



Reducing Amplification Through Releasable Capital Buffers

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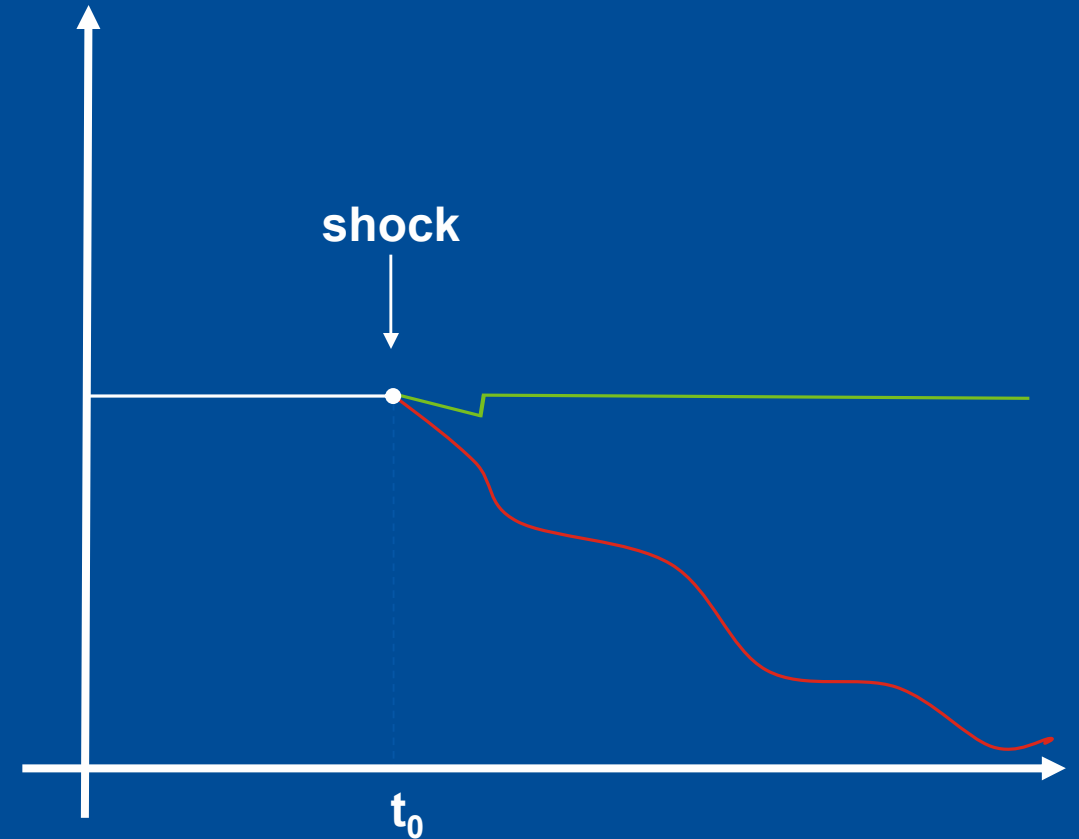
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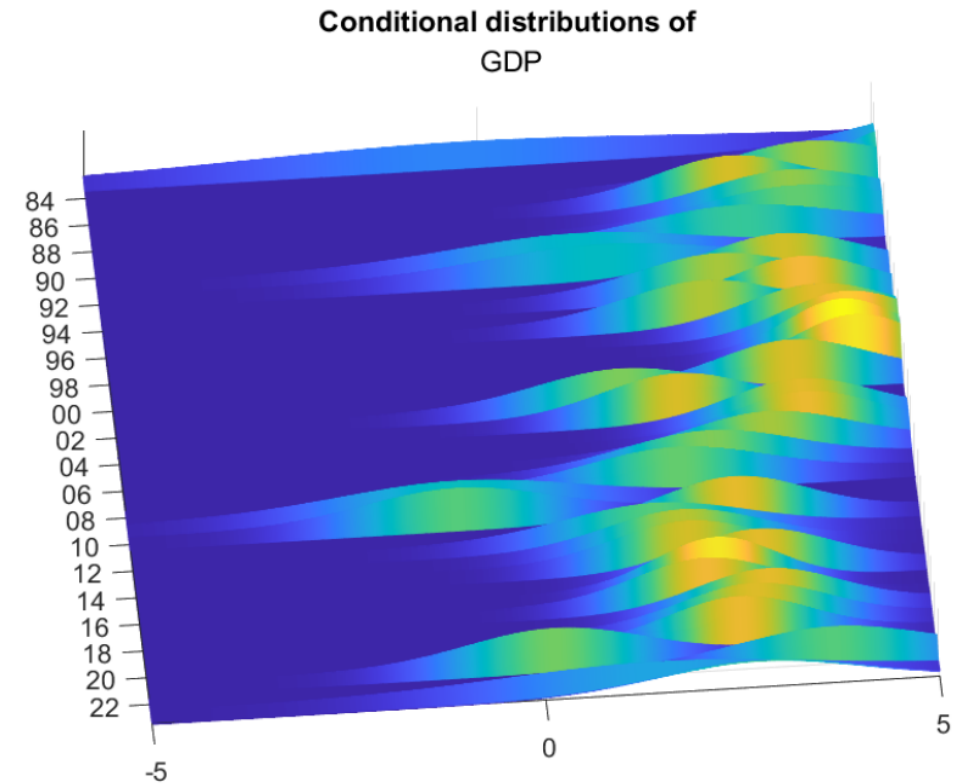
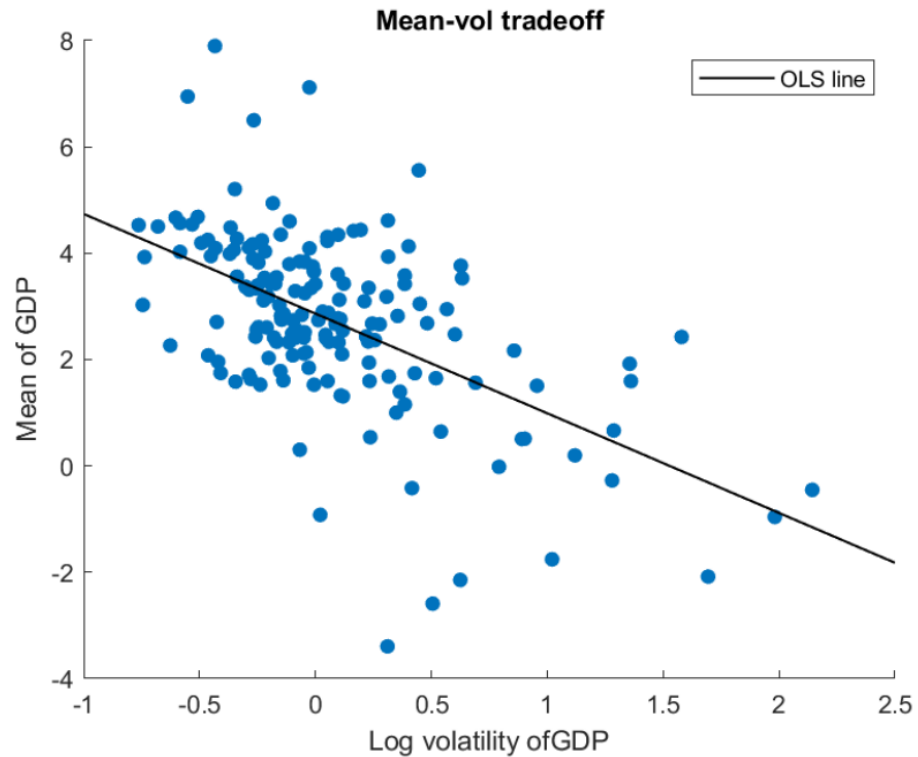
Resilience.

The ability of the financial system to withstand shocks and to continue provision of financial services, without amplifying the original shock.



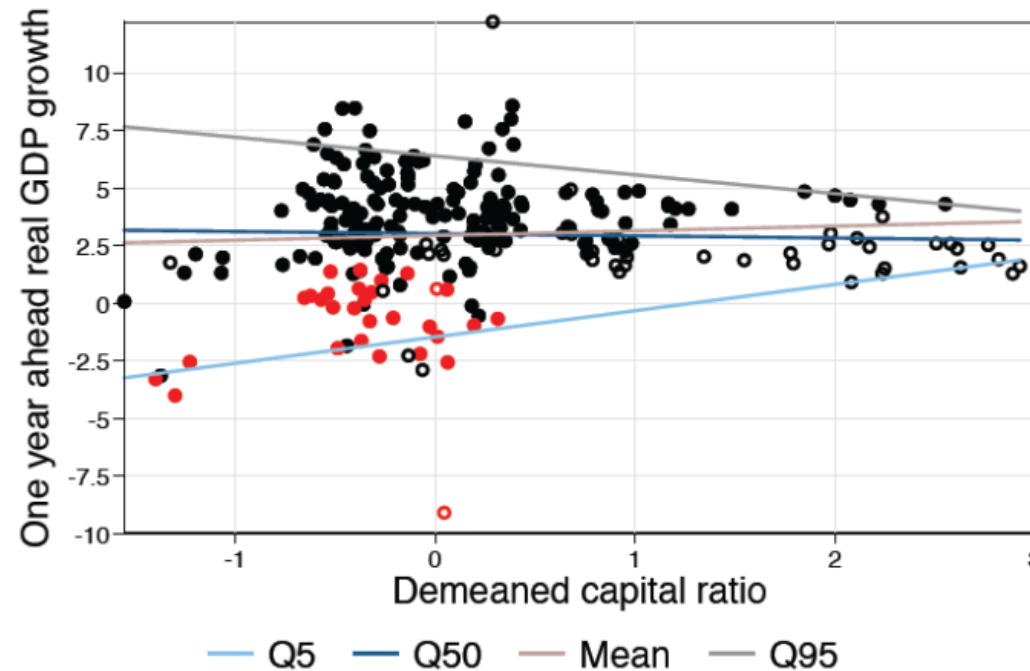
Macro-financial feedback generates amplification

- Macro-financial feedback amplifies shocks and generate a negative correlation between the first and second moments of growth (Adrian et al., 2019):



Bank capital plays a crucial role as shock absorber

- Bank capital matters in shaping the distribution of growth, and helps shield the economy from downside risks (Adrian et al. 2022; Boyarchenko et al., 2024):



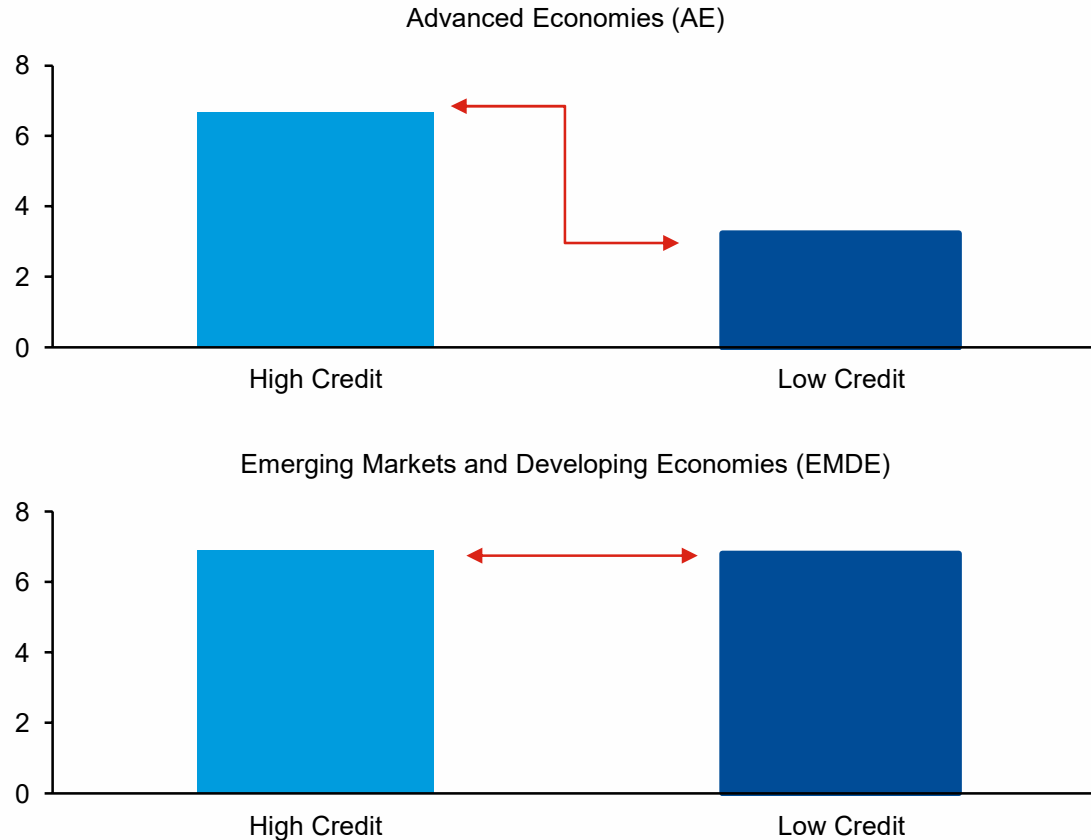
Source: Boyarchenko Nina, Giannone Domenico, and Kovner Anna (2024) – Figure 1

Regulating capital buffers

Banks need resilience even if there is no credit boom

Losses are significant during banking crises, including those that were not preceded by a credit boom, and especially in emerging markets.

Systemic Banking Crises: Peak Losses as a Share of RWA



Systemic Banking Crises and Prior Credit Booms

For AEs, losses are 1.5 pp higher when there is a prior credit boom.

Losses are significant (4%) even when there was no credit boom.

In EMDEs, no difference in losses after high and low growth periods.

Losses are substantial (7%) even after periods of low credit growth.

Banking systems benefit from greater resilience irrespective of whether there is a prior credit boom, especially in EMDEs.

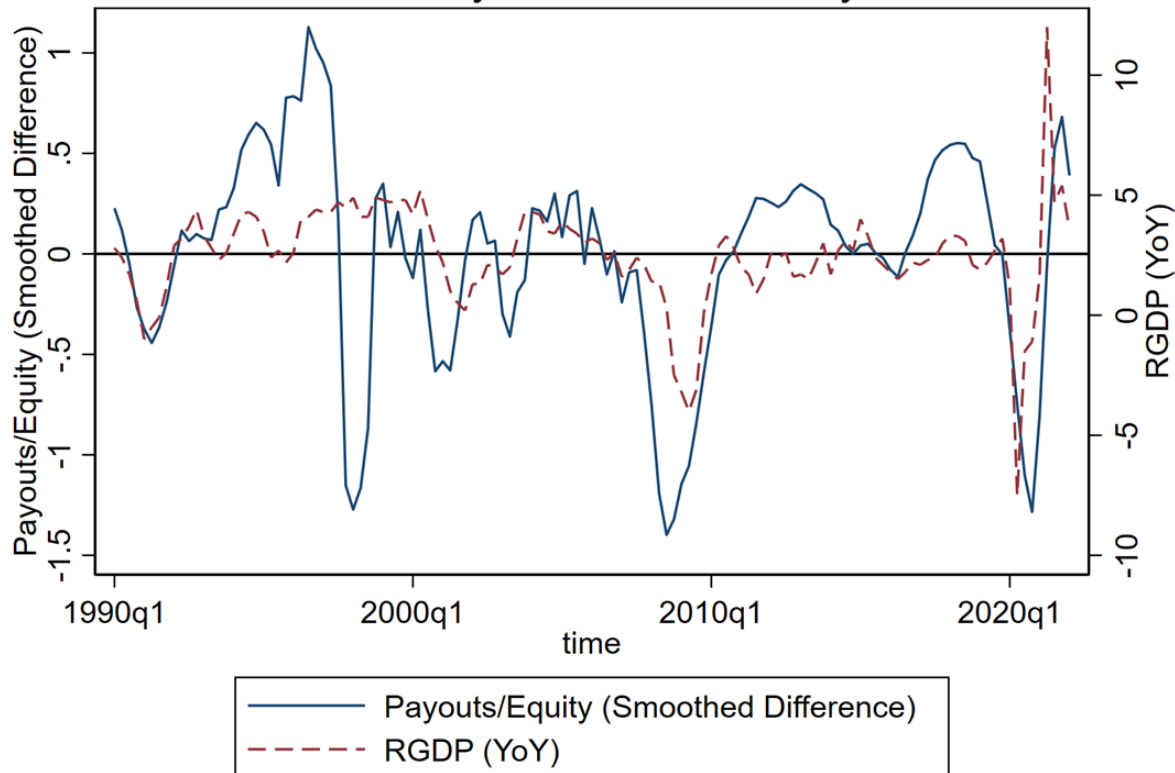
Sources: IMF Financial Soundness Indicator; Laeven and Valencia (2020).

Note: Peak losses as a share of RWA are calculated as (Peak NPL × Average Share of Total Gross Loans to RWA). The Average Share of Total Gross Loans to RWA is calculated as (Total Gross Loans × 15%)/RWA for AEs and (Total Gross Loans × 25%)/RWA for EMDEs. Latest observations for Total Gross Loans and RWA are used. Peak NPL is from Laeven and Valencia (2020). Total Gross Loans and RWA are from the IMF FSI. Countries are divided into low or high credit based on their maximum credit growth 1 to 5 years before the crisis.

When banks are profitable, they distribute dividends, leading to lack of capital in bad times

Bank dividend payouts tend to go up during good times when the economy is doing well, and banks are profitable.

USA - Pro-cyclical Dividend Payouts

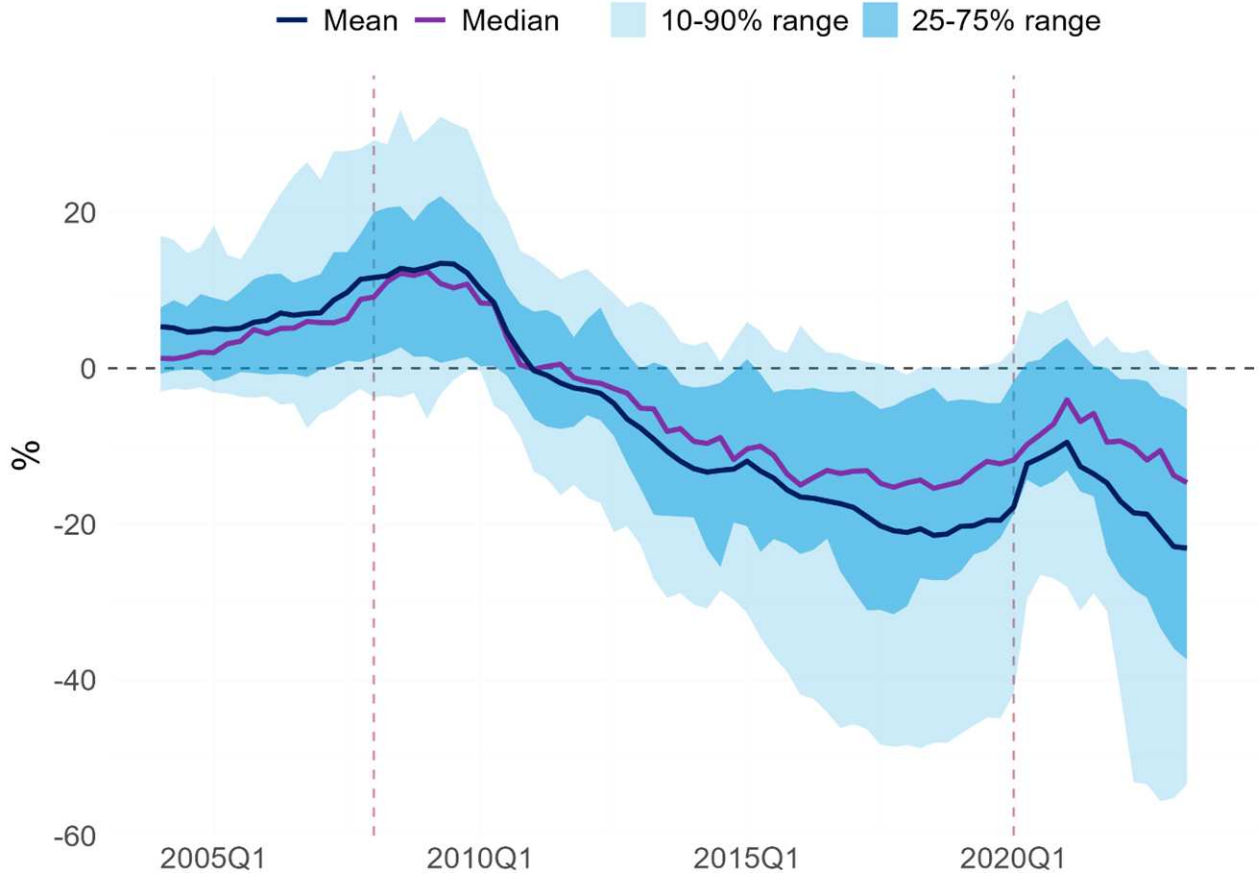


- Poorly capitalized banks amplify the effects of adverse shocks.
- Banks do not fully internalize systemic risks in decisions on distributions and capital.
- There is scope for policy intervention to correct this myopic behavior.

Focus on credit gaps led to lack of releasable capital buffers prior to the pandemic

Credit gaps were mostly negative in the post GFC period

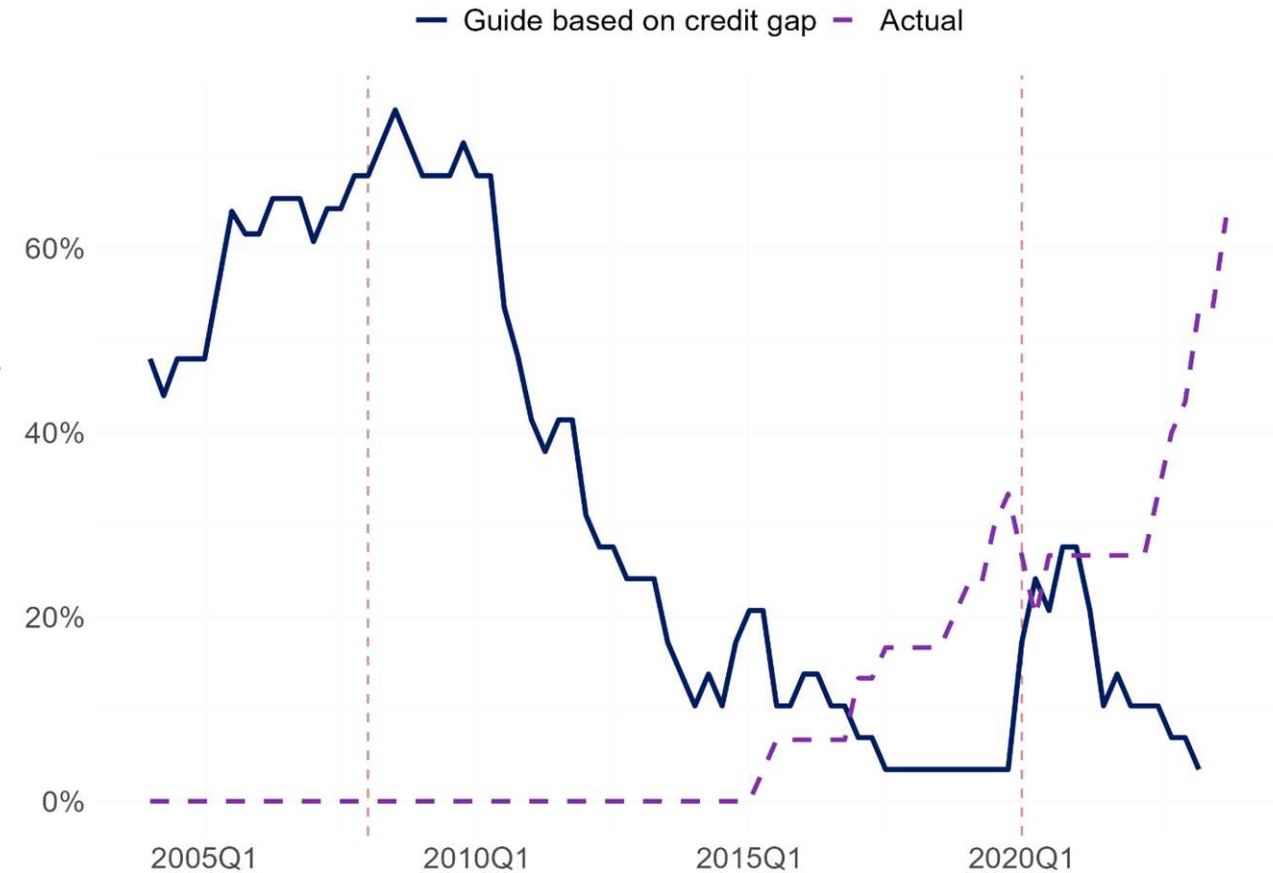
Credit-to-GDP gaps in ESRB countries



Sources: IMF staff calculations based on Haver Analytics data.
Note: the credit gap is based on the one-sided HP filter with smoothing parameter set at 400,000.

leading the conventional CCyB rule to suggest no buffer accumulation.

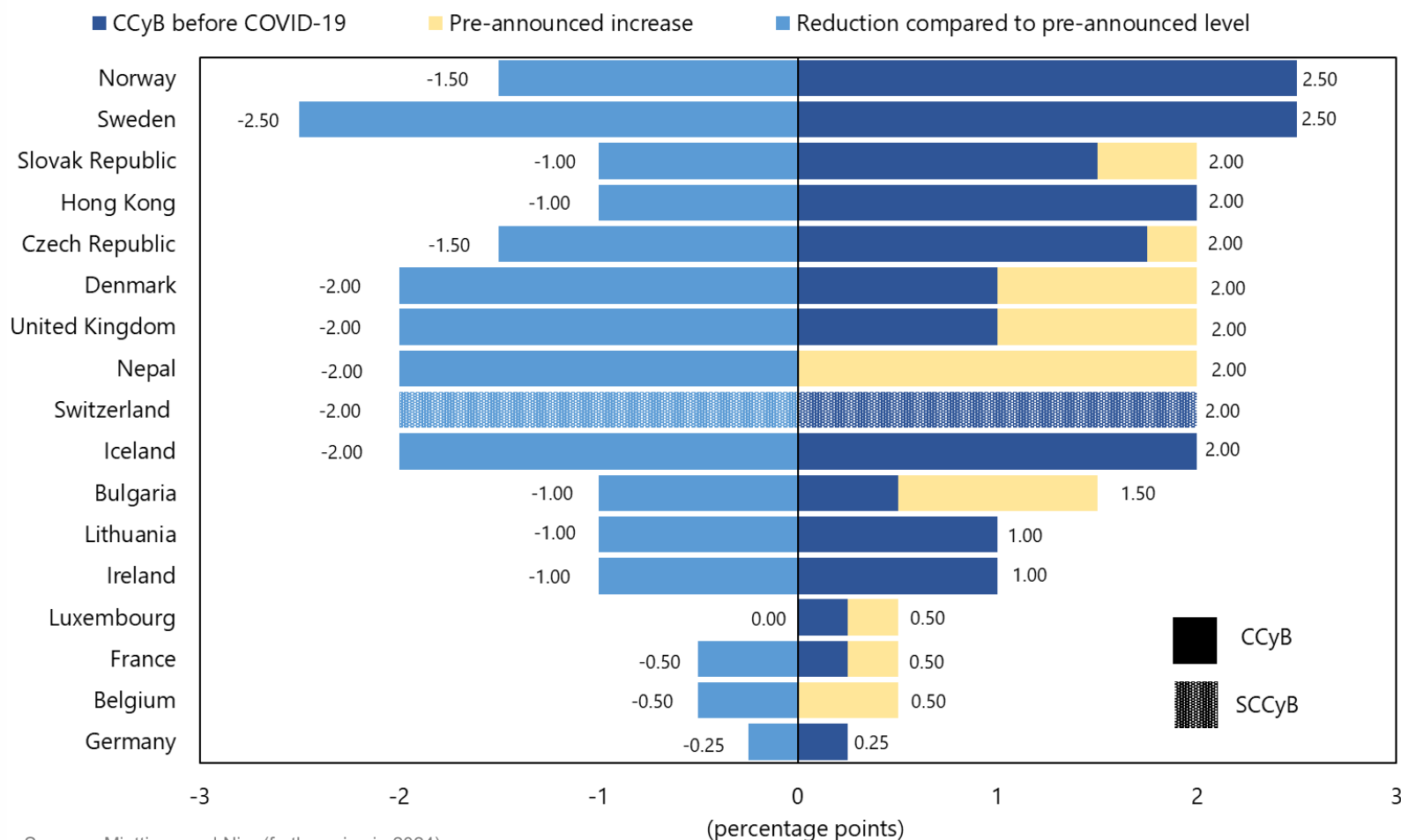
Share of ESRB countries with CCyB > 0%



Sources: IMF staff calculations based on ESRB data.
Note: The CCyB guide rule is based on credit gap, using equation (1) from Herz and Keller (2023).

Some countries had built up buffers, which could be released during the Covid-19 pandemic

Relaxation of CCyB in response to COVID-19



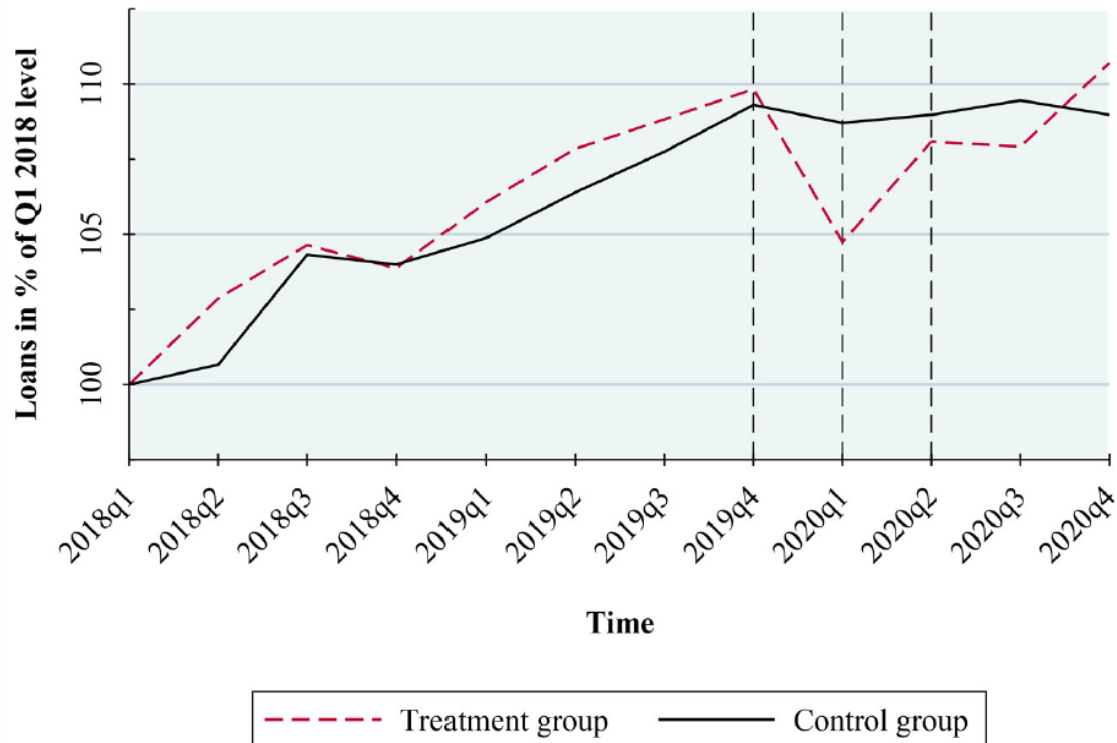
Sources: Miettinen and Nier (forthcoming in 2024).

- A few countries accumulated releasable buffers (CCyB) ahead of the pandemic.
- Most who had buffers, released them at the onset of the Covid-19 pandemic.
- However, 66 countries had a CCyB framework but no releasable buffer entering the pandemic.

Mounting empirical evidence shows that release of capital buffers worked – supported the provision of credit

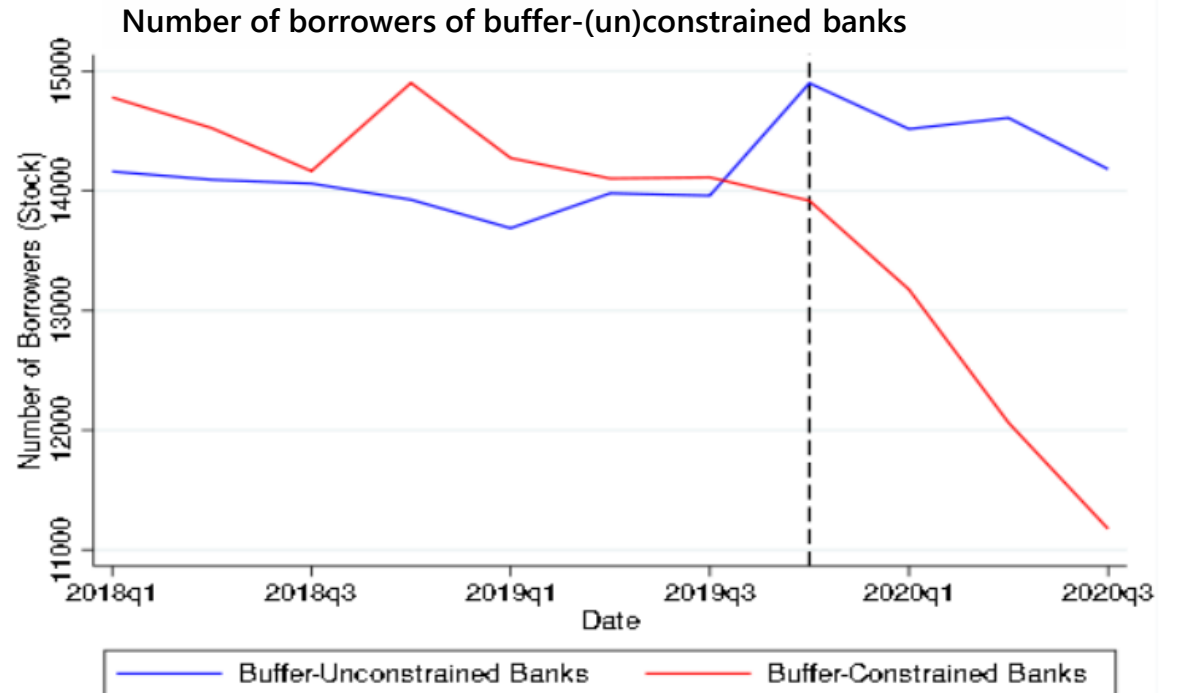
Couaillier et al. (2022) and Özlem Dursun-de Neef et al. (2023) found that buffer releases had the intended effect of supporting the provision of credit, especially for banks that were close to requirements prior to the release.

Loan growth: treatment vs. control group



Source: Özlem Dursun-de Neef et al. (2023), Figure 2.
Notes: treatment marks the release of capital buffers.

Berrosipide et al. (2021) show that buffer-constrained banks amplified the crisis in the US by cutting back on lending, unlike unconstrained banks, which continued the provision of credit to small firms.



Note: This plot shows the number of lending relationships between SME firms and buffer-constrained banks (those that start the pandemic with a capital ratio relatively close to the regulatory buffer region). Domestic BHCs, Source: Y-14Q H1 Schedule.

Source: Berrosipide et al. (2021), Figure 1

Three operational questions

1. How big should releasable buffers be in normal times?
2. When to go beyond?
3. When to release the buffer?

A quantitative framework can help answering these questions

- Reduction of macro-financial risks requires modeling dynamic interactions at the tails of the distribution, and perform stress test-type exercises to calibrate an appropriate level of capital buffers
- Parsimonious macro-financial model for analysis of downside risks
 - Banks' profits and capital are affected by GDP and FCI
 - It features **macro-financial feedback**: banks' role in amplifying shocks
 - Allows to calibrate **bank capital buffer**: additional bank capital that offsets the macro-financial feedback loop
 - This is the difference between direct and second round effects
- The required capital buffer can be calibrated across the business cycle using a **Growth-at-Risk** based metric as a measure of financial stability risks

The Model

- A simple model with quarterly data which captures the contemporaneous and lagged interactions of GDP growth, changes in bank capital ΔC_t , and a Financial Condition Index (FCI)
 - FCI uses financial variables in 2020 CCAR scenario
 - Changes in bank capital ΔC_t are proxied by (PPNR – Net Losses)
 - The variables are also function of bank capital ratio (as a % of RWA)

- ⑩ Capital to RWA evolves follows a simple law of motion:

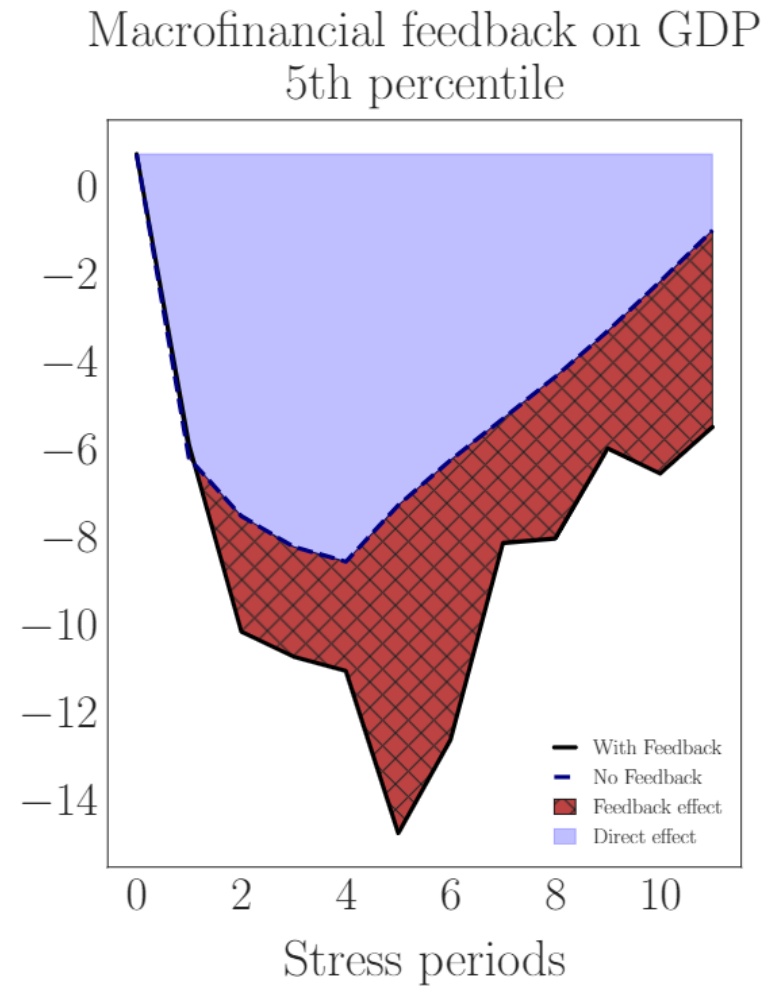
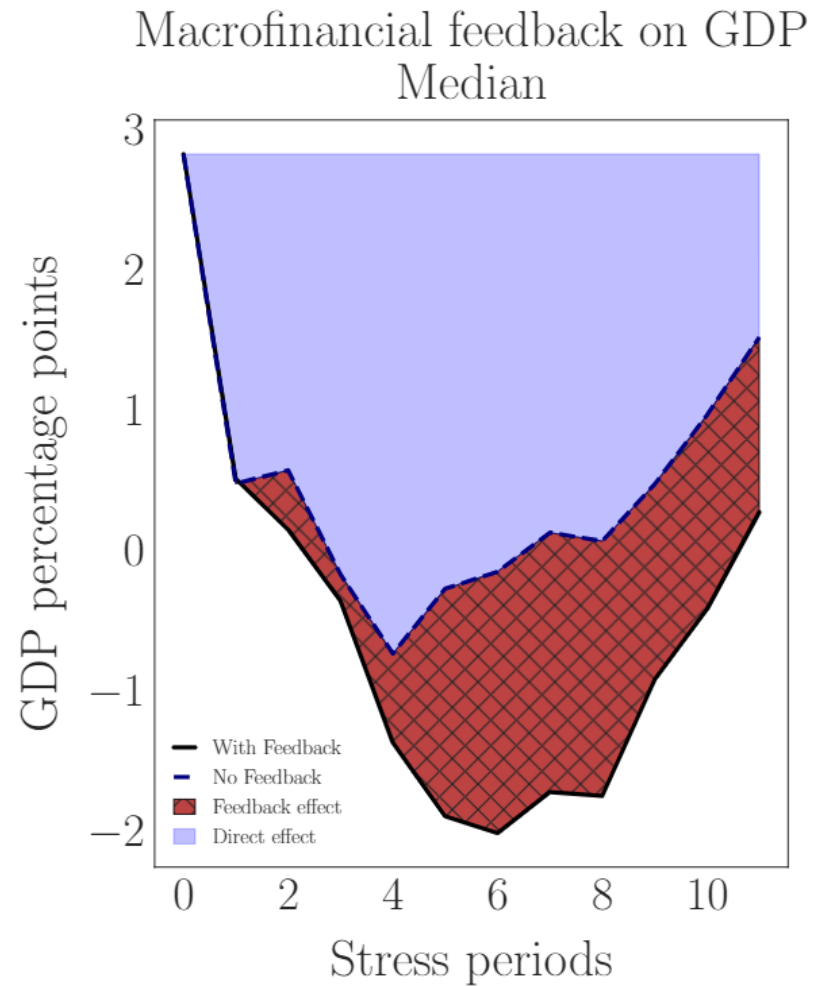
$$C_t = C_{t-1} + PTNI_t - Tax_t - Cap. Distribution_t$$

- ⑩ The model is recursive and it is estimated via dynamic simulation through quantile sampling
- ⑩ It allows to compute **counterfactual experiments** (i.e. stress test scenarios) and analyze the **macro-financial feedback at different quantiles of the distributions**

The Macro-financial Feedback Loop

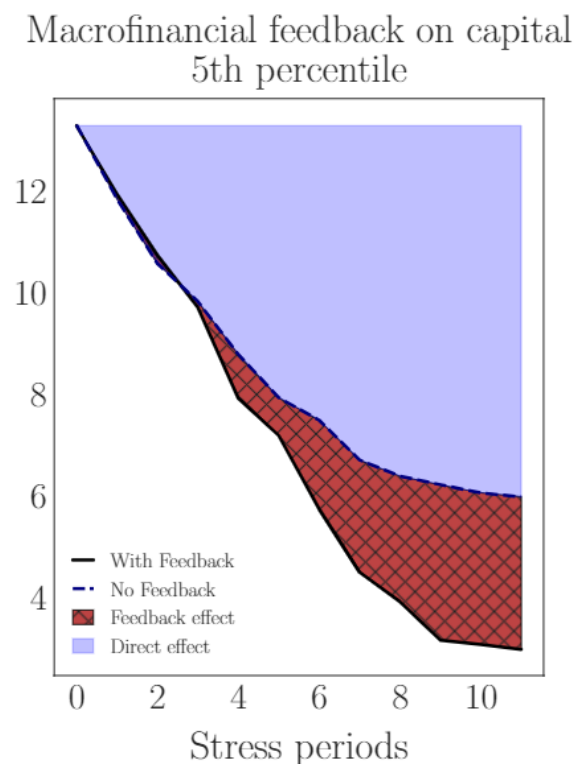
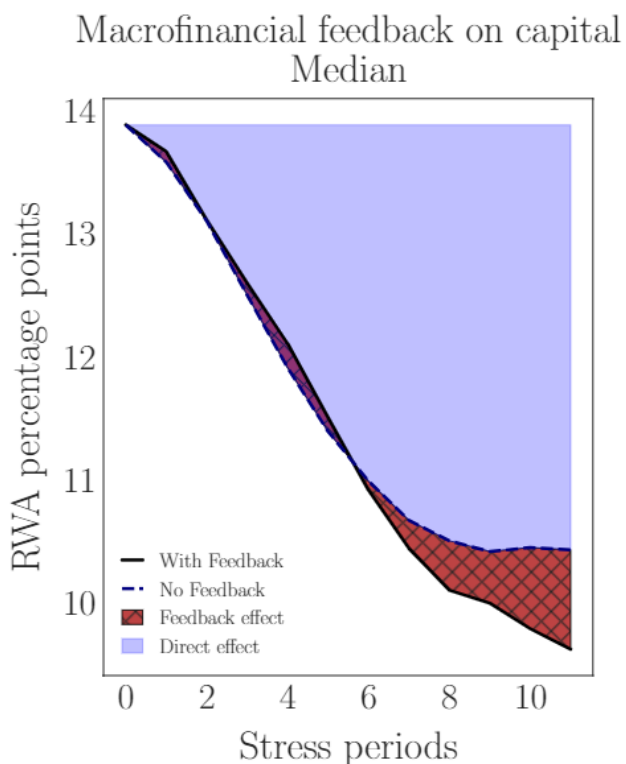
- The **direct effect** is defined as the real or financial impact from GDP or from FCI to the banks (as in standard stress-tests)
- The **macro-financial feedback** is the **second-round effect** of shocked bank capital on the economy and the financial sector (deleveraging, increased risk premia, etc.)
 - It reflects how banks amplify the economic/financial crisis at different points of the distribution of GDP and FCI
- **Macro-financial feedback** is calculated as the difference between the projected path of GDP growth in the unrestricted model and in the restricted model that shuts down the responses of GDP and FCI to changes in banks' capital

Feedback loop impact on GDP



Feedback loop impact on capital

- **Capital surcharge:** additional capital needed to offset banks' macrofinancial feedback:
 - In 2019, **A capital surcharge of 1.5 p.p. for the median** will be needed to offset a macrofinancial feedback impact on GDP of around 2 p.p. for the median.



Growth-at-Risk Gap as Vulnerabilities Metric

- **GaR estimates downside risks to GDP: it is derived from our estimated model**
 - It is a forward-looking, time-varying metric that depends on the state of the economy (conditional distribution)
 - Natural anchor: unconditional Growth at Risk, updated with historical sample and incorporating structural changes
- Difference between conditional and unconditional GaR: **cyclical versus through-the-cycle vulnerabilities**
- To mitigate parametric noise at finite distance, we approximate the unconditional distribution by the quantile projection at sample mean on expanding sample:

$$\text{Gap}(\tau) = Q(y_{t+1}|y_t, fci_t, \Delta c_t, \tau) - Q(y_{t+1}|\bar{y}_t^m, \bar{fci}_t^m, \bar{\Delta c}_t^m, \tau)$$

Growth-at-Risk Gap as Vulnerabilities Metric

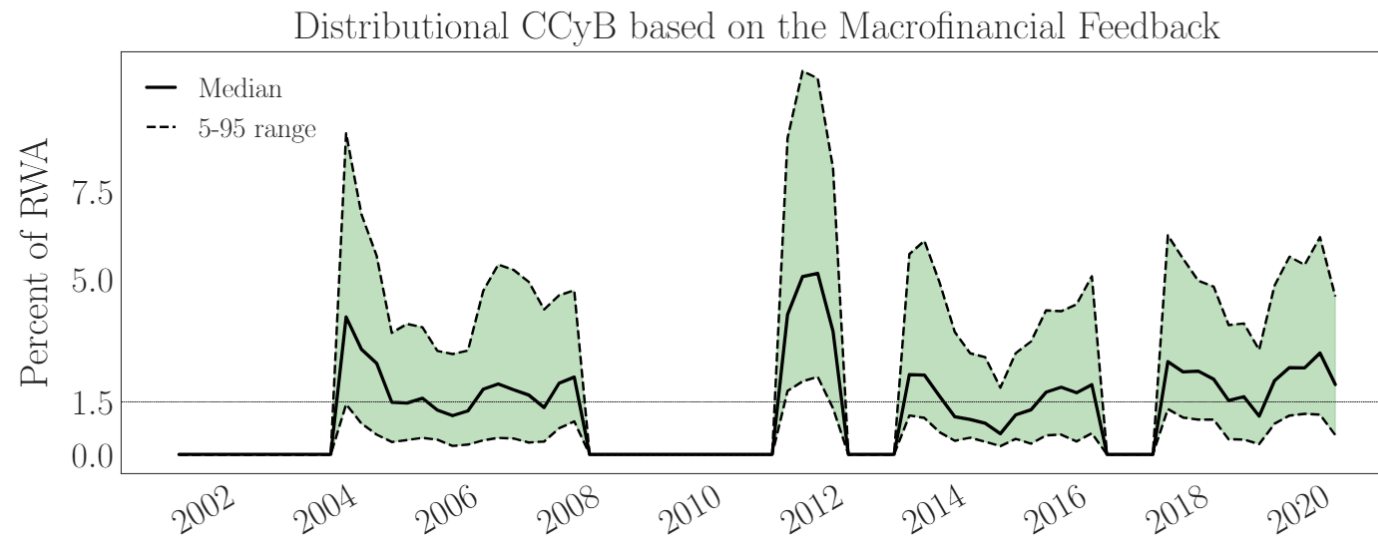
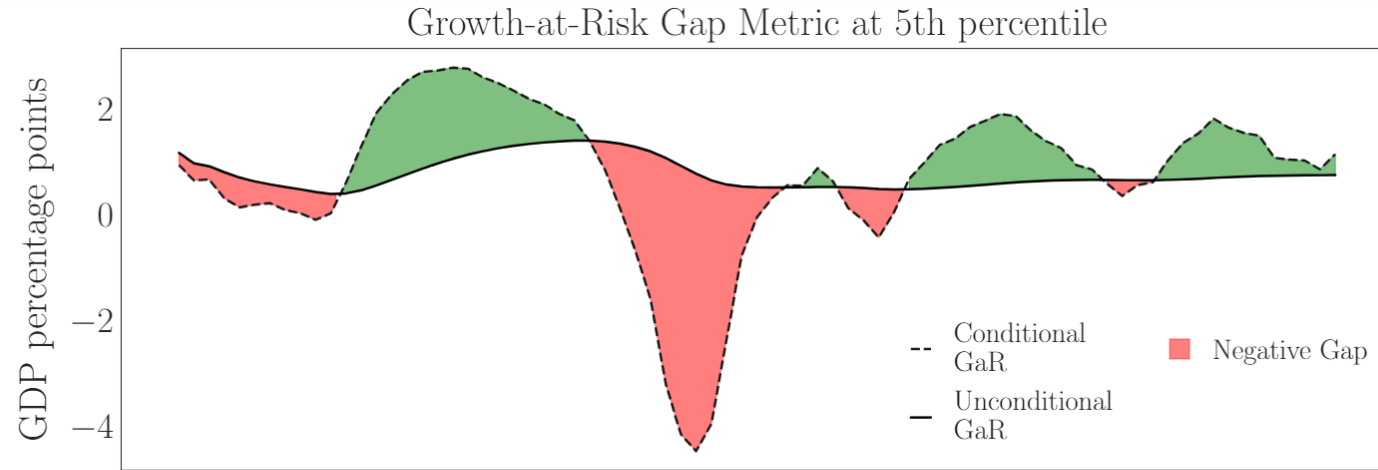
- **Our GaR Gap measure improves upon alternative measures of financial vulnerabilities, such as the Credit-to-GDP Gap:**
 - Credit-to-GDP gap measures one potential source of vulnerabilities (e.g., excessive credit relative to GDP), whereas the **GaR Gap summarizes different vulnerabilities into one consistent metric**
 - Credit-to-GDP gap reacts slowly to the cycle: empirical evidence suggests it is a poor counter-cyclical indicator
 - Credit-to-GDP gap is not risk-based, does not capture amplification in the tails
 - HP filter suffers from many statistical shortcomings (end-point problem, choice of lambda, over-persistent trend, etc.), which makes it difficult for policy use

Growth-at-Risk Gap and the Capital Buffer

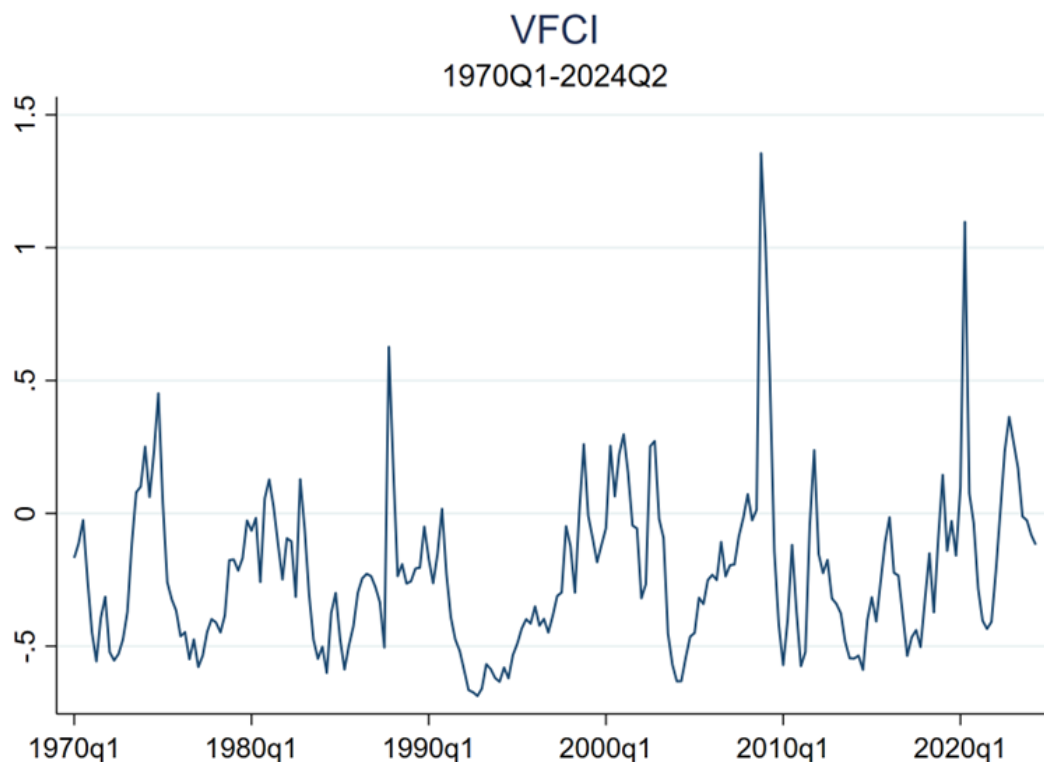
- **The estimated GaR metric provides the basis for a counter-cyclical, state-dependent and risk-based capital buffer:**
- The capital buffer is defined as the additional bank capital needed to offset the macro-financial feedback across the business cycle, at a given risk level (CCyB):
 - It depends on the state of the economy
 - It does not offset all the vulnerabilities, only the amplification coming from banks

$$\text{CCyB}(\tau)_t = \mathbb{1}_{\text{Gap}(\tau) > 0} \left[Q(C_j^{R,PTT} | \theta_j^{CCAR}, \tau)_t^{t+H} - Q(C_j^{U,PTT} | \theta_j^{CCAR}, \tau)_t^{t+H} \right]$$

Growth-at-Risk Gap and the Capital Buffer



When to build capital buffers beyond the neutral level?



Source: Adrian, Duarte, Iyer (2023)

- Financial Conditions (FCIs) are Strong Predictors of Downside Risks
- FCIs are very much related to the market price of risk, and can be well proxied by the conditional volatility of output or consumption (Adrian et al. 2023)
- FCIs are volatile over the cycle, making a minimum "through-the-cycle" releasable buffer preferable
- Persistently accommodative FCIs would suggest buffers beyond this "neutral level".
- Can also combine with other indicators, e.g., measures of credit growth, debt service pressures, etc.

When to release?

- A release of the buffers should be considered **when capital buffer requirements become binding as a result of financial stress.**
 - To reduce the risk that credit provision becomes constrained in periods of aggregate stress, then amplifying the aggregate shock.
- Indicators guiding the release should capture whether **capital buffer requirements are becoming binding as a result of stress.**
 - Analysis of near-contemporaneous indicators of solvency stress, as well as judgement.
 - Analysis of liquidity stress that leads to greater liquidity demands on banks
- **A slowdown of credit or economic activity are not sufficient.**
 - In a cyclical downturn, regulatory capital buffers are not typically binding. The release of the CCyB is then not able to generate benefits.
 - Such a release could be counterproductive, because the buffers may be needed in future, when the banking system becomes capital-constrained.

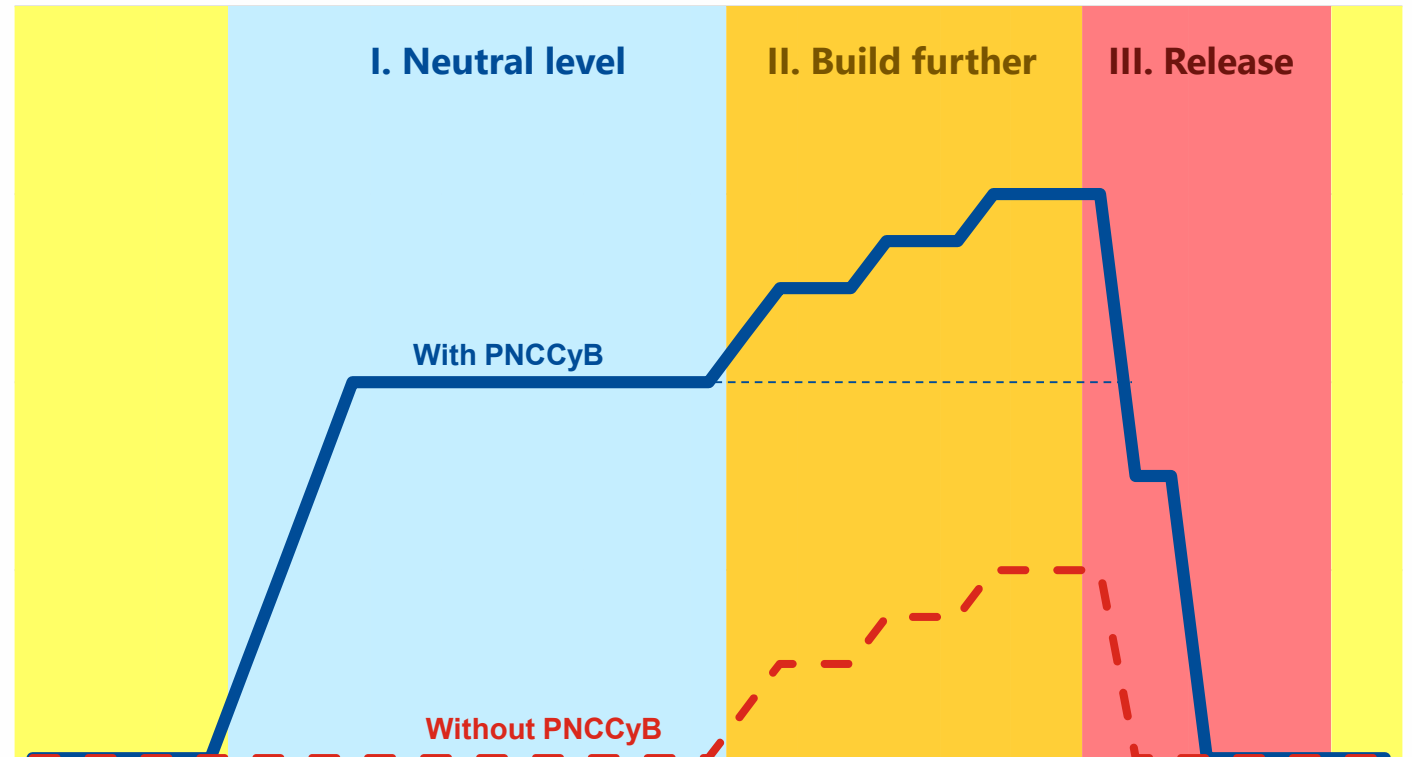
Putting things together: a Positive Neutral CCyB

A PNCCyB allows regulators to strengthen resilience and create policy space by building up capital early, at a low cost, and use it to support the provision of credit in crisis times.

I. Build-up to neutral level starts in normal times when banks are profitable or have buffers, and the supply of credit is not constrained by capital.

II. In an elevated risk environment, authorities can increase the CCyB beyond the neutral rate, based on early warning indicators, including credit gaps, growth-at-risk, stress tests, etc.

III. Release when supply of credit to the economy is constrained by capital due to incipient solvency or liquidity stress.



Recovery phase
Risk build-up phase
CCyB - neutral @ 2%

Normal risk phase
Financial stress phase
CCyB - neutral @ 0%

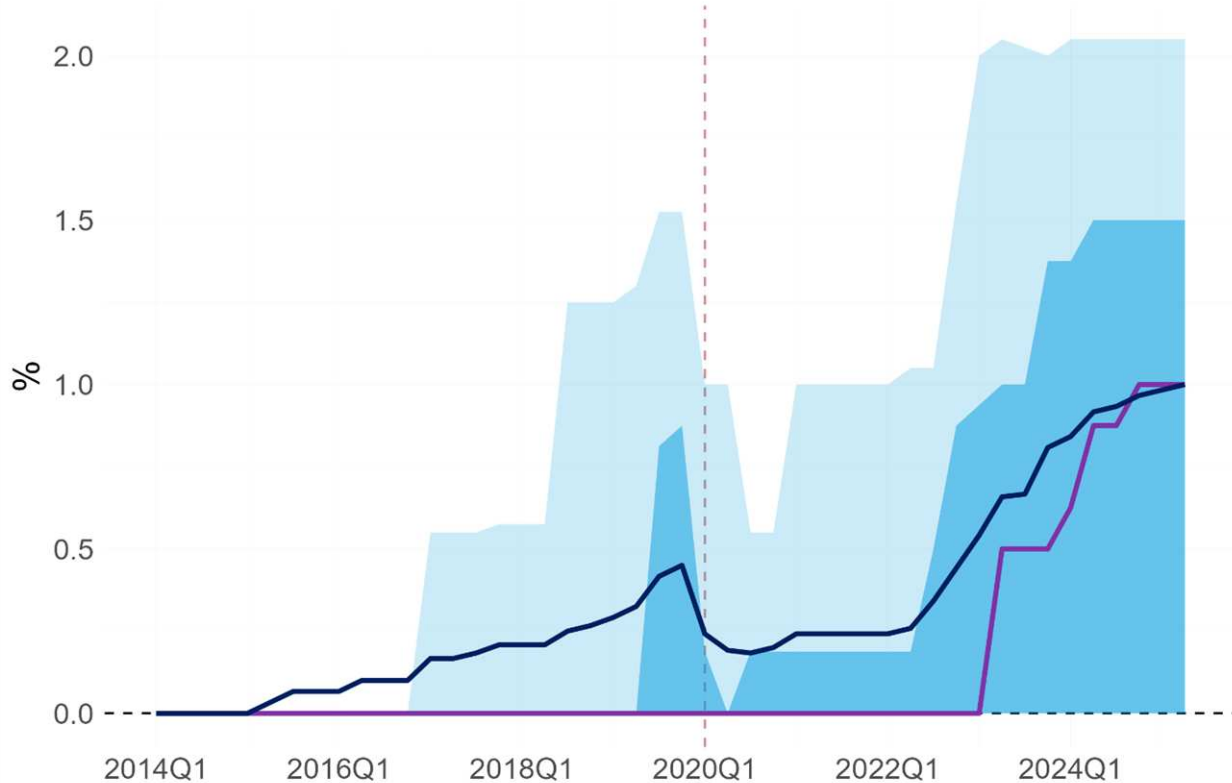
Countries are adopting Positive Neutral CCyB frameworks

Countries in Europe are raising CCyB requirements despite their credit gaps being negative

Several countries have already adopted a PNCCyB framework

CCyB level in ESRB countries

— Mean — Median 10-90% range 25-75% range



Sources: IMF calculations based on ESRB data.

Countries that formally adopted PNCCyB frameworks

Armenia	1.5 %	Latvia*	1 %
Australia	1 %	Lithuania	1 %
Czechia	1 %	New Zealand	1.5%
Cyprus	0.5 %	Netherlands	2 %
Estonia	1 %	Slovenia*	1 %
Hong Kong*	1 %	South Africa	1 %
Ireland	1.5 %	Spain⁺	1 %
Georgia*	1 %	Sweden	2 %
		United Kingdom	2 %

Sources: IMF compilation based on information in authorities' websites.

Notes: *Planned transition, ⁺Currently set at zero.

IMF Euro Area Article IV recommends to accumulate releasable capital buffers, e.g., CCyB

*“Policymakers should continue to safeguard euro area financial stability and expand the macroprudential toolkit. Banks have been resilient in the face of a rapid rise in interest rates. **Their capital ratios in aggregate are strong and liquidity is ample. Bank profits are high but will likely moderate. Therefore, even though credit growth is currently low, the authorities should encourage banks to use their temporarily high profits to build safeguards, including by increasing countercyclical capital buffers requirements. These can later be released as needed to support credit provision if risks materialize in a severe downturn.** Ad-hoc taxes on bank profits are problematic because they create an uncertain business environment, and they could also impede bank capital accumulation. Policymakers should develop nonbank macroprudential tools, such as restrictions on leverage or emergency curbs on redemptions for investment funds, while continuing efforts to bridge data gaps and improve data sharing among supervisors.”*

Sources: IMF Staff Concluding Statement of the 2024 Mission ([link](#)).

IMF: published and forthcoming papers

Conceptual:

- Adrian T., Berrospide J., Duarte F., Sola S., forthcoming, “*Macrofinancial Feedback, Bank Stress Testing and Capital Surcharges*”, IMF.
- Adrian T., Duarte F., Iyer T., 2023 “*The Market Price of Risk and Macro-Financial Dynamics*”, IMF Working Paper No. 2029/199. [Link](#)

Policy and Empirical:

- Miettinen, P., and Nier, E., forthcoming, “*Rethinking Macroprudential Capital Buffers*”, IMF.
- Biljanovska, N., Chen, S. Gelos, G., Igan, D. Martinez-Peria, M. Nier, E., and Valencia, F., 2023, “*Macroprudential Policy Effects Evidence and Open Questions*”, IMF Departmental Paper No 2023/002. [Link](#).
- Brandao Marques, L., Gelos, G., Narita, M., and Nier, E., 2020, “*Leaning Against the Wind: A Cost-Benefit Analysis for an Integrated Policy Framework*”, IMF Working Paper No. 2020/123. [Link](#).
- Alam, Z., Alter, A., Eiseman, J., Gelos, G., Kang, H., Narita, M., Nier, E., and Wang, N., 2024, “*Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database*”. *Journal of Money, Credit and Banking*. [Link](#).

Thank you!