

How to Release Capital Requirements during a Pandemic? Evidence from Euro Area Banks

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Motivation

- Expected functioning of the **Basel III macroprudential framework**.
 - Bank capital buffers built up in **economic upturns** when vulnerabilities accumulate.
 - They can be employed to absorb losses and meet credit demand in **downturns**.
- But some concerns about **potential limitations of this framework**.
 - Are there constraints to the actual **usability of capital buffers**?
 - Is there adequate macroprudential space for **buffer releases**?
- **The pandemic** as ideal setting to **test the functioning of the framework**, due to exogenous nature of shock and different measures of capital relief
- **Euro area** provides attractive setting **to study effects of capital relief**.
 - **Institutional setting of** macro- and micro-prudential policy
 - **Data for multiple countries:** supervisory, credit register
 - **Prudential policy measures:** reduction of requirement; supervisory flexibility

Research Questions and Preview of Results

- **Setting.** Bank capital relief by prudential authorities at onset of pandemic
 - **Analysis.** Loan-level study on the effects of capital relief on bank lending to firms, controlling for credit demand and concurrent policy measures
1. What is the **impact of bank capital relief on credit supply**?
 - Capital relief measures contribute to expand credit supply to firms
 2. Does the **nature of the capital relief** matter for its effectiveness?
 - **Releases of capital requirements** (permanent or temporary) raise lending.
 - **Supervisory flexibility** on capital expectations has no significant impact.
 3. Are the **effects different across banks**?
 - Requirement releases more effective for banks with smaller capital headroom
 4. Does **capital relief promote bank risk-taking** towards weaker firms?
 - The requirement releases does not promote lending towards insolvent firms

Outline

- ***Related Literature and Contributions***
- ***Capital Relief Measures***
- ***Methodology & Data***
- ***Empirical Results***
- ***Conclusions***

Related Literature and Contribution

1. The effect of changes in capital requirements on bank lending

- **Capital surcharges and structural buffers** [Gropp et al., 2019; De Jonghe et al., 2020; Behn and Schramm, 2020; Degryse et al. 2022; Cappelletti et al., 2022]
- **Dynamic requirements** [Aiyar et al 2014; Auer et al 2022; Imbierowicz et al 2018; Basten 2019]
- **Capital requirement releases during Global Financial Crisis** [Jimenez et al., 2017]
- *Analyse the effects of (different) capital releases during a pandemic.*

2. Rules vs. discretion in prudential policy

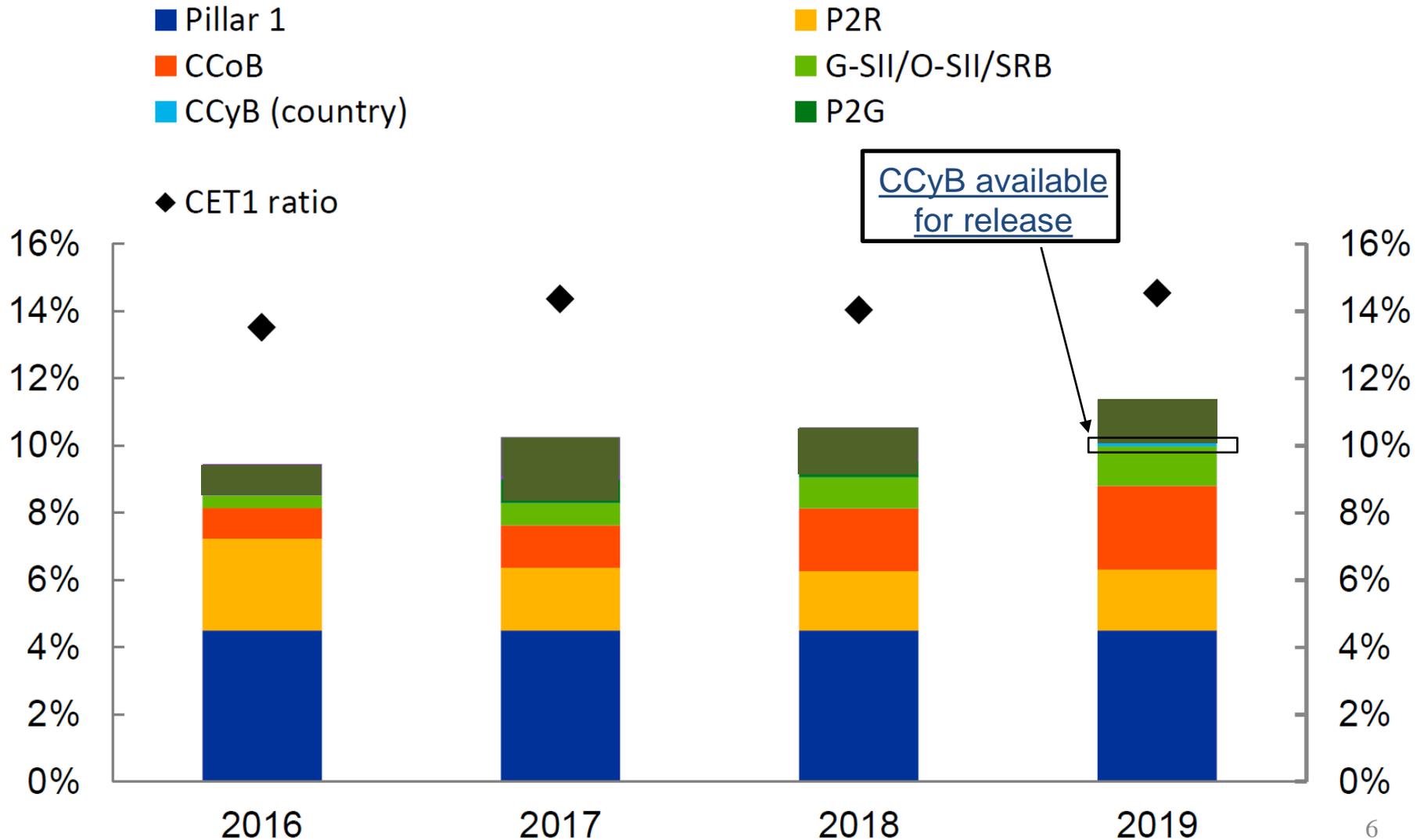
- **Microprudential regulation and supervision** [Walther and White, 2020; Elliott et al., 2013]
- **Macroprudential policy** [Agur and Sharma, 2013; Calem et al., 2020].
- *Predictability within known frameworks supports policy effectiveness.*

3. Basel III framework and bank lending during the pandemic

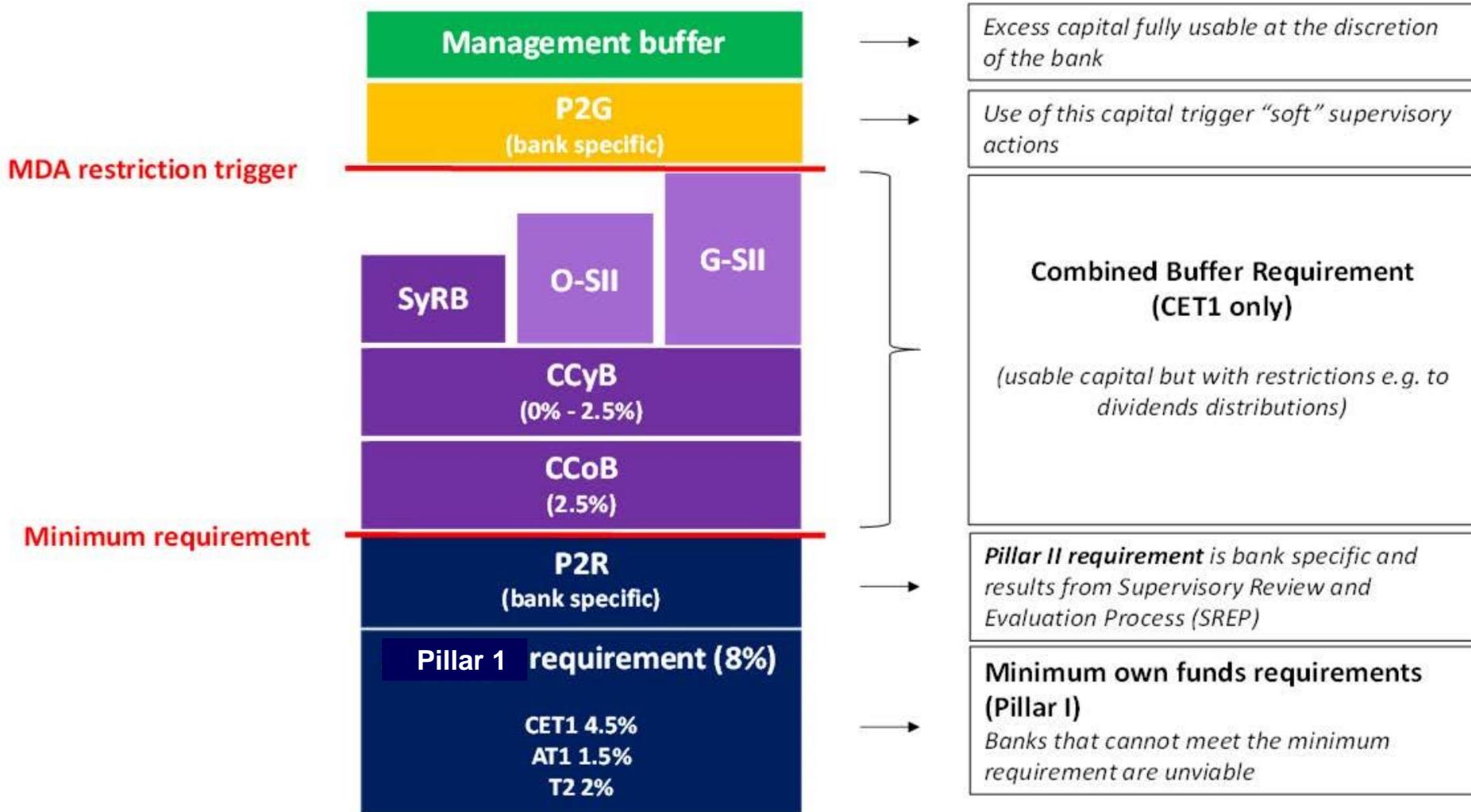
- **Capital buffers, internal models and bank lending** [Abad and Garcia, 2022; Berrospide et al., 2021; Couaillier et al., 2022; Mathur et al., 2022; Matyunina and Ongena, 2022; Fiordelisi et al., 2022]
- *Assess capital requirement releases under the Basel III framework.*

Limited space from Countercyclical Capital Buffer (CCyB)

Capital requirements and CET1 ratios (percentages of risk-weighted assets)



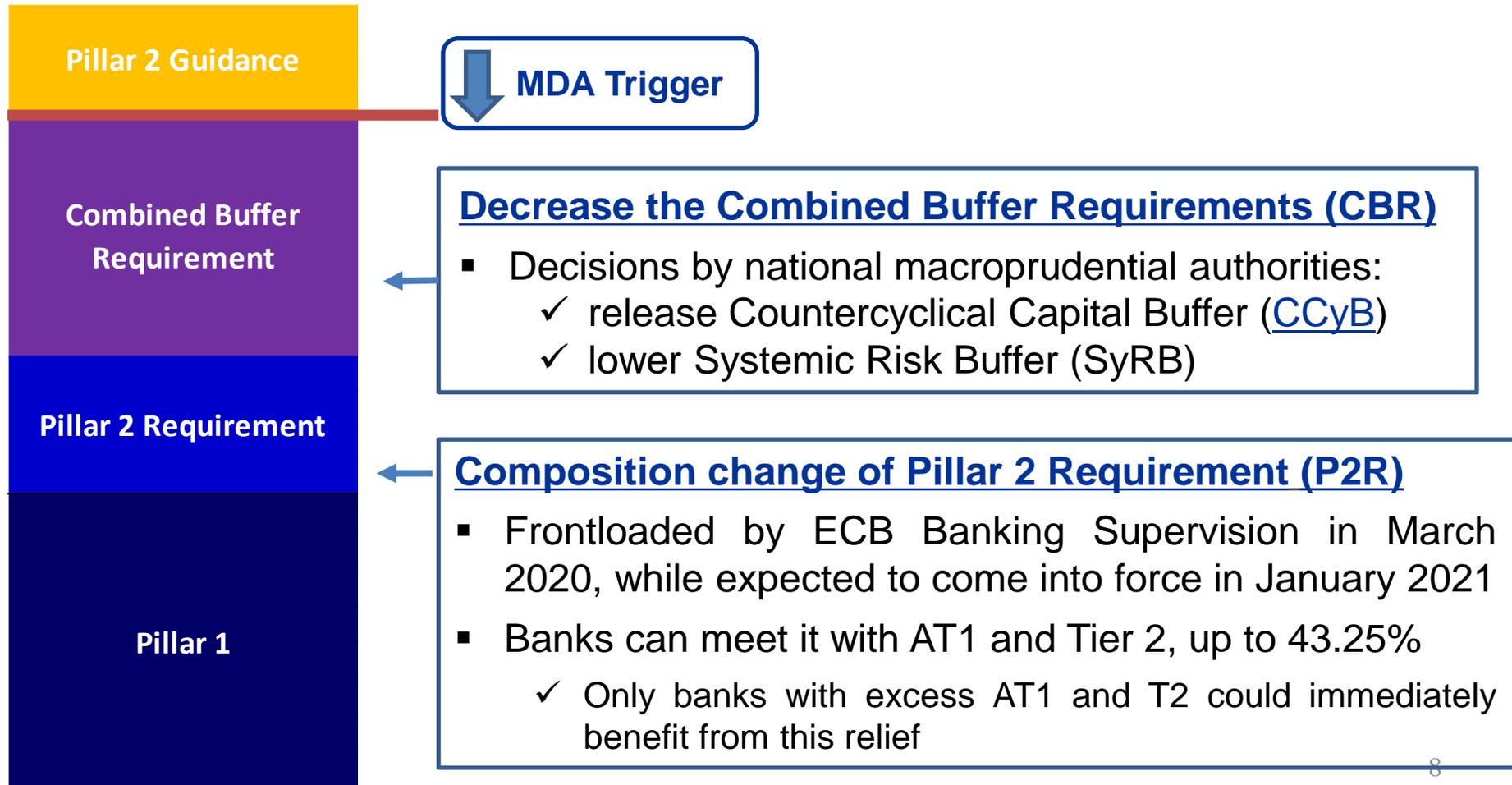
The Capital Stack for EU Banks



Capital Relief: Reduction of CET1 Requirements

- Starting on 12 March 2020, euro area prudential authorities adopted two types of measures, providing capital relief for overall EUR 140 bn:

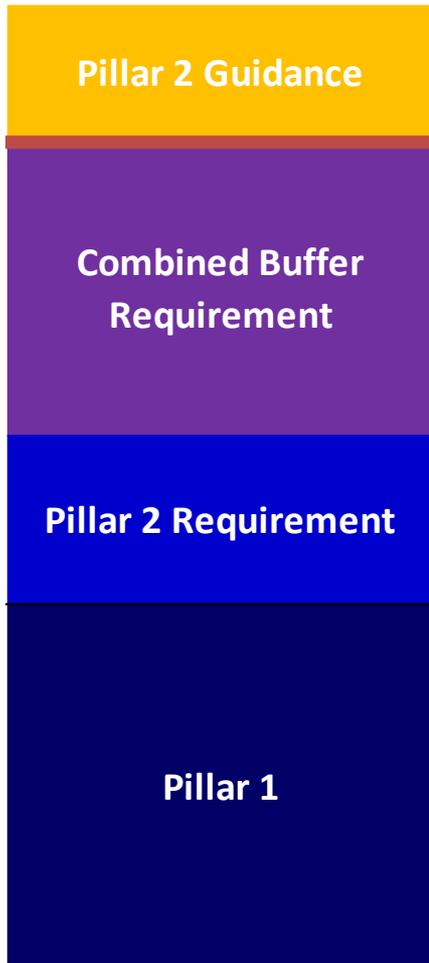
1. Reduced binding capital requirements (rule-based action)



Capital Relief: P2G Usability

- Starting on 12 March 2020, euro area prudential authorities adopted two types of measures, providing capital relief for overall EUR 140 bn :

2. Granted flexibility on supervisory guidance (discretionary measure)



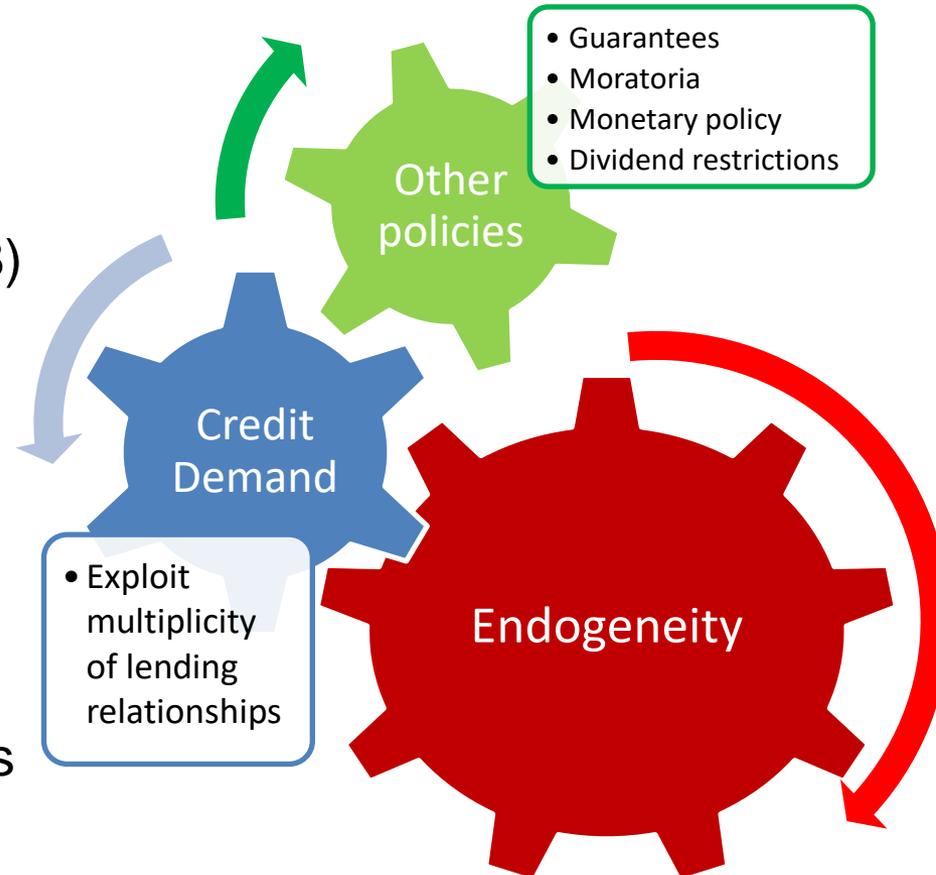
← Permission to operate below Pillar 2 Guidance (P2G)

- Decided by ECB Banking Supervision
- While supervisory expectation in place, temporary waiver on the potential consequences of a breach

Empirical Strategy

➤ Econometric identification:

- **Bank-firm loan-level data** to study the effects of capital relief measures on banks' credit supply
- **Control for demand** through firm fixed effects (Khwaja and Mian, 2008)
- **Supply** controlled for:
 - **bank characteristics** (time-variant balance sheet variables, bank FEs);
 - **policy interventions**
 - TLTRO III and dividend restrictions at bank level
 - credit guarantees and moratoria at bank-firm level



Data

- Combine different micro confidential datasets with euro area coverage for a quarterly sample from 2019 Q3 to 2020 Q4.
- **Loan-level data from Anacredit**
 - All **bank-firm credit relations** with initially more than 25,000€
 - **Credit contract data: loan volumes, lender, borrower, guarantees, moratoria**
 - **Firm level information:** Industry (NACE), Location & Size information
- **Bank-level supervisory data**
 - Offer a vast variety of bank characteristics to control for
 - Information on **capital relief measures** and distance to the P2G
 - Focus on Significant Institutions due to P2G data availability
- **Pandemic-related policy measures**
 - **Central bank liquidity measures:** TLTRO-III allotment
 - **Suspension of dividend distribution** (decided by ECB Banking Supervision)

Empirical Specification

- **Regression equation:**

$$\Delta Y_{f,b,c,t} = \alpha CAPREL_{b,t} * PostCOVID_t + \beta P2G_{b,t} * PostCOVID_t + \Phi X_{b,t-1} + \Psi Z_{f,b,t-1} + \eta_{f,t} + \mu_{c,t} + \rho_b + \epsilon_{f,b,c,t}$$

f is the firm, b is the lender bank, c is the country of the bank, t is the quarter

- **Dependent variable** for credit at the firm-bank level:

- Δ log of lending stocks

- **Key regressors** expressed as continuous variables:

- $CAPREL_{b,t}$ is the size of **capital requirement decreases** (from P2R & CBR)
- $P2G_{b,t}$ is the pre-Covid level of the **Pillar 2 Guidance**

- **Fixed effects:** firm-quarter, country-quarter and bank (or firm-bank)

- **Errors clustered** at the firm-quarter, bank-quarter, firm-bank levels.

- **Bank controls:** bank size, NPL ratio, provisions/tot assets, net interest margin, cost to income ratio, deposits/tot assets, liquid assets/tot assets, loans/tot assets, average risk weight, lagged CET1 ratio

Table 1. Effects of Different Capital Relief Measures

- The **reduction in capital requirements increased banks' credit supply to firms** (as able to affect banks' dividend policy and capital planning)
- The **flexibility on supervisory guidance had no significant impact** on banks' lending behaviour

	(1)	(2)	(3)	(4)
	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)
CAPREL*PostCOVID	1.247* (0.665)	1.744** (0.734)	2.723** (1.19)	2.773** (1.169)
P2G*PostCOVID	-1.046 (0.963)	-0.975 (0.992)	-1.240 (1.081)	-0.358 (0.960)
Obs.	5,480,013	5,480,013	5,480,013	5,480,013
Firm*Quarter FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	YES	YES
Bank FE	NO	NO	YES	NO
Firm-bank FE	NO	NO	NO	YES

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, cost to income ratio, deposits-to-total assets, liquid-assets-to-total-assets, loans-to-total-assets, average risk weight, lagged CET1 ratio. **Policy controls:** (at the bank-level) TLTRO-to-total assets, dividend restrictions; (at the bank-firm level) share of loans under moratoria, share of loans under guarantee schemes, dividend restriction policy. [Capital relief measures](#)

Effectiveness of Different Relief Measures

➤ The design of the capital relief measure is key for its effectiveness.

What are the main differences?

	Decrease in Requirements	Usability of P2 Guidance
Benefits from change?	Reduction of binding requirements → Reduce MDA trigger (breach implies automatic restrictions)	Supervisory expectation still in place → Temporary waiver on supervisory actions (already discretionary)
Replenishment rules/timeline?	- P2R permanent - CBR temporary but set within established framework (clear rules for future rate increase decisions)	- Temporary usability, on discretionary basis outside scope of the framework - Timeline communicated only at the end of July 2020

Predictability of measures for replenishment and sanctions enhance policy effectiveness

Uncertainty on replenishment or breach consequences may hamper relief effectiveness

Table 2. Bank Heterogeneity and Capital Headroom

- **Expansionary effects** stronger for **banks closer to P2G** pre-pandemic
 - Dist. P2G PreCOVID= CET1 ratio - P2G level (as of 2019 Q4).
 - The reduction of capital requirements **released buffer usability constraints** particularly for banks with smaller capital headroom (Couaillier et al., 2022)

	(1)	(2)	(3)	(4)
	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$
CAPREL*PostCOVID	3.33*** (1.05)	3.36*** (1.11)	4.18*** (1.60)	4.32*** (1.51)
P2G*PostCOVID	-1.51 (1.43)	-0.52 (1.50)	-1.89 (1.75)	-0.51 (1.63)
Dist. P2G PreCOVID	0.08 (0.20)	0.14 (0.20)		-14.09 (39.38)
CAPREL*PostCOVID* Dist. P2G PreCOVID	-0.62** (0.27)	-0.41 (0.28)	-0.70* (0.39)	-0.72** (0.34)
Obs.	5,308,638	5,308,638	5,308,638	5,308,638
Firm*Quarter FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	YES	YES
Bank FE	NO	NO	YES	NO
Bank-firm FE	NO	NO	NO	YES

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, cost to income ratio, deposits-to-total assets, liquid-assets-to-total-assets, loans-to-total-assets, average risk weight, lagged CET1 ratio. **Policy controls:** (at the bank-level) TLTRO-to-total assets, dividend restrictions; (at the bank-firm level) share of loans under moratoria, share of loans under guarantee schemes, dividend restriction policy.

Table 3. Firm Heterogeneity and Riskiness

- **Requirement releases did not promote** risk-taking towards insolvent firms
 - L.IMPAIRMENT=1 if bank *b* has recognized **impairments** in credit relationships with firm *f* in quarter *t-1* (private info available to the lender; Jimenez et al. 2014)
 - Releases supported a considerably **lower lending growth for riskier firms**

	(1)	(2)	(3)	(4)
	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)
CAPREL*PostCOVID	1.291* (0.6841)	1.842** (0.7610)	3.169*** (1.220)	3.073*** (1.188)
P2G*PostCOVID	-1.063 (0.9981)	-1.005 (1.031)	-1.620 (1.143)	-0.5618 (1.014)
L.IMPAIRMENT	0.0257*** (0.0050)	0.0247*** (0.0051)	0.0259*** (0.0052)	0.1005*** (0.0077)
CAPREL*PostCOVID* L.IMPAIRMENT	-1.773* (0.9172)	-2.098** (0.9395)	-2.747*** (0.9075)	0.6275 (0.8477)
Obs.	5,180,712	5,180,712	5,180,712	5,180,712
Firm FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	YES	YES
Bank FE	NO	NO	YES	NO
Bank-firm FE	NO	NO	NO	YES

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, cost to income ratio, deposits-to-total assets, liquid-assets-to-total-assets, loans-to-total-assets, average risk weight, lagged CET1 ratio. **Policy controls:** (at the bank-level) TLTRO-to-total assets, dividend restrictions; (at the bank-firm level) share of loans under moratoria, share of loans under guarantee schemes, dividend restriction policy.

Robustness Analysis

➤ Definition of the dependent variable

- ✓ Investigate increase in loan volumes in lending relationships ([table](#))
 - Define a binary dependent variable for the increase in credit and estimate a logit regression

➤ Potential endogeneity of the P2G

- ✓ P2G set by banking supervisors based on the risk of banks ([table](#))
 - Two stage approach:
 - Estimate the P2G as function of expected capital depletion from 2018 Stress Tests under adverse scenario
 - Use residuals from the P2G estimation as regressors in the main estimation

➤ Disentangle the decrease of different capital requirements

- ✓ Estimate separately the effects of the release of P2R and CBR ([table](#))

Conclusions

- **COVID-19 pandemic** provides ideal setting to study the functioning of capital buffer framework and the design of capital releases in crisis times
- **Capital relief measures support banks' credit supply to firms, but not all measures are equally successful.**
 - Banks adjust their credit supply only if the **capital relief is permanent or implemented within rule-based processes** (which foresee long release periods or define clear rules on replenishment and sanctions)
 - **Discretionary relief measures** show limited success, possibly for the uncertainty in capital replenishment or as not affecting dividend policy.
- The effectiveness of countercyclical capital relief measures in crisis times depends not only on the relief size, but also on the **design of measures.**
 - Focus on **rules setting clear policy reactions.**
 - Tilting the balance **from usable to releasable buffers**

Thank you!

APPENDIX

Countercyclical Capital Buffer Rates

Countercyclical Capital Buffer rate applicable in euro area countries (2019-2024, as of January, percent of Risk Weighted Assets)

Country	Jan-19	Jan-20	Jan-21	Jan-22	Jan-23	Jan-24
Austria	0	0	0	0	0	0
Belgium	0	0	0	0	0	0
Croatia	0	0	0	0	0	0.5
Cyprus	0	0	0	0	0	0
Estonia	0	0	0	0	1	1.5
Finland	0	0	0	0	0	0
France	0	0.25	0	0	0	0.5
Germany	0	0	0	0	0	0.75
Greece	0	0	0	0	0	0
Ireland	0	1	0	0	0	1
Italy	0	0	0	0	0	0
Latvia	0	0	0	0	0	0
Lithuania	0.5	1	0	0	0	1
Luxembourg	0	0.25	0.5	0.5	0.5	0.5
Malta	0	0	0	0	0	0
Netherlands	0	0	0	0	0	1
Portugal	0	0	0	0	0	0
Slovakia	1.25	1.5	1	1	1	1.5
Slovenia	0	0	0	0	0	0
Spain	0	0	0	0	0	0

At the beginning of 2020, among euro area countries:

- 5 had activated a positive CCyB rate;
- 2 (BE, DE) had announced a positive CCyB (under phase-in).

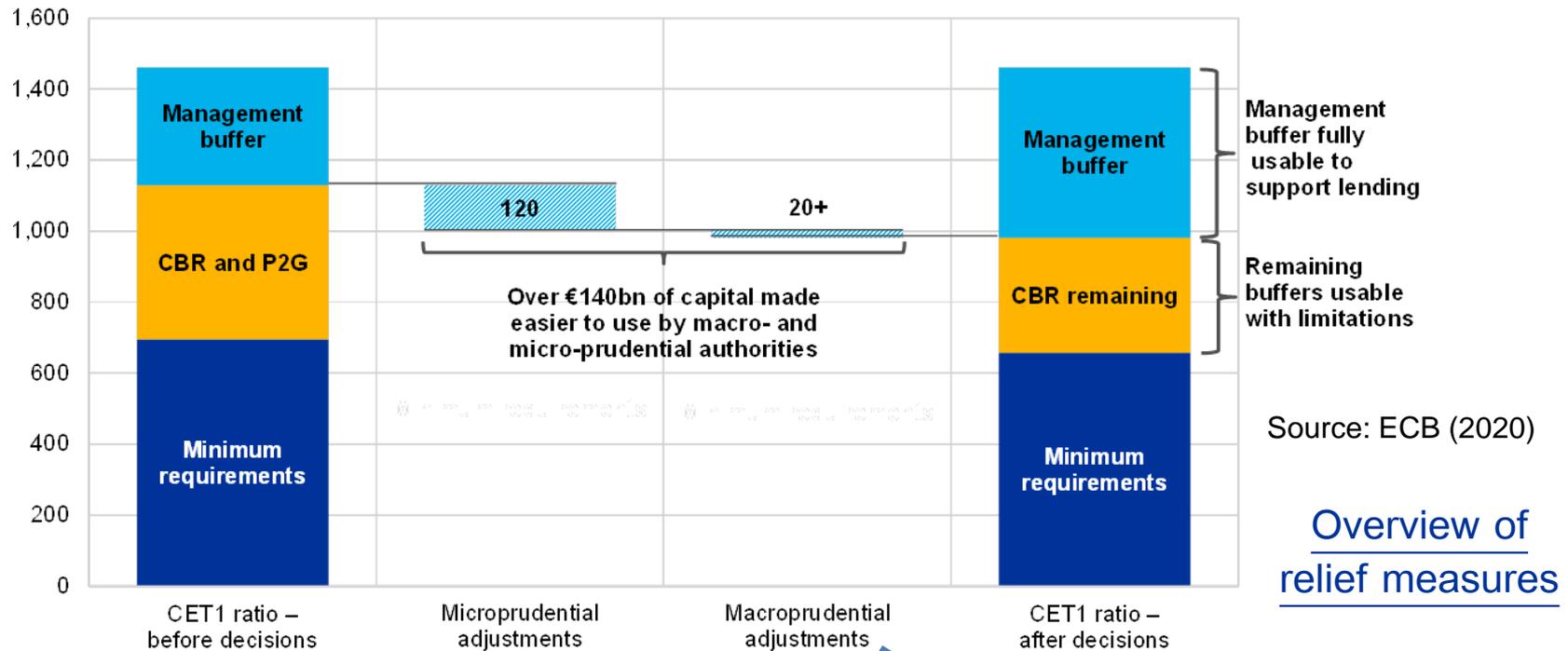
The activation or the increase of the CCyB rate requires a 12-month phase-in implementation period

Capital ratios
before pandemic

Source: ESRB (2022)

Capital Relief Measures

Capital relief measures by euro area prudential authorities for overall EUR 140 bn at the onset of the pandemic



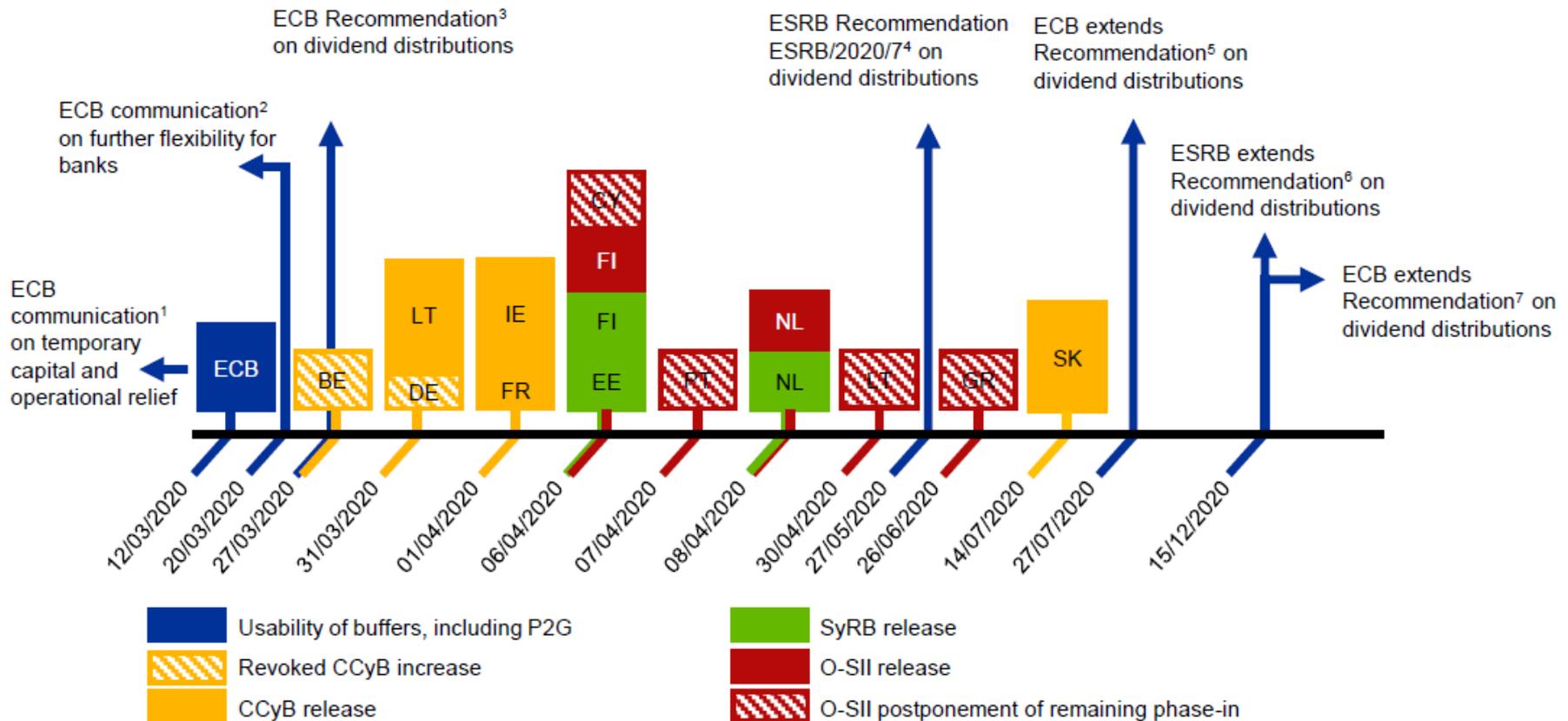
Microprudential adjustments include:

- the composition change of P2R: approx. € 30 bn
- the temporary usability of P2G: approx. € 90 bn

Macroprudential adjustments include the releases of:

- the CCyB buffer: € 13.7 bn
- the SyRB buffer: € 7.5 bn
- the O-SII buffer: € 0.6 bn

Timeline of Capital Relief Measures

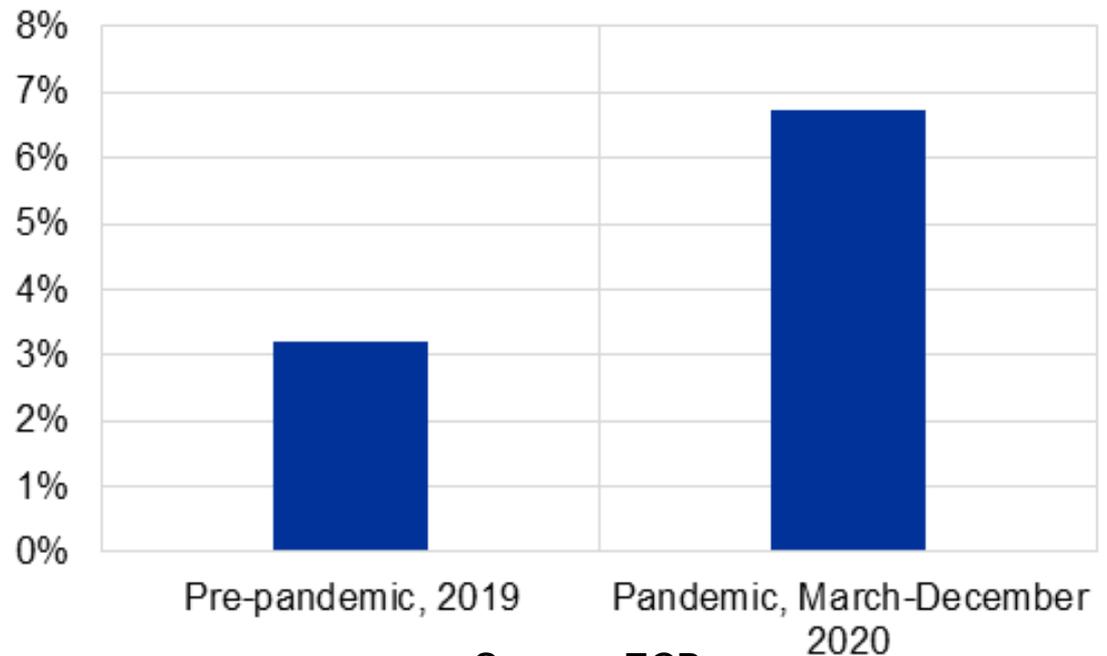


Source: ECB (2022)

Credit Developments

On aggregate **euro area banks were able to meet credit demand during the pandemic.**

Growth rate of loans to non-financial corporations



Source: ECB

But **the aggregate perspective** does not explain the functioning of the buffer framework nor the effects of capital releases in the lending behaviour of banks with borrowers

Capital Relief Measures

Summary Statistics on Bank-Level Capital Relief Measures

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
CAP REL	106	0.007	0.006	0.000	0.002	0.010	0.030
CBR REL	106	0.004	0.004	0.000	0.0003	0.005	0.023
P2R REL	106	0.003	0.003	0.000	0.000	0.006	0.013
P2G 2020	106	0.014	0.007	0.010	0.010	0.018	0.060

[Data](#)

Distribution of the reduction in capital requirements

[Table 1](#)

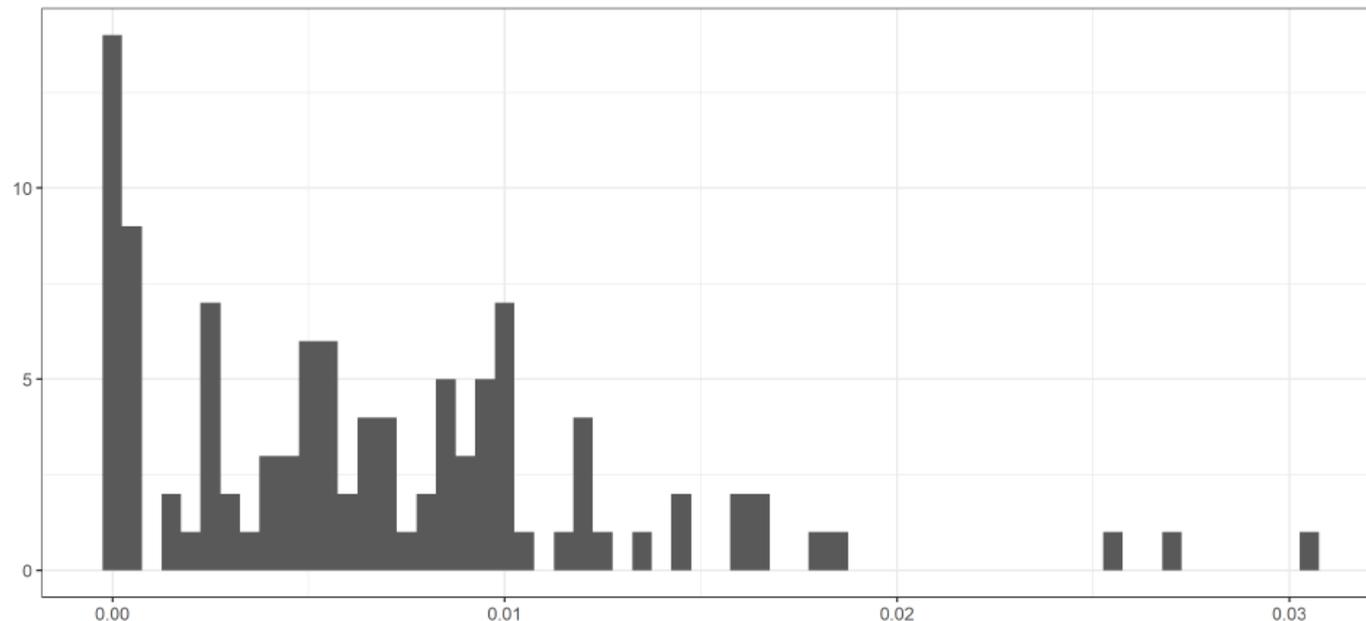


Table A.1. Loan Volumes in Existing Relationships

- **Definition of the dependent variable**
- Define a dummy equal to 1 when the credit volume in lending relationships increased between t-1 and t and run a logit regression

	(1) I(Δ credit > 0)
CAPREL*PostCOVID	32.69*** (9.927)
P2G*PostCOVID	-42.34** (17.11)
Bank Controls	YES
Policy Controls	YES
Obs.	2,216,490
Firm*Quarter FE	YES

The expansionary impact of **requirement releases** is confirmed also in supporting the **increase of lending volumes in existing relationships**

The possibility to operate below the P2G did not support credit expansion

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, cost to income ratio, deposits-to-total assets, liquid-assets-to-total-assets, loans-to-total-assets, average risk weight, lagged CET1 ratio. **Policy controls:** (at the bank-level) TLTRO-to-total assets, dividend restrictions; (at the bank-firm level) share of loans under moratoria, share of loans under guarantee schemes, dividend restriction policy.

Robustness

Table A.2. Robustness Analysis for the P2G

- Concern: P2G may be endogenous, set by the supervisor based on bank's riskiness, which could potentially drive bank's behavior in crisis times
- Solution: use Expected Capital depletion from 2018 Stress Tests under adverse scenario to calibrate P2G and use residuals as regressors in the main estimation
- Two steps: $P2G_b = \alpha + \beta \text{Stress test capital depletion}_b + \epsilon_b \rightarrow$ Define $\widetilde{P2G}_b \equiv P2G_b - \widehat{P2G}_b$

$$\Delta Y_{f,b,t} = \alpha + \beta \text{CAPREL}_{b,t} * \text{PostCOVID} + \gamma \widetilde{P2G}_{b,t} \text{PostCOVID} + \sum \delta X_{b,t-1} + \epsilon_{f,b,t}$$

	(1)	(2)	(3)	(4)
	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$
CAPREL*PostCOVID	1.933** (0.8074)	2.564*** (0.9718)	3.093*** (1.181)	2.542** (1.132)
$\widetilde{P2G}$ *PostCOVID	-0.3245 (1.043)	0.0730 (1.211)	-0.4038 (1.404)	-0.4323 (1.383)
Obs.	3,526,437	3,526,437	3,526,437	3,526,437
Firm*time FE	YES	YES	YES	YES
Lender country FE	NO	YES	YES	YES
Bank FE	NO	NO	YES	NO
Bank-firm FE	NO	NO	NO	YES

Results confirm:

- expansionary impact of **requirement releases**
- no significant effect of P2G usability

Robustness

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, cost to income ratio, deposits-to-total assets, liquid-assets-to-total-assets, loans-to-total-assets, average risk weight, lagged CET1 ratio. **Policy controls:** (at the bank-level) TLTRO-to-total assets, dividend restrictions; (at the bank-firm level) share of loans under moratoria, share of loans under guarantee schemes, dividend restriction policy.

Table A.3. Disentangling different capital requirements

	(1)	(2)	(3)	(4)
	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)
P2R REL*PostCOVID	2.012** (0.9094)	1.725* (0.9376)	2.086* (1.194)	2.455** (1.194)
CBR REL*PostCOVID	-0.5674 (1.123)	1.811 (1.671)	9.751*** (3.689)	5.966* (3.502)
P2G*PostCOVID	-1.208 (0.9735)	-0.9702 (0.9988)	-0.7386 (1.036)	-0.1425 (0.9391)
Obs.	5,480,013	5,480,013	5,480,013	5,480,013
Firm*time FE	YES	YES	YES	YES
Lender country FE	NO	YES	YES	YES
Bank FE	NO	NO	YES	NO
Bank-firm FE	NO	NO	NO	YES

Frontload P2R composition change:
1.72-2.45% increase in credit volume

Decrease in Combined Buffer Requirement:
effect positive but not always significant

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, cost to income ratio, deposits-to-total assets, liquid-assets-to-total-assets, loans-to-total-assets, average risk weight, lagged CET1 ratio. **Policy controls:** (at the bank-level) TLTRO-to-total assets, dividend restrictions; (at the bank-firm level) share of loans under moratoria, share of loans under guarantee schemes, dividend restriction policy. Standard errors clustered at the bank and firm levels.

Robustness