

How to Release Capital Requirements in an Economic Downturn? Evidence from Euro Area Banks

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The views presented are those of the authors and should not be attributed to the European Central Bank or the Eurosystem.

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Motivation

- **The pandemic** as an attractive setting to **test the functioning of the macroprudential framework** in severe economic downturns.
- Expected functioning of the **Basel III macroprudential framework**.
 - Bank capital buffers built 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**?
- **Euro area** provides ideal 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 requirements; 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** raise bank lending to firms.
 - **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?
 - Requirement releases promote **lending to firms with former loan impairments**
 - But do **not** foster **excessive risk-taking for weaker** rel. to stronger **banks**

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., RFS 2019; De Jonghe et al., JCF 2020; Behn and Schramm, 2020; Degryse et al., JCF 2023; Cappelletti et al., JBF 2022]
 - **Dynamic requirements** [Aiyar et al., JFE 2014; Auer et al., JFI 2022; Imbierowicz et al., JMCB 2018; Basten, RoF 2019]
 - **Capital requirement releases during Global Financial Crisis** [Jimenez et al., JPE 2017]
- *Analyse the effects of (different) capital releases during severe downturn.*

2. Rules vs. discretion in prudential policy

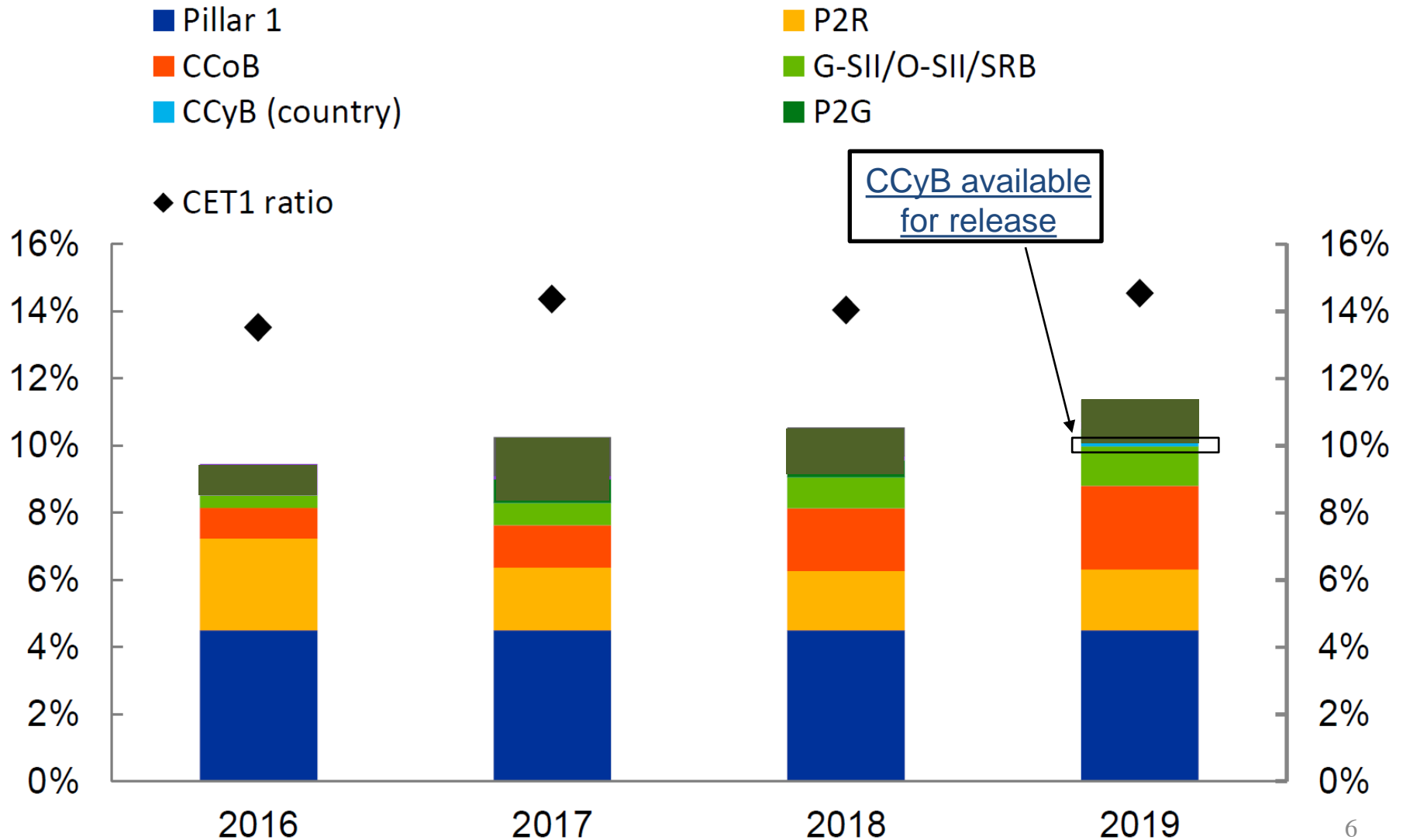
- **Microprudential regulation and supervision** [Walther and White, RFS 2020; Elliott et al., 2013]
 - **Macroprudential policy** [Agur and Sharma, 2013; Calem et al., JFI 2020].
- *Predictability within known frameworks supports policy effectiveness.*

3. Basel III framework and bank lending during the pandemic

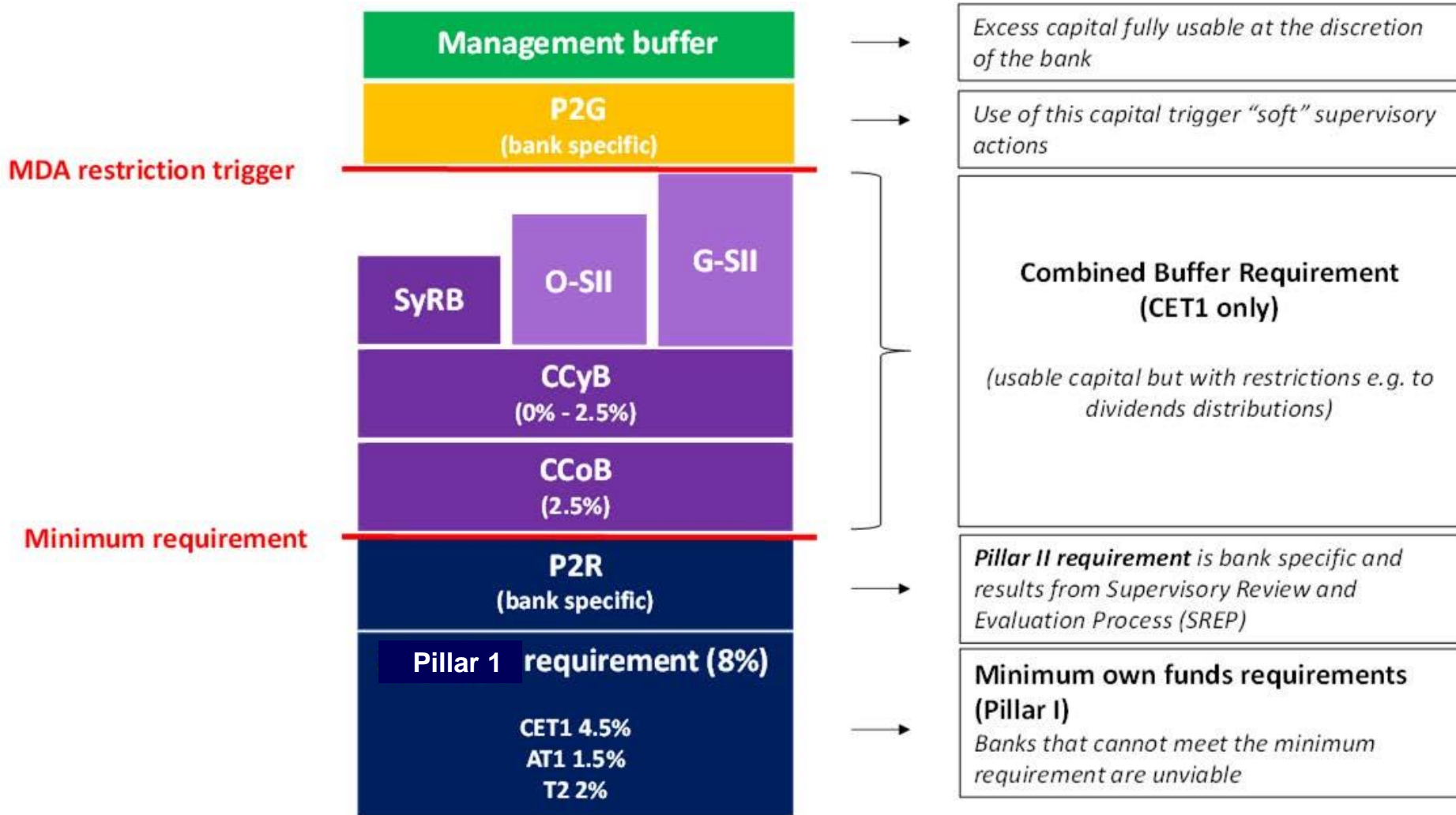
- **Capital buffers, internal models and bank lending** [Abad and Garcia, 2022; Berrospide et al., IJCB 2023; Couaillier et al., 2022; Mathur et al., 2023; Matyunina and Ongena, EJLE 2022; Fiordelisi et al., 2022]
- *Assess capital requirement releases under the Basel III framework.*

Limited space from Countercyclical Capital Buffer (CCyB)

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



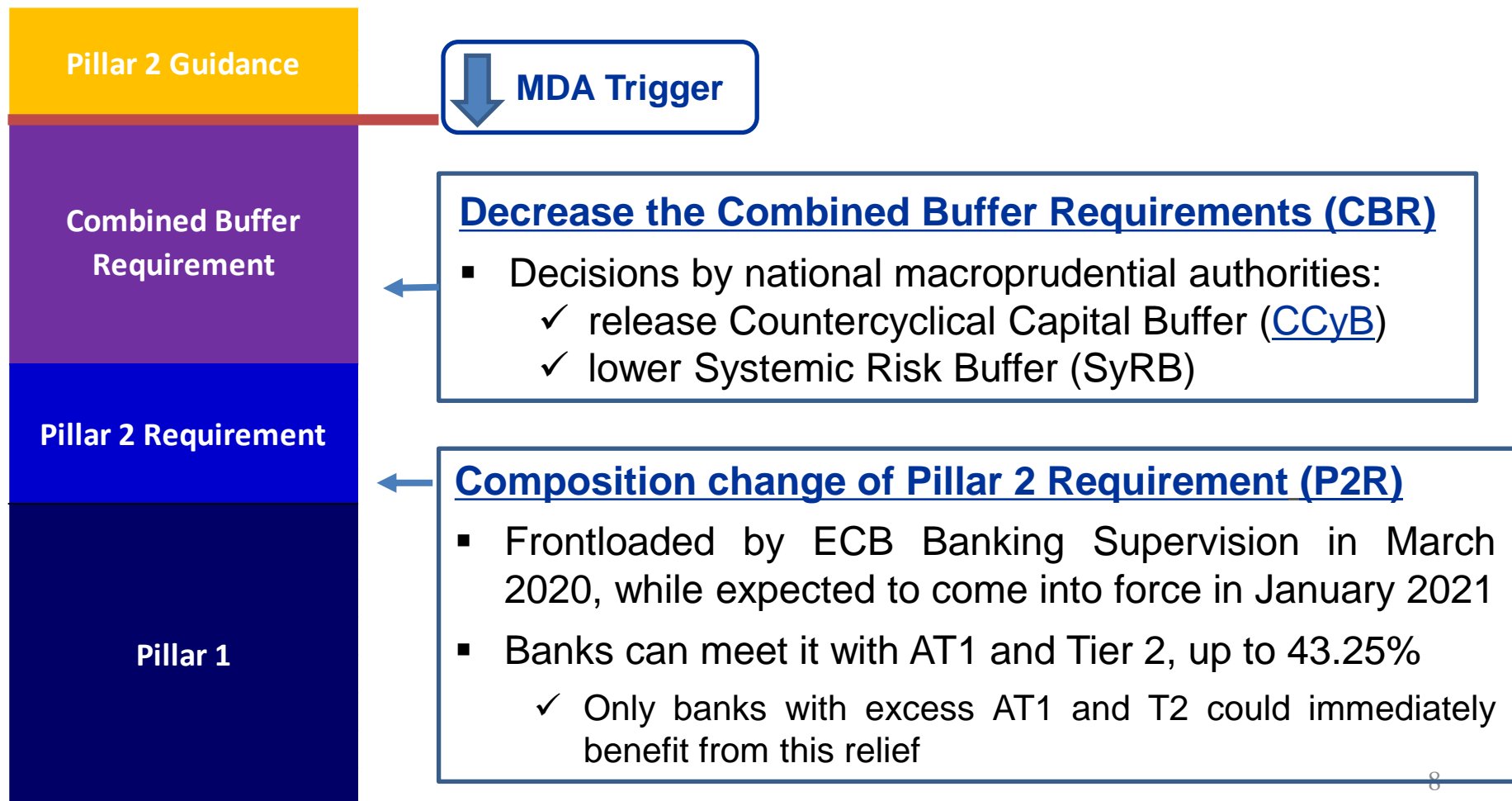
The Capital Stack for EU Banks



Capital Relief: Reduction of Capital 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: Supervisory Flexibility on Pillar 2 Guidance

- 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)



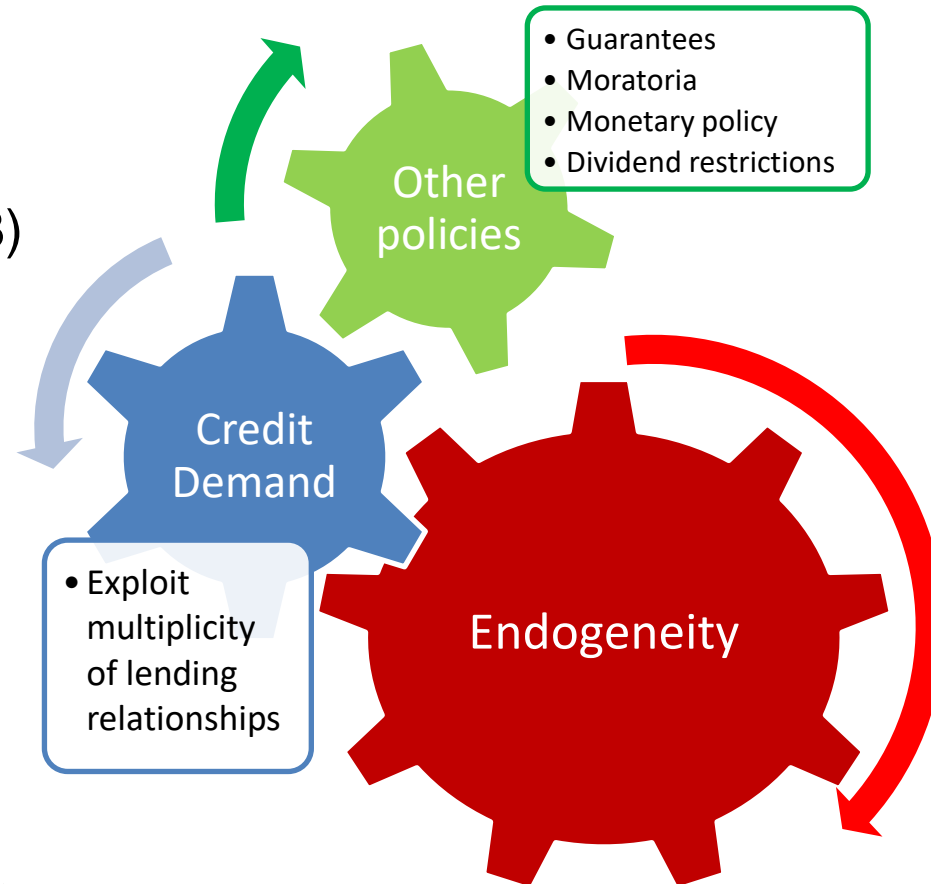
← Permission to operate below Pillar 2 Guidance (P2G)

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

Empirical Strategy

➤ Econometric strategy:

- **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) as well as across sectors
- **Supply** controlled for:
 - **bank characteristics** (time-variant balance sheet variables, bank FEs);
 - **policy interventions**
 - TLTRO III and dividend payment restriction 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 EUR 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 Pillar 2 Guidance
 - Focus on Significant Institutions due to Pillar 2 Guidance 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**
- $P2G_{b,t}$ 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 and bank-quarter levels.

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

Table 1. Effects of Different Capital Relief Measures

- **Reduction in capital requirements increases banks' credit supply to firms** (for a release of 1 pp of risk-weighted assets, increase by 2.6%-3.6%).
- The **flexibility on supervisory guidance** has **no significant impact** on banks' lending behaviour.

	(1)	(2)	(3)	(4)
	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$
CAPREL*PostCOVID	2.579** (1.144)	2.845** (1.179)	3.459* (1.907)	3.641* (2.160)
P2G*PostCOVID	-1.949 (1.515)	-1.427 (1.532)	-0.8299 (1.581)	-0.7976 (1.596)
TLTRO-III Allotment/Tot Assets	0.1925*** (0.0410)	0.1460*** (0.0413)	0.2177*** (0.0544)	0.2059*** (0.0640)
Share Guaranteed Loans	0.3525*** (0.0512)	0.3495*** (0.0508)	0.8298*** (0.0852)	0.8273*** (0.0849)
Obs.	4,939,787	4,939,787	4,939,787	4,939,787
Firm*Quarter FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	NO	YES
Firm-bank FE	NO	NO	YES	YES

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, deposits-to-total assets, cash-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. [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 Supervisory 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?	- Pillar 2 Requirement permanent - Combined Buffer Requirement 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
	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <p>Predictability for replenishment and sanctions enhances policy effectiveness</p> </div>	<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <p>Uncertainty on replenishment or breach consequences may hamper relief effectiveness</p> </div>

Table 2. Effects of Capital Relief across Quarters

- **Are expansionary effects of capital relief different across quarter?**
 - Expansionary effects of requirement releases mainly in 2020 Q2 and 2020 Q3.

	(1) Δ Log (loans)	(2) Δ Log (loans)	(3) Δ Log (loans)	(4) Δ Log (loans)
CAPREL*2020 Q2	2.224 (1.894)	4.433** (2.111)	3.399 (2.294)	5.271** (2.662)
CAPREL*2020 Q3	4.216*** (1.558)	4.402** (1.705)	3.716* (1.941)	3.180 (2.166)
CAPREL*2020 Q4	2.139 (1.892)	1.236 (1.784)	0.8265 (2.349)	-0.2459 (2.608)
P2G*2020 Q2	-10.48*** (3.866)	-10.13*** (3.734)	-7.421** (3.173)	-7.519** (3.314)
P2G*2020 Q3	2.145 (1.927)	2.435 (2.154)	4.267** (2.057)	4.378** (2.108)
P2G*2020 Q4	-0.1007 (1.667)	0.7922 (1.567)	1.937 (2.378)	1.919 (2.363)
Obs.	4,939,787	4,939,787	4,939,787	4,939,787
Firm*Quarter FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	NO	YES
Bank-firm FE	NO	NO	YES	YES

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, deposits-to-total assets, cash-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.

Table 3. Bank Heterogeneity and Capital Headroom

- **Expansionary effects** stronger for banks with **ex-ante smaller capital headroom**
 - Dist. P2G PreCOVID= CET1 ratio - P2G level (as of 2019 Q4).
 - The reduction of capital requirements **releases buffer usability constraints** (Couaillier et al., 2022; Berrospide et al., 2023; Mathur et al., 2023)

	(1)	(2)	(3)	(4)
	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)
CAPREL*PostCOVID	3.282** (1.325)	3.097** (1.353)	4.777*** (2.110)	4.591** (2.302)
CAPREL*PostCOVID* Dist. P2G PreCOVID	-0.4751** (0.2137)	-0.2971 (0.1961)	-0.5599* (0.2921)	-0.5098* (0.2951)
Dist. P2G PreCOVID	-0.2952 (0.2218)	-0.2877 (0.2336)	-0.2280 (0.3909)	-0.3628 (0.4197)
P2G*PostCOVID	-3.656* (1.947)	-2.488 (2.028)	-1.897 (2.837)	-2.125 (2.901)
P2G x PostCOVID × Dist. P2G PreCOVID	0.3006*** (0.1066)	0.2087** (0.1018)	0.2940* (0.1695)	0.2995* (0.1744)
Obs.	4,939,787	4,939,787	4,939,787	4,939,787
Firm*Quarter FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	NO	YES
Bank-firm FE	NO	NO	YES	YES

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, deposits-to-total assets, cash-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.

Table 4. Firm Heterogeneity and Riskiness

- Investigate **interaction between capital relief and firms' ex-ante riskiness**
 - In firm-bank relationships, L.IMPAIR is the (lagged) ratio of provisions over the sum of provisions and the carrying amount (private info available to the lender; Jimenez et al. 2014)
 - In crisis times, capital requirement releases support **higher lending growth for firms with previous loan impairments** (evidence of some risk-taking)

	(1)	(2)	(3)	(4)
	$\Delta \text{ Log (loans)}$	$\Delta \text{ Log (loans)}$	$\Delta \text{ Log (loans)}$	$\Delta \text{ Log (loans)}$
CAPREL*PostCOVID	2.233* (1.179)	2.489** (1.223)	1.108 (1.673)	1.074 (1.920)
CAPREL*PostCOVID* L.IMPAIR	7.175* (3.659)	6.351* (3.675)	31.68*** (6.831)	31.23*** (6.828)
L.IMPAIRMENT	15.41*** (2.504)	15.26*** (2.497)	56.30*** (8.657)	56.34*** (8.662)
P2G*PostCOVID	-1.638 (1.515)	-1.138 (1.530)	-0.5322 (1.572)	-0.5009 (1.587)
P2G x PostCOVID x L.IMPAIR	0.8368 (2.736)	0.7842 (2.747)	9.322** (3.824)	9.507** (3.844)
Obs.	4,939,787	4,939,787	4,939,787	4,939,787
Firm FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	NO	YES
Bank-firm FE	NO	NO	YES	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.

Table 5. Explore Both Firm and Bank Heterogeneity

- Requirement releases do **not** foster **excessive risk-taking for weaker banks**
 - The additional **risk-taking** enhanced by capital releases **does not** statistically **differ across banks**, in relation to their existing capital position

	(1)	(2)	(3)	(4)
	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$
CAPREL*PostCOVID	2.948** (1.363)	2.814** (1.406)	3.535* (1.976)	3.300 (2.173)
CAPREL*PostCOVID*L.IMPAIR	0.0604** (0.0254)	0.0518** (0.0254)	0.1227*** (0.0374)	0.1166*** (0.0381)
CAPREL*PostCOVID*L.IMPAIR*Dist. P2G	-0.0134 (0.0082)	-0.0121 (0.0081)	-0.0149 (0.0125)	-0.0144 (0.0126)
CAPREL*PostCOVID*Dist. P2G	-0.4145** (0.2106)	-0.2447 (0.1933)	-0.5018* (0.2808)	-0.4669 (0.2842)
P2G*PostCOVID	-3.615* (2.024)	-2.531 (2.089)	-1.238 (2.893)	-1.428 (2.960)
P2G*PostCOVID*L.IMPAIR	0.0268* (0.0139)	0.0259* (0.0138)	0.0231 (0.0197)	0.0255 (0.0201)
P2G*PostCOVID*L.IMPAIR*Dist. P2G	-0.0023 (0.0137)	0.0016 (0.0137)	-0.0810*** (0.0183)	-0.0817*** (0.0186)
P2G*PostCOVID*Dist. P2G	0.2782*** (0.1047)	0.1912* (0.0999)	0.2629 (0.1653)	0.2715 (0.1705)
Obs.	4,845,496	4,845,496	4,845,496	4,845,496
Firm FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	NO	YES
Bank-firm FE	NO	NO	YES	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.

Table 6. Interaction with Loan Guarantees

- Capital releases **support bank lending, independently from guarantees**
- Also, **loan guarantees reduce credit risk** and so risk weight for loans
 - The **released capital space** can be used to **extend a larger amount of loans**

	(1) Δ Log (loans)	(2) Δ Log (loans)	(3) Δ Log (loans)	(4) Δ Log (loans)
CAPREL*PostCOVID	2.608**	2.918**	5.839***	6.555***
	(1.161)	(1.183)	(1.795)	(2.050)
CAPREL*PostCOVID* D.GUAR SHARE	2.157	1.974	11.09***	11.34***
	(3.769)	(3.768)	(3.715)	(3.755)
P2G*PostCOVID	-1.769	-0.9164	-1.595	-1.674
	(1.472)	(1.508)	(1.309)	(1.306)
P2G*PostCOVID* D.GUAR SHARE	-0.1454	-0.3599	-1.787	-1.893
	(3.834)	(3.834)	(4.536)	(4.600)
GUAR SHARE	0.3403***	0.3351***	0.8472***	0.8444***
	(0.0502)	(0.0494)	(0.0735)	(0.0730)
Obs.	4,939,787	4,939,787	4,939,787	4,939,787
Firm*Quarter FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	NO	YES
Bank-firm FE	NO	NO	YES	YES

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, deposits-to-total assets, cash-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.

Further Analyses and Robustness

➤ Sectors less vulnerable to the pandemic

- ✓ Given the differences in credit demand across sectors, exclude loans to firms in sectors more vulnerable to the pandemic.
- ✓ The expansionary effect of requirement releases is confirmed ([table](#))

➤ Definition of the dependent variable

- ✓ Investigate increase in loan volumes in lending relationships ([table](#))
 - Estimate a logit regression using a binary variable for the increase in credit

➤ Potential endogeneity of the Pillar 2 Guidance

- ✓ 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
 - 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 and define clear rules to shape banks' capital planning)
 - **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).

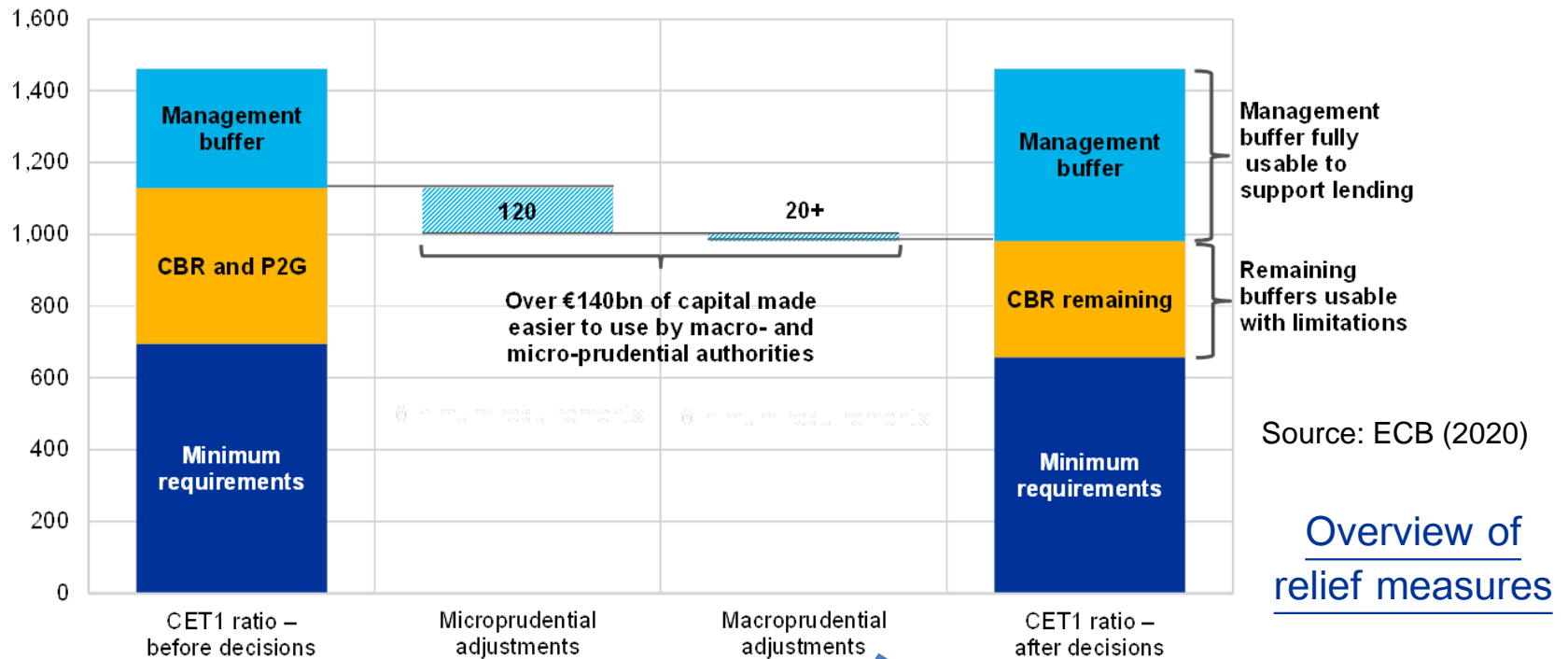
The activation or the increase of the CCyB rate requires a 12-month phase-in implementation period

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



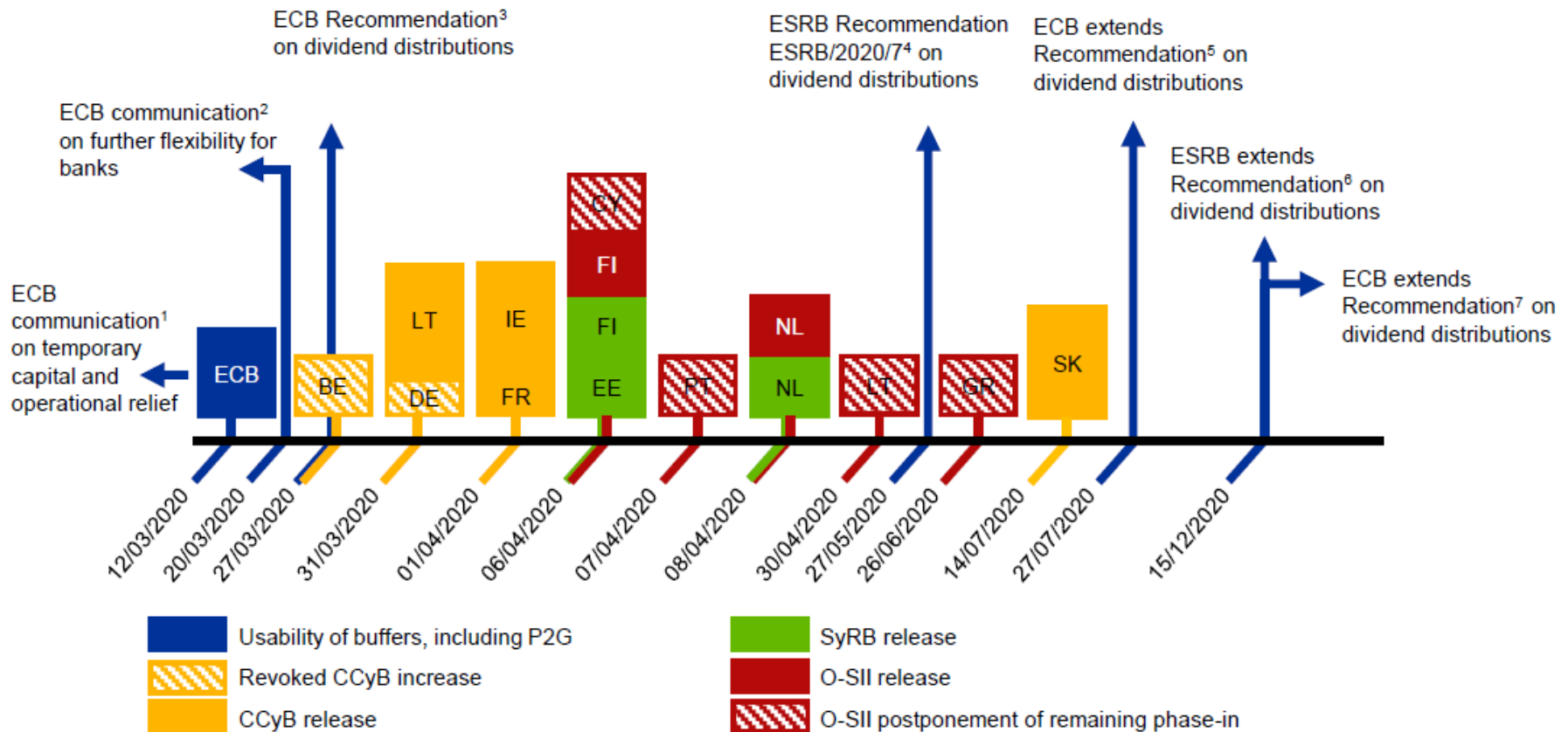
Microprudential adjustments include:

- 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)

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](#)

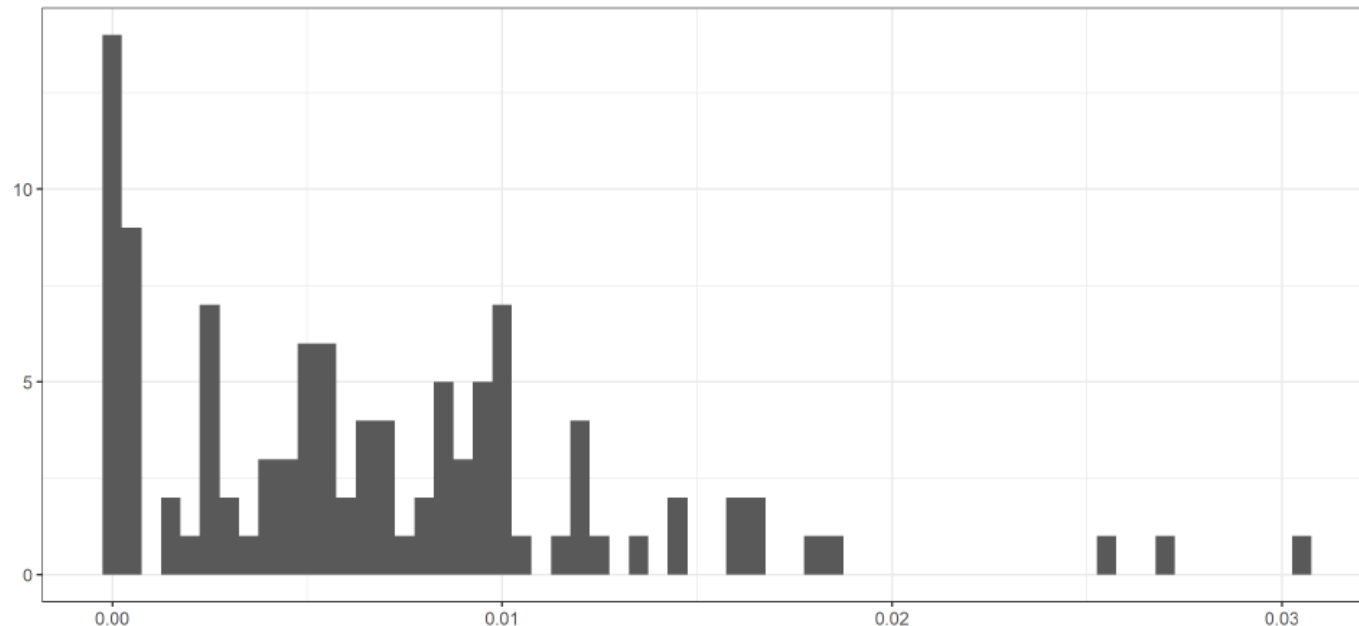


Table A.1. Sectors less Vulnerable to the Pandemic

- Some differences in credit demand could be observed **across sectors**, due to the **different exposures to the shock of the pandemic**
- The **expansionary effect of capital requirement releases is confirmed**, also after excluding loans to firms in sectors more vulnerable to the effects of the pandemic

	(1)	(2)	(3)	(4)
	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$	$\Delta \text{Log (loans)}$
CAPREL*PostCOVID	1.566	1.551**	2.729**	2.905**
	(0.8106)	(0.7570)	(1.284)	(1.358)
P2G*PostCOVID	-0.3559	-0.2688	-0.0612	0.0213
	(0.6968)	(0.7026)	(0.5695)	(0.5754)
TLTRO-III Allotment/Tot Assets	0.1232***	0.0741**	0.1338***	0.1043**
	(0.0301)	(0.0294)	(0.0408)	(0.0453)
Share Guaranteed Loans	0.2798***	0.2771***	0.7504***	0.7464***
	(0.0433)	(0.0432)	(0.0849)	(0.0848)
Obs.	1,234,620	1,234,620	1,234,620	1,234,620
Firm*Quarter FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	NO	YES
Bank-firm FE	NO	NO	YES	YES

Bank controls: log of bank total asset, non-performing loans ratio, provisions-to-total-assets, net interest margin, deposits-to-total assets, cash-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.

Robustness

Table A.2. 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 does 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.3. 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**	2.564***	3.093***	2.542**
	(0.8074)	(0.9718)	(1.181)	(1.132)
$\widetilde{P2G}$ *PostCOVID	-0.3245	0.0730	-0.4038	-0.4323
	(1.043)	(1.211)	(1.404)	(1.383)
Obs.	3,526,437	3,526,437	3,526,437	3,526,437
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

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.4. Disentangling Different Capital Requirements

	(1)	(2)	(3)	(4)
	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)	Δ Log (loans)
P2R REL*PostCOVID	3.411** (1.460)	2.344 (1.438)	4.170* (2.177)	3.887* (2.306)
CBR REL*PostCOVID	0.2756 (1.914)	4.815* (2.709)	1.185 (2.684)	2.442 (4.202)
P2G*PostCOVID	-1.968 (1.533)	-1.408 (1.519)	-0.8487 (1.582)	-0.8089 (1.591)
Obs.	4,939,787	4,939,787	4,939,787	4,939,787
Firm*time FE	YES	YES	YES	YES
Bank country*Quarter FE	NO	YES	NO	YES
Bank-firm FE	NO	NO	YES	YES

Frontload Pillar 2 Req. composition change:
3.4 - 4.2% 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.

Robustness