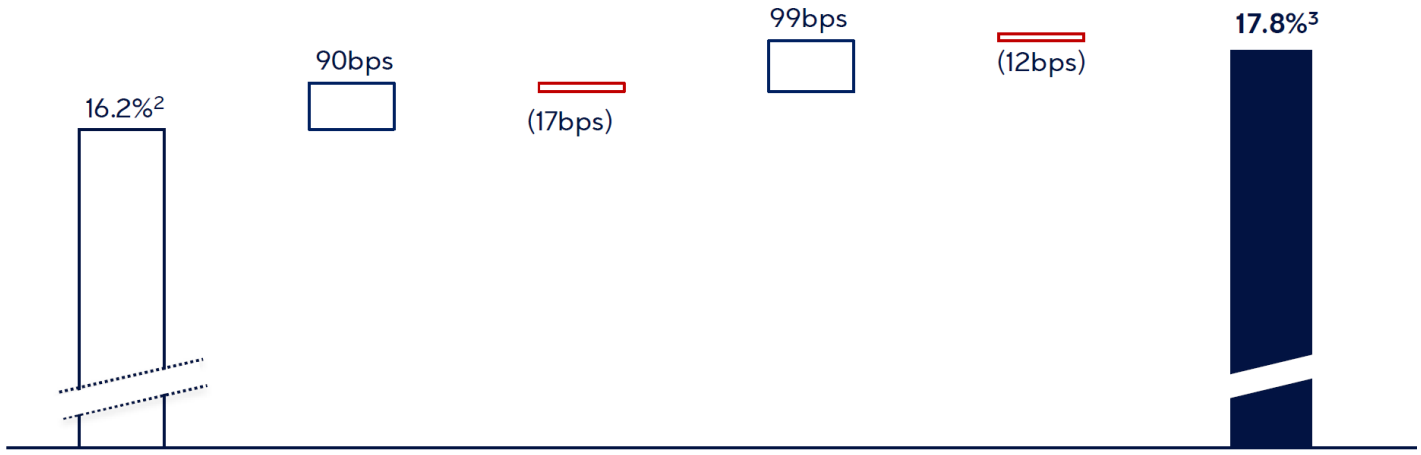
Strong capital generation to sustain higher payouts; FL CET1 at 15.5%

Capital evolution (q/q)



The Group's Fully Loaded CET 1 Capital base stood at €4.8bn, resulting in a Fully Loaded CET1 ratio of 15.8\%, or 15.5\% post dividend accrual of 32bps, up by 70bps q/q. The move was primarily attributable to a 61bps positive contribution from organic capital generation, a negative impact of RWA -59bps related to loan growth as well as **a positive contribution of 102 bps from rating related relief**.

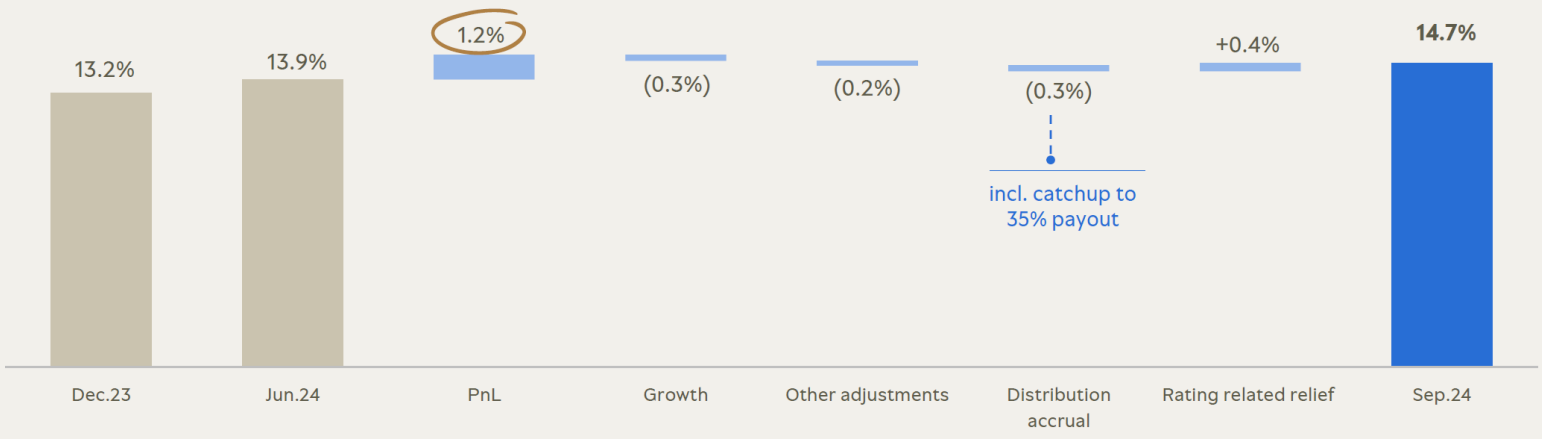
Bank 3 - Shareholders' Report Q3 2024



	2Q24[1]	3Q24 Adj. Net Profit	Asset Growth	Ratings related & other regulatory	Other	3Q24[1]
RWAs (€ m)	50,021	0	507[4]	(2,409)[5]	(163)[6]	47,956
Capital (€ m)	8,079	413	0	0	28	8,520

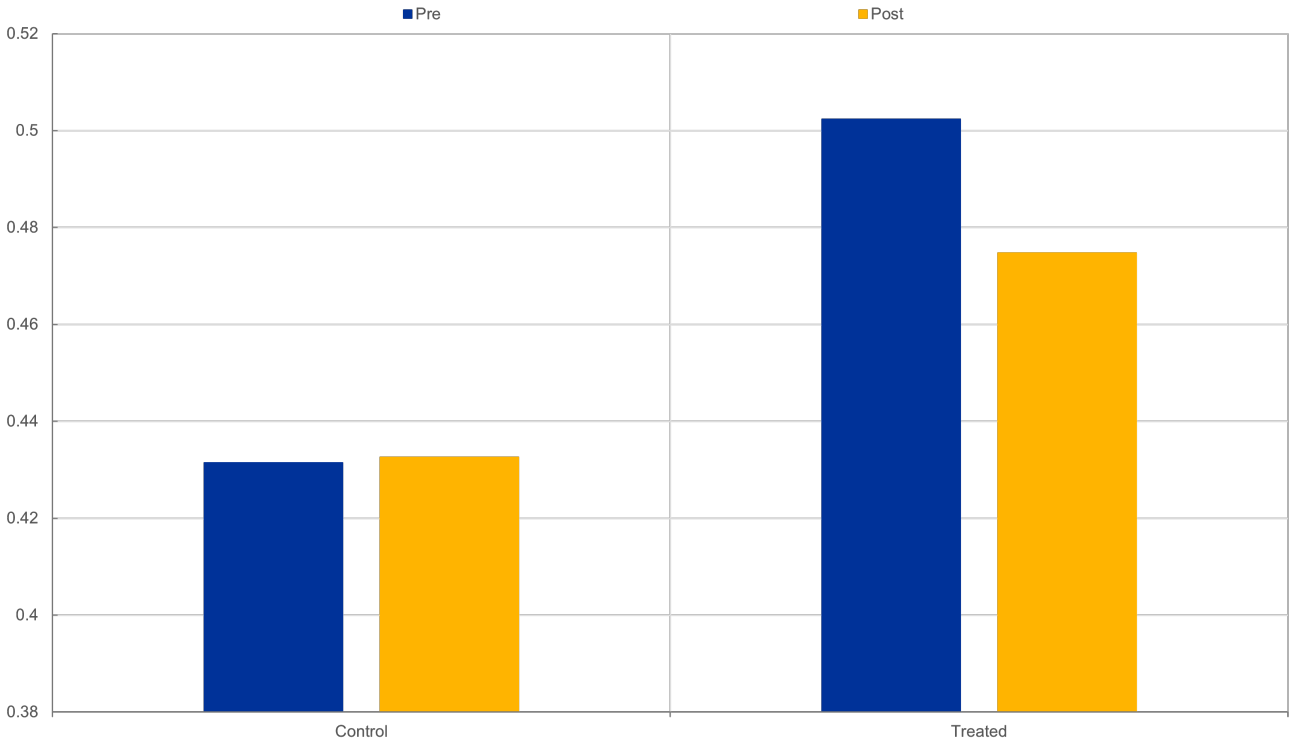
Control Bank - Shareholders' Report Q3 2024

CET1 trajectory Q3.24 (%)



Note: "other adjustments" includes delta of reserves, and prudential deductions (such as prudential DTC deduction and NPE calendar provision shortfall; Sep.24 CET1 capital incorporates €150mn cumulative deduction for NPE calendar shortfall related with Greek State Guaranteed exposures of €0.6bn net book value); rating related relief refers to the €1bn RWA relief arising from the revised CQS mapping of the ICAP-CRIF external credit assessment institution; distribution is subject to necessary conditions being met and supervisory approval

RWA for treated and control banks



Average RWA/Total Assets for the pre and the post period

Related literature

- Changes in CCyB, mainly household credit (Jiménez et al., 2017; McCann & O'Toole, 2019; Basten, 2020; Dassatti et al., 2023; Auer et al., 2022; Acharya et al., 2023)
- Changes in capital requirements
  - EBA exercise: Gropp et al. (2019); Blattner et al. (2023)
  - Supervisory action: Peek & Rosengren (1995); Aiyar et al. (2014); De Marco et al. (2021)
  - Basel II: Fraisse et al. (2020); Demir (2017)
  - Basel III: Juelsrud & Wold (2020); Anguren et al. (2024)
  - Windfall gains from monetary policy: Acharya et al. (2019)
  - Bank portfolio choice under risk-sensitive regulation: Boyarchenko (2025)

This paper, key contributions:

1. Shock exogenous, unexpected, not contaminated by other policies, unrelated to banks' situation or business cycle; resembles the *release* of a macroprudential buffer — most studies focus on tightening
2. Granular and comprehensive loan-level data (not only syndicated loans) on NFCs; firm×time fixed effects rule out demand-side confounds
3. Novel evidence on how rating-induced capital relief shapes bank behavior, with direct implications for Basel IV

What we test

The regulatory shock allows us to test three key empirical questions:

1. **Credit supply**: Do treated banks expand credit, or do they use the extra capital headroom to expand securities holdings or return capital to shareholders?

2. **Risk-taking**: Do treated banks increase lending to riskier borrowers, shift toward riskier sectors, or take on more risk in their securities portfolios?

3. **Securities rebalancing**: Do treated banks rebalance away from capital-efficient assets (e.g. sovereign bonds) toward more liquid instruments?

Possible mechanism: a reduction in loan risk weights lowers the capital absorbed per unit of lending $\Rightarrow$ banks expand loans and have weaker incentives to hold capital-efficient sovereign bonds; well-capitalised banks need not shift toward riskier assets.

Baseline DID: sample and specification

- AnaCredit loan-level quarterly data Q1 2023–Q3 2025; (log) total granted credit
- Supervisory data for bank balance sheet information
- Pre-treatment period: up to June 2024; post-treatment: from January 2025 onward
- July–Dec 2024 excluded to avoid transitional dynamics and end-of-year balance-sheet effects
- Robustness over periods (include all, exclude September, exclude December)
- Retain only firm–bank pairs appearing at least once in both periods
- Standard errors clustered at bank and firm level

Baseline DID: sample and specification

$$\log(\text{credit}_{ibt}) = \beta\,(\text{Treated}_b \times \text{Post}_t) + \theta\,\text{Treated}_b + \delta\,\text{Post}_t + \varepsilon_{ibt},$$

Sequence of increasingly rich fixed effects:

(1) none (2) time (3) firm-bank (4) time + firm-bank

(5) industry×size×time (6) + firm-bank

(7) firm-time (8) firm-time + firm-bank *[preferred]*

Estimate it also as an event-study

$$\log(\text{credit}_{ibt}) = \sum_{k \neq k_0} \beta_k\,(\text{Treated}_b \times 1\{t = k\}) + \alpha_{ib} + \alpha_{it} + \varepsilon_{ibt},$$

Balancing Table

	(1) Control		(2) Treated		(1)–(2)	
Variable	N	Mean/(SE)	N	Mean/(SE)	N	Norm. diff.
Log Granted	15872	-2.003 (0.014)	21792	-1.914 (0.013)	37664	-0.048
Maturity (days)	15872	2686.3 (13.1)	21792	3630.9 (18.7)	37664	-0.414*
Int. Rate	15837	0.064 (0.000)	21792	0.066 (0.000)	37629	-0.110
SME	15658	0.874 (0.003)	21751	0.873 (0.002)	37409	0.003
NPL	15872	0.043 (0.002)	21792	0.104 (0.002)	37664	-0.236
Construction	15872	0.098 (0.002)	21792	0.081 (0.002)	37664	0.060
Main Bank	15872	0.842 (0.003)	21792	0.830 (0.003)	37664	0.032
Share Bank/Ind.	15872	0.229 (0.001)	21792	0.219 (0.001)	37664	0.076
Share Ind./Bank	15872	0.065 (0.001)	21792	0.051 (0.000)	37664	0.182

Note: norm. diff. (Imbens & Wooldridge 2009) $< |\pm 0.25|$ indicates good balance; $|\pm 0.25|$–$|\pm 0.50|$ intermediate. Imbalances in maturity and NPL are absorbed by firm-bank fixed effects in all preferred specifications.

Bank Balance Sheet Characteristics

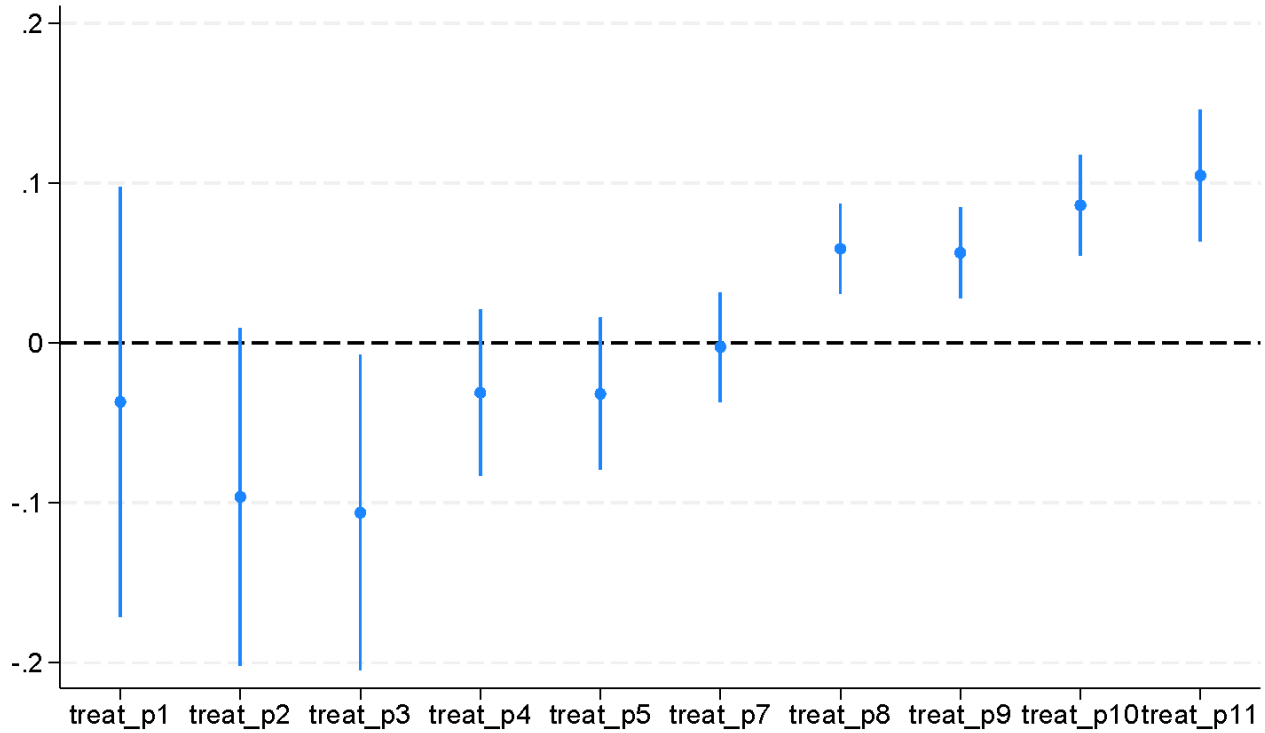
	Mean	Median	P25	P75	Std. Dev.
Bank Size	24.380	25.023	25.022	25.092	1.501
CET1 Ratio	0.147	0.148	0.139	0.151	0.024
ROE	0.059	0.072	0.042	0.082	0.027
LC Ratio	2.219	2.010	1.870	2.397	0.617
Deposit Assets	0.696	0.692	0.636	0.743	0.066
Securities Assets	0.181	0.190	0.167	0.213	0.040

Table 1: Baseline DID estimates across fixed-effect specifications

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treated	0.0925	0.0915			0.0648		0.0221	
	(0.109)	(0.109)			(0.0571)		(0.0720)	
Post	-0.186***		-0.161***					
	(0.0210)		(0.0108)					
Treated*Post	**0.0461****	**0.0475****	**0.0761*****	**0.0765*****	**0.0730*****	**0.0724*****	**0.136*****	**0.125*****
	(0.0213)	(0.0207)	(0.0246)	(0.0244)	(0.0157)	(0.0227)	(0.0325)	(0.0320)
Observations	288,097	288,097	288,097	288,097	287,855	287,854	82,569	82,544
R-squared	0.003	0.005	0.949	0.949	0.489	0.951	0.831	0.969
Fixed effects	none	t	fb	t+fb	ist	ist+fb	ft	ft+fb

- Treated banks expand credit by **4–13%**; result holds across all specifications
- Consistent with a **genuine supply response**, not demand or compositional changes
- **Robustness**: alternative window dropping only September 2024 (post = Dec 2024 onward) yields 0.042–0.130, closely aligned

Event study



- Firm-time and firm-bank fixed effects; reference period: June 2024
- **No pre-treatment trends** (p1–p5): supports parallel-trends assumption
- **Persistent post-treatment expansion** (p7–p11): gradual and sustained

Cross-section estimates (Khwaja & Mian 2008)

Table 2: Δ-method cross-section estimates

	(1)	(2)	(3)	(4) Excl. Dec. 2024
Treated	0.0608**	0.0570**	0.110***	0.118***
	(0.0225)	(0.0205)	(0.0254)	(0.0311)
Observations	37,730	37,491	11,587	11,351
R-squared	0.003	0.017	0.448	0.459
Fixed effects	none	is	firm	firm

- Outcome: $\Delta \log(\text{credit}_{ib})$ between pre- and post-treatment periods
- With firm fixed effects, treated banks expand credit by **11–12%**, consistent with panel estimates
- Col. (4) excludes December 2024 to remove end-of-year balance-sheet effects; results stable

Robustness checks

1. **Excluding Bank 1 (treated = Bank 2 & Bank 3)**
   - Treated × Post: **0.062****; event study shows no anticipatory effects

2. **Excluding Bank 2 and Bank 3 (treated = Bank 1 only)**
   - Treated × Post: **0.179***; consistent with Bank 1's larger exposure to the upgrade

Conclusion: expansion is **not driven by any single bank**.

3. **Main bank and bank specialization controls**
   - Include *mainbank* and two bank–sector specialization measures (*bankspec1*, *bankspec2*) to control for potential failure of bank substitutability (De Jonghe & Lewis, 2025; Bruche et al., 2025)
   - Treated × Post remains positive and significant across all specifications (0.067–0.124)
   - Slight moderation when *mainbank* included: consistent with treated banks becoming the primary lender as they expand credit

4. **Staggered DiD (Callaway & Sant'Anna, 2021)**
   - ATT(g=7, early-treated): **0.048*** ATT(g=8, late-treated): **0.030***
   - Residualised specifications yield similar patterns

Loan terms

	(1) Interest rate	(2) Log maturity	(3) Log drawn credit
Treated*Post	-0.00558***	0.0381***	0.136***
	(0.00130)	(0.00982)	(0.0310)
Observations	82,408	82,544	82,500
R-squared	0.911	0.899	0.967
FE		firm-time, bank-firm	

- **Interest rate:** loan rates fall by 56 bps
- **Maturity:** contractual maturity increases by 3.9% (≈142 days)
- **Drawn credit:** utilisation rises by 14%, indicating firms actively use the additional credit capacity
- Simultaneous rate decline and maturity extension consistent with a relaxation of binding capital constraints, not a shift in borrower demand

Risk-taking

X =	(1) NPL	(2) Stg2/3
Treated*Post	0.105***	0.136***
	(0.0276)	(0.0342)
Treated*Post*X	-0.0938	-0.0312
	(0.0673)	(0.0453)
Observations	68,947	82,544
R-squared	0.973	0.969
FE	firm-time, bank-firm	

- Treatment effect positive and significant across all models
- Triple interaction insignificant throughout: no differential lending to riskier borrowers
- No shift toward NPL or Stage 2/3
- Credit expansion is broad-based, not risk-concentrated

Sectoral and borrower-type heterogeneity

	(1) SME	(2) Constr.	(3) Constr.+RE	(4) Real Estate
Treated*Post	0.165***	0.120***	0.120***	0.125***
	(0.0479)	(0.0318)	(0.0318)	(0.0320)
Treated*Post*X	-0.0599	0.0835	0.0370	-0.202*
	(0.0360)	(0.0678)	(0.0600)	(0.109)
Observations	82,464	82,544	83,276	83,276
R-squared	0.969	0.969	0.969	0.969
FE	firm-time, bank-firm			

- Credit expansion widespread across firm sizes and industries
- Slightly weaker response for SMEs (col. 1) and real estate (col. 4, marginal)
- No differential expansion toward construction or construction+real estate
- No evidence of targeted regulatory arbitrage or reallocation toward collateral-rich, cyclically sensitive sectors

Securities holdings - Empirical setup

$$\log(\text{holdings}_{jbt}) = \beta\,(\text{Treated}_b \times \text{Post}_t \times X_{jbt}) + \beta_1(\text{Treated}_b \times \text{Post}_t) + \beta_2(\text{Treated}_b \times X_{jbt}) + \beta_3(\text{Post}_t \times X_{jbt}) + \beta_4 \text{Treated}_b + \beta_5 \text{Post}_t + \beta_6 X_{jbt} + \alpha_{jbt} + \alpha_{bt} + \varepsilon_{jbt}.$$

where X_{jbt} denotes one of five bond-level characteristics:

- government-bond dummy,
- investment-grade dummy
- the risk weight
- logarithm of residual maturity
- the yield to maturity

FE: rating class*maturity quartiles*time and bank*time fixed effects
As in the baseline, Post: $t >$ Dec 2024 (Sep and Dec 2024 Excluded)

Securities holdings - results

Var	(1) Gov. Bond	(2) Inv. Grade	(3) Risk Weight	(4) Log Mat.	(5) Yield
Treated*Post*Var	-0.236***	-0.0841	0.239***	-0.216***	-0.0374
	(0.0812)	(0.0557)	(0.0795)	(0.0538)	(0.0269)
Obs.	4,704	4,704	4,648	4,704	4,096
R-squared	0.985	0.985	0.985	0.985	0.988

- Treated banks reduce sovereign bond holdings (col. 1) and rebalance toward shorter-maturity securities (col. 4)
- No effect on yield to maturity or investment-grade status: no risk-taking in securities portfolio
- Positive coefficient on risk weight (col. 3): mirros shift away from govt bonds
- Lower loan risk weights $\Rightarrow$ weaker incentive to hold capital-efficient sovereign bonds $\Rightarrow$ shift toward short-term securities (lower haircut, increase collateral)

Conclusions

- Sharp and plausibly exogenous regulatory shock — sizeable reduction in capital requirements for Greek banks
- Treated banks expand credit supply by **4–13%**, consistently across all specifications
- Response reflects a **genuine supply effect**: rates fall 56 bps, maturities lengthen, firms draw more heavily on credit lines
- **No risk-taking**: no shift toward non-performing borrowers, Stage 2/3 firms, SMEs, or collateral-rich sectors
- **Securities**: reduce sovereign bond holdings, rebalance toward shorter-maturity instruments; no change in yields or rating composition
- Capital requirement reductions for well-capitalised banks translate into meaningful credit expansion without compromising portfolio quality

Why this matters for policy

1. **Asymmetric effects of tightening vs. easing**
   - Literature focuses on tightening; easing evidence is scarce
   - We show easing does not mirror tightening: no risk-taking, no portfolio deterioration, no shift toward capital-efficient securities

2. **Basel IV transition**
   - Basel IV increases reliance on external ratings in standardized risk weights
   - Our setting previews how banks will respond to rating-driven RWA changes under the new framework

3. **Macroprudential design**
   - Shock occurred when banks were well-capitalised and loan demand strong
   - Resembles the ideal conditions for releasing macroprudential buffers
   - Effectiveness depends critically on initial bank conditions and the state of the credit cycle

Next steps

- Credit reallocation: which firms benefit most from the capital relief?
- Real outcomes: investment, employment, firm performance
- Persistence of credit expansion and potential feedback to bank balance sheets
- Marginal propensity to lend: back-of-envelope exercise
- Expand securities analysis: shifts in ICAP-rated holdings, duration, substitution between loans and securities