

Macroprudential Regulation: A Risk Management Approach

Daniel Dimitrov¹ Sweder van Wijnbergen²

May 19, 2026

¹University of Amsterdam, De Nederlandsche Bank (Authors' own views)

²University of Amsterdam, CEPR and Tinbergen Institute

Challenges with the Current Buffer Design

- **Fragmented architecture across policy tools**
 - Multiple layers (CCyB, SyRB, O-SII, G-SII...) calibrated separately
 - Yet *all ultimately act on banks' default probabilities*
 - ⇒ No integrated view of how buffers jointly affect financial tail risks.
- **Absence of a unified, model-based benchmark**
 - Calibration relies on heuristic rules, scorecards, supervisory judgment
 - ⇒ No common framework linking buffer levels to systemic risk, default probabilities, and welfare outcomes.
- **Inconsistent implementation of common guidelines**
 - EU-level principles (CRD/ESRB/EBA) leave substantial national discretion
 - Comparable banks may face different capital constraints
 - ⇒ Distortions in competition and potential regulatory arbitrage.
- **Large cross-country dispersion not clearly risk-based**
 - Buffer requirements, esp. O-SII, vary widely across EU jurisdictions.

Challenges with the Current Buffer Design

Ultimately: unclear whether bank buffer heterogeneity reflects *true differences in systemic risk contributions* or *institutional and political factors*.

Research Question

What is the **welfare-optimal level** and **cross-bank allocation** of macroprudential capital buffers in a European context?

Where This Paper Sits

- Market-based systemic risk measurement: CoVaR, MES, DIP
 - No guidance on buffer size
- Macro-style cost–benefit: BCBS (2010), Miles et al. (2013)
 - No bank heterogeneity
 - Mostly used for microprudential buffer calibration
- Buffer calibration in practice: Expected Equal Impact approach
 - Heuristic rules, no welfare basis

Where This Paper Sits

- Market-based systemic risk measurement: CoVaR, MES, DIP
 - No guidance on buffer size
- Macro-style cost–benefit: BCBS (2010), Miles et al. (2013)
 - No bank heterogeneity
 - Mostly used for microprudential buffer calibration
- Buffer calibration in practice: Expected Equal Impact approach
 - Heuristic rules, no welfare basis
- Our Contribution:
 - integrate structural credit model & welfare optimization & bank-level heterogeneity
 - calibrate risk contributions on market data
- First framework to jointly determine the *level* of macropru buffers and their *allocation*

Framework

Capital Decomposition

Total capital of bank i decomposes as:

$$k_i = k_i^{mi} + k_i^{ma} + k_i^{headr}$$

- k_i^{mi} : **Microprudential** requirement - MCB, CCB, P2R
- k_i^{ma} : **Macroprudential** add-on — the key policy lever
- k_i^{headr} : Voluntary **headroom** held to avoid breaching regulatory minima

⇒ We treat k_i^{mi} and k_i^{headr} as exogenous and focus on calibrating k_i^{ma}

Default as “Non-Viability”: The Structural Link

A bank becomes *non-viable* when its asset value falls below a threshold

$$\mathbb{1}_i \equiv \begin{cases} 1 & \text{if } U_i \leq X_i \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

Merton-style credit structure implies:

$$PD_i = \Phi\left(\frac{\ln(1 - \nu_i k_i)}{\sigma_i} + 0.5 \sigma_i\right)$$

- ν_i : risk-weighted asset ratio; k_i is CET1 capital ratio; σ_i : asset volatility
- **Key innovation:** σ_i inferred from CDS-implied PDs and observed CET1 — not assumed;
- CDS data: market-credible, forward-looking, covers *non-listed* banks

Measuring Systemic Risk

Each bank's latent default variable loads on common factors M :

$$U_i = \rho_i^\top M + \sqrt{1 - \|\rho_i\|^2} \varepsilon_i$$

Bank losses measured as:

$$L_i = \begin{cases} LGD & \text{if } U_i \leq X_i \\ 0 & \text{otherwise} \end{cases} \quad \text{for } i = 1, \dots, n$$

Aggregate systemic loss:

$$L_{\text{sys}} = \sum_i w_i L_i$$

Expected Systemic Shortfall (ESS) & Systemic Crisis Probability:

$$\text{ESS} = \mathbb{E}[L_{\text{sys}} \mid L_{\text{sys}} > \bar{L}]; \quad P_{\text{sys}} = \mathbb{P}(L_{\text{sys}} > \bar{L})$$

Welfare Optimisation: Two Stages

Stage 1 — Allocation: given average buffer $\bar{k}$, minimise ESS:

$$\min_{\{k_1^{ma}, \dots, k_N^{ma}\}} \text{ESS} \times P_{\text{sys}} \quad \text{s.t.} \quad \sum_i w_i k_i^{ma} = \bar{k}, \quad k_i^{ma} \geq 0$$

Stage 2 — Level: choose $\bar{k}$ to minimise welfare cost:

$$W_c(\bar{k}) = \underbrace{\lambda_g \cdot \text{ESS}(\bar{k}) \cdot P(\bar{k})}_{\text{expected crisis cost}} + \underbrace{\eta \cdot \bar{k} \cdot (1 - P(\bar{k}))}_{\text{output cost of higher buffers}}$$

- λ_g relates losses in crisis to GDP losses: $\lambda_g \times \text{ESS}(0)$ anchored to 4% (mild) / 6% (moderate) / 9% (severe) based on Reinhart and Rogoff (2009), Romer and Romer (2017)
- $\eta \approx 0.024$: credit supply elasticity to GDP

Data & CDS Liquidity Correction

- **Sample:** 27 European systemic banks (G-SIIs / O-SIIs)
- **Period:** August 2019 – August 2022 (weekly CDS data)
- Includes key tail events:
 - Covid systemic shock (2020)
 - Russian invasion of Ukraine (2022)
 - Inflation and monetary tightening (mid-2022)

⇒ Ensures tail dependencies are *in-sample* (Nagel 2020)

- **Instrument:** subordinated CDS spreads — includes non-listed banks
- **LGD assumption:** 80% (RR = 20%), in line with Bloomberg prospectus data
- **Factors:** 3 latent factors capture >80% of CDS co-variation (scree plot)

CDS Liquidity Correction: The Regression

Concern: illiquidity premia may distort PD estimates and buffer allocation

Panel regression:

$$\log s_{it} = \alpha + \beta^\top X_{it} + \underbrace{\gamma BA_{i,t}}_{\text{market liquidity}} + \delta_t + \delta_i + \varepsilon_{it}$$

- X_{it} : CET1, liquidity ratio, net income/assets, deposits/liabilities
- $BA_{i,t}$: bid-ask spread as % of mid price

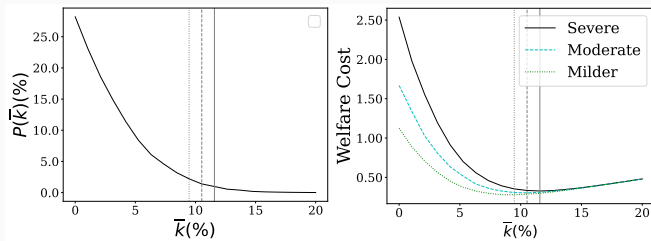
	Model 1 (bank FE)	Model 2 (bank + time FE)
$\hat{\gamma}$	-2.057***	-1.201**
Solvency controls	Significant	Absorbed by δ_t
Preferred		✓

Result: Liquidity premia are significant but *economically small* ($\approx 15\text{--}20$ bps); heterogeneous across banks $\Rightarrow$ filtered out before optimisation.

Empirical Results

Result 1: Optimal Buffer Level

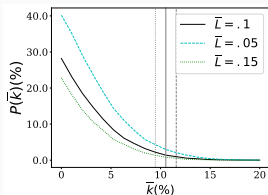
- Welfare-based benchmark implies **significantly higher** macroprudential buffers than current practice
- High convexity of $P(\bar{k})$: once $\bar{k} > 10\%$, crisis probability approaches zero



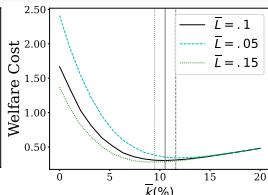
Welfare-optimal average macroprudential buffer: **9.5%–11.6%** than current $\approx 7\%$ (on top of $\approx 7\%$ micropru layer.) **Consistent with prior literature:**

- Miles et al. (2013): optimal Tier 1 ratio 16–20%
- Firestone et al. (2017): 13–26%
- BCBS (2010): net benefits positive at 15–19%

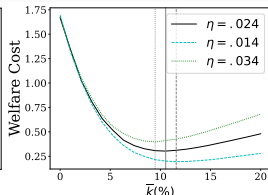
Result 1: Robustness



(a) Trigger threshold



(b) Trigger threshold

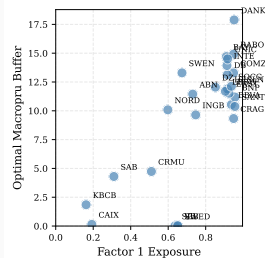


(c) Cost of holding buffers

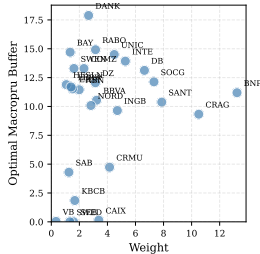
Parameter	Range tested	Effect on $\bar{k}^*$
Systemic loss trigger $\bar{L}$	5%–15% of systemic losses	Lower $\bar{L}$ increases $\bar{k}^*$
Output cost η	0.014 – 0.034	Lower η increases $\bar{k}^*$
Crisis severity λ_g	4% to 9% of GDP	Lower severity lowers $\bar{k}^*$

$\Rightarrow \bar{k}^*$ stays within **9.5%–11.6%** across all variations

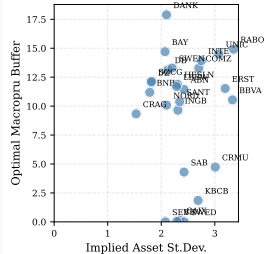
Result 2: Optimal Cross-Bank Allocation



(a)



(b)



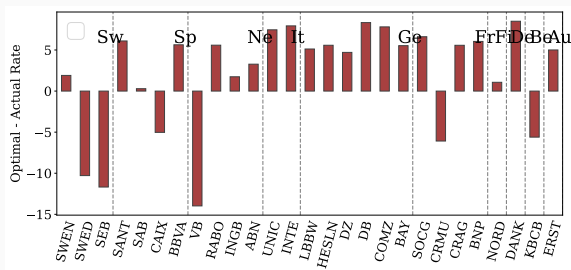
(c)

⇒ Macropru buffers are **concentrated where they most reduce aggregate risk**

⇒ Correlate positively with (a) common factor exposure; (b) size; (c) implied asset risk

Persistent cross-country gaps between current and optimal

Figure 4: Model vs. actual capital ratios



Country	Actual Buffer	Model Mild	Model Moderate	Model Severe
France	5.48	8.99 (3.51)	10.07 (4.59)	11.44 (5.96)
Germany	6.02	11.69 (5.67)	12.86 (6.84)	14.03 (8.00)
Italy	6.48	13.13 (6.65)	14.19 (7.71)	16.06 (9.58)
Netherlands	8.60	10.28 (1.68)	11.31 (2.71)	12.13 (3.53)
Spain	4.58	6.83 (2.25)	7.73 (3.15)	8.10 (3.52)
Sweden	11.17	4.13 (-7.04)	4.75 (-6.42)	4.67 (-6.50)

Result 3: Optimal O-SII Buffer Allocation

1. Allocate buffers per country *against the country average* O-SII rate
⇒ optimal distribution **statistically aligns** with actual O-SII allocations
2. Allocate buffers across Europe *against the European average* O-SII rate
⇒ optimal distribution **statistically differs** from actual O-SII allocations

	France	Germany	Italy	Netherlands	Spain	Sweden	Europe
Actual	1.13	1.36	0.87	2.10	0.76	1.00	1.25
Model	1.18	1.72	2.28	0.95	0.98	0.00	1.25
Delta	- 0.05	- 0.36	- 1.42	1.15	-0.23	1.00	0.00

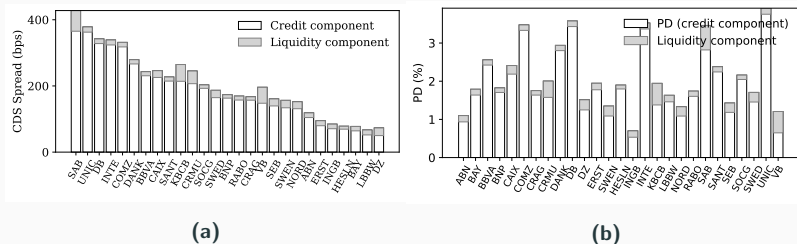
- National regulators align well with *domestic* systemic risk profiles rather than with European systemic risk contributions
- Results consistent with institutional and political economy constraints at the domestic level.

Conclusion

Key Takeaways

- Our welfare-based benchmark implies **significantly higher** average macroprudential buffers than current practice
- At current levels output cost of higher buffers is **outweighed** by the reduction in expected crisis losses
- Optimal distribution is **heterogeneous** across banks and countries
- National regulators align well *domestically* in terms of bank allocations...
 - ... but may miss European-wide spillovers
 - ... and do not justify the average level
 - ... pointing to a role for **supranational calibration**.

Figure 5: CDS Credit Component vs. Liquidity Component



Note. This set of figures shows the estimated bank-specific liquidity component as of the model evaluation data August 22, 2022. Panel (a) shows the liquidity component as a share in the CDS price; Panel (b) as a share of the CDS-implied default probabilities.

Annex
