# Creditable Capital:
# Macroprudential regulation and bank lending in stress

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A previous version of this paper was titled "Useful, usable and used? Buffer usability during the Covid-19 crisis"

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# Motivation

## Macroprudential policy (MPP) has 2 primary objectives

I Enhance resilience of the financial system. Evidence: Success post-GFC

Benbouzid et al., 2022; Meuleman & Vander Vennet, 2020; Altunbas et al., 2018; Claessens et al., 2013

II Smooth the credit cycle

   i Contractionary: soften credit-led *booms*. Evidence: ↑ MPP → ↓ lending

     Acharya et al., 2022; Galan, 2020; Jimenez et al., 2017; Dell'Ariccia et al., 2016

   ii Expansionary: dampen credit *crunch* dynamics. Evidence: …
     relatively scarce – few episodes, particularly post-Basel III

**Covid-19**: exogenous shock to FS with ↑ uncertainty and ↑ risk of loan losses. First test of expansionary post-GFC MPP.

**UK**: Tests of two policy strategies:

1. Basel III 'usable' regulatory capital buffers   ▸ Usable buffers
2. Explicit 'release' of capital, by cutting the Countercyclical Capital Buffer (CCyB)
  ▸ CCyB

# This paper

▶ Did these expansionary macroprudential policies help to mitigate pro-cyclical **lending** and **risk-taking** behaviour during Covid-19?

Approach

We disentangle the effects of each policy and analyse changes in UK banks' capital and lending profiles.

1. **'Usable' buffers:** pre-pandemic capital-constraints, based on headroom over capital buffers, calculated using reg. data on capital reqts
2. **'Released' capital:** bank-specific relief from domestic CCyB release, calculated using regulatory data on banks' exposures to UK credit risk-weighted assets

# What we find

**The 'usability' of buffers did not alleviate capital constraints during Covid-19**

- ▶ All UK banks **increased capital ratios** but the *relative* increase was **larger for more capital-constrained** banks
- ▶ Capital-constrained banks maintained **tighter lending terms** and exhibited **higher risk aversion** relative to their peers

**But the explicit 'release' of capital did; mitigating pro-cyclical credit dynamics**

- ▶ Banks that received greater capital relief from the CCyB cut maintained **more stable capital ratios**, **looser lending terms**, and **lower risk aversion** relative to their peers

# Related literature

## General: Effectiveness of macroprudential policy

▶ Different tools: borrower-based (LTV, DTI, LTI) vs lender-based (liquidity, leverage, **capital reqts**) (Altunbas et al., 2017; Araujo et al., 2020; Elliot, 2013; Galan, 2020).

▶ Different objectives: financial system resilience (Acharya et al.,'12; Admati et al.,'14; Benbouzid,'22; Dell'Arricia et al.,'16) and **smoothing credit cycle**.

## Narrower: Effectiveness of capital requirements on credit cycle smoothing

1. **Pre-Basel III**: tightening of capital reqts restricts credit supply and can soften procyclical credit dynamics (Fraisse et al.,'20; Gropp et al.,'19; Behn et al.,'15; Berrospide & Edge,'19; Jimenez et al.,'17). Evidence on loosening more limited, with some suggestions of asymmetry (Cantu et al.,'20; Cerutti et al.,'17; Claessens et al.,'13; Valencia et al.,'20).

2. **Post-Basel III, Pre-Covid (Tightening):** increase in capital reqts restricts lending in the short-run (Favara et al.,'21).

3. **Post-Basel III, Post-Covid (Loosening):** first test in face of exogenous shock.
   ▶ **Usability**: to SME borrowers in the US (Berrospide et al.,'21); to non-financial corporates in EU, with real economic impacts (Couaillier et al.,'22; BCBS,'21).
   ▶ **Releasability**: capital releases supported lending during Covid-19 (Couaillier et al.,'22 & Avezum et al.,'21 for EU; BCBS,'21). Calls for further analysis (Bergant & Forbes,'21; Drehmann et al.,'20; Restoy'21; Lewrick et al.,'20; Galati & Moessner,'18).

# Contributions

1. Provide evidence on the effectiveness of *loosening* macroprudential tools during periods of stress, in first test of Basel III capital buffers regulation

2. Focusing on the UK allows us to
   - ▶ Use regulatory data to precisely measure banks' surpluses above regulatory buffers
   - ▶ Use an instance of a cut to a positive CCyB rate to estimate its real economy impact

3. Granular data on universe of UK mortgages allows us to *causally* identify credit supply effects
   - ▶ Key segment of HH credit provision *not* directly impacted by govt. guarantees
   - ▶ Loan-level data controls for changes in loan demand or borrower risk

Did 'usable' buffers alleviate capital-constraints?

# Approach: Grouping banks based on pre-Covid capital constraints

**Approach**   **Pre-pandemic headroom over Basel III regulatory buffers** as indicator of banks' capital constraints

**Issue**   Different ways to calculate banks' voluntary capital surpluses

**Solution**   Calculate **effective CET1 surpluses**
- ▶ Takes into account CET1 used to meet other requirements on lower qualities of capital, leverage, and MREL

**Data**   Quarterly confidential regulatory data on 159 UK banks

**Grouping**   Average 2019 CET1 surplus of $\leq 2\%$: **more capital-constrained** bank
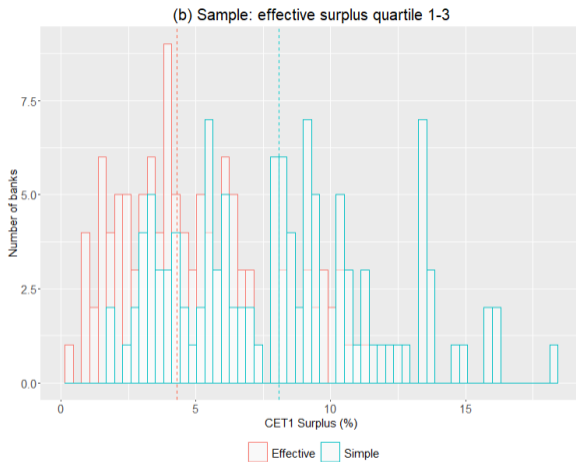$> 2\% \leq$ top quartile in 2019: **more capital-constrained** bank

**Robustness**   Use different capital-constrained definitions (e.g. bottom quartile) or continuous *log* surplus

▸ Effective surplus calculation details    ▸ Evolution of major UK banks' capital ratios    ▸ Details on the UK capital framework
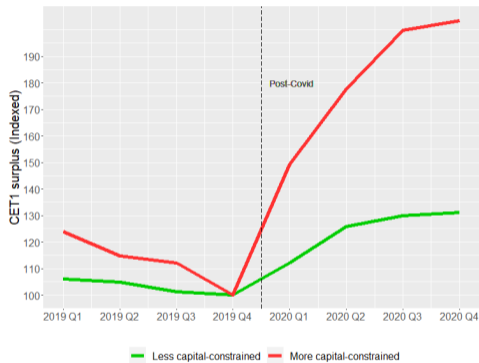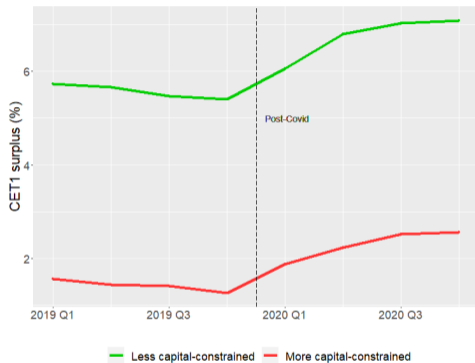
# Effective surplus distribution



(b) Sample: effective surplus quartile 1-3

- ▶ Simple surpluses are an *overestimate* of a bank's *true* voluntary surpluses
- ▶ Effective surplus distribution lies to the left of the simple surplus distribution, with a lower median (4.3% vs. 8.1%)

# CET1 surpluses: Trends in more vs. less cap-constrained banks

Source: BSM/Regulatory returns



▶ All banks increased capital surpluses by c.1.5pps over 2020; but this represented a relative increase of 100% for **more capital-constrained** banks & only 30% for **less capital-constrained** banks

# 'Usable' buffers: Empirical strategy on capital behaviour

For bank $b$ at time $t$

$$Y_{b,t} = \beta_1 \text{Cap-Constrained}_b \times \text{Post-Covid}_t + \delta X_{b,t-1} + f_b + f_t + \epsilon_{b,t} \qquad (1)$$

- $Y_{b,t}$: capital surplus, log capital surplus
- Cap-Constrained$_b$: Dummy $= 1$ if bank is in **cap-constrained** category in 2019; 0 otherwise
- Post-Covid$_t$: Dummy $= 1$ if time period is between Q1 2020 and Q4 2020; 0 otherwise
- $X_{b,t-1}$: balance sheet variables that are likely to differ across the two comparison groups, eg. business models, profitability, liquidity resilience, provisioning
- $f_b$, $f_t$: Bank and quarterly time fixed effects

**Evidence of capital constraints binding**: $\beta_1 > 0$

# 'Usable' buffers: Results on capital behaviour

|  | CET1 surplus (%) | CET1 surplus (Log) |
|---|---|---|
|  | (1) | (2) |
| Post-Covid x **Cap-Constrained** | −0.14 | 0.43*** |
|  | (0.41) | (0.11) |
| No. of obs | 890 | 886 |
| $R^2$ (wthin) | 0.10 | 0.08 |
| Bank controls (lagged) | Yes | Yes |
| Bank FE | Yes | Yes |
| Time FE | Yes | Yes |

*Notes:* ***/**/* indicate significance at the 1%, 5%, and 10% level respectively. Robust standard errors clustered at bank level are in brackets.

▶ **More capital-constrained** banks grew their surpluses by approximately 43% more than peers during the pandemic (column 2) ▸ PTH
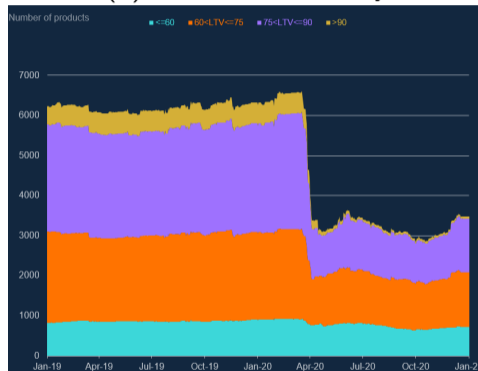
# Mortgage pricing and availability

Source: Moneyfacts

### (a) Pricing
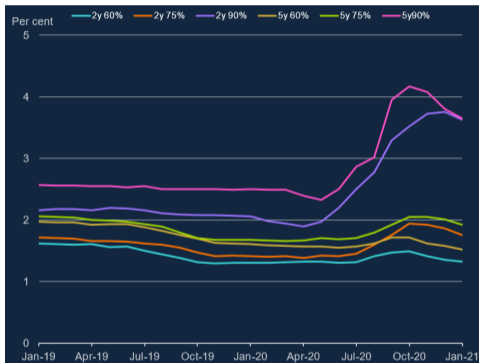


### (b) Product availability



▶ There was a general tightening of conditions in the mortgage market, especially in the *riskier* segments

## 'Usable' buffers: Empirical strategy on mortgage lending

For loan to individual $i$ in postcode $l$ issued by bank $b$ at time $t$:

$$Y_{i,l,b,t} = \gamma_1 \text{Cap-Constrained}_b \times \text{Post-Covid}_t \qquad (2)$$
$$+ \delta_1 \text{Post-Covid}_t \times X_{i,l,b,t} + \delta_2 X_{b,t-1} + f_{l,t} + f_{l,b} + \epsilon_{i,l,b,t}$$

- $Y_{i,l,b,t}$: log interest rate (%), log loan value (GBP)
- $X_{i,t-1}$: lagged bank controls
- $X_{i,l,b,t}$: loan and borrower risk characteristics
- $f_{l,t}$: postcode-time FE accounts for time-varying loan demand conditions
- $f_{l,b}$: postcode-bank FE accounts for differences in bank presence across local areas

**Evidence of pro-cyclical dynamics**: $\gamma_1 > 0$ for interest rates, $\gamma_1 < 0$ for loan values

# 'Usable' buffers: Results on mortgage lending

|  | Interest rate (Log) | Loan value (Log) |
|---|---|---|
|  | (1) | (2) |
| Post-Covid x **Cap-Constrained** | 0.037*** | −0.022*** |
|  | (0.009) | (0.004) |
| No. of obs. | 1602650 | 1602650 |
| $R^2$ (within) | 0.207 | 0.469 |
| Bank controls (lagged) | Yes | Yes |
| Borrower risk controls | Yes | Yes |
| Bank x Postcode FE | Yes | Yes |
| Postcode x Time FE | Yes | Yes |

*Notes:*   \*\*\*/\*\*/\* indicate significance at the 1%, 5%, and 10% level respectively. Robust standard errors clustered at bank and postcode are in brackets

▶ **More capital-constrained** banks maintained **higher interest rates** (by 3.7%) and **lower loan values** (by 2.2%) after the onset of the pandemic compared to peers ▸ PTH - surplus

Impact of explicitly 'releasing' capital

# Approach: Grouping banks based on exposure to CCyB cut

**Issue** **CCyB cut same for all banks**, so difficulty in measuring bank-specific benefits to the cut

**Approach** Use cross-sectional variation in **pre-pandemic bank-specific CCyB pass-through rates**

**Grouping** Define **High Capital-Relief** banks as those with more than 50% CCyB pass-through rate in 2019, and **Low Capital-Relief** banks as those with less

**Reason** **High Capital-Relief** banks are more exposed to UK credit markets & so affected to a greater extent by changes in the UK CCyB

**Robustness** Use continuous version

# CET1 surpluses: Trends in high vs. low Capital-Relief banks

Source: BSM/Regulatory returns
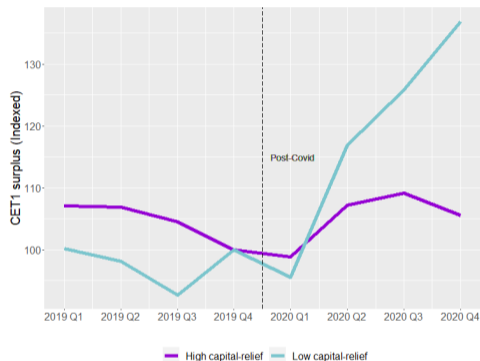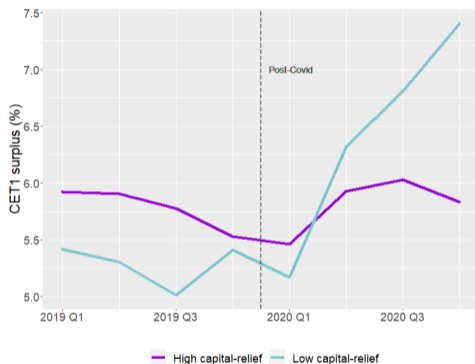


- ▶ **High Capital-Relief** banks ↑ surpluses by 0.6pp compared to a 2pp ↑ by **Low Capital-Relief** banks

- ▶ This was a relative ↑ of 5% for **High Capital-Relief** banks & 37% for **Low Capital-Relief** banks

# Capital 'release': Results on capital behaviour

|  | CET1 surplus (%) | CET1 surplus (Log) |
|---|---|---|
|  | (1) | (2) |
| Post-Covid x **High Capital-Relief** | $-1.30^{**}$ | $-0.13$ |
|  | (0.63) | (0.09) |
| No. of obs | 891 | 887 |
| $R^2$ (within) | 0.12 | 0.04 |
| Bank controls (lagged) | Yes | Yes |
| Bank FE | Yes | Yes |
| Time FE | Yes | Yes |

*Notes:* ***/**/* indicate significance at the 1%, 5%, and 10% level respectively. Robust standard errors clustered at bank level are in brackets.

▶ **High Capital-Relief** banks maintained more stable capital surpluses (around 1.3 pp lower than their peers after the onset of Covid-19) <span>▸ PTH</span>

# Capital 'release': Results on mortgage lending

|  | Interest rate (Log) | Loan value (Log) |
|---|---|---|
|  | (1) | (2) |
| Post-Covid x **High Capital-Relief** | $-0.037^{***}$ | $0.023^{***}$ |
|  | (0.013) | (0.005) |
| No. of obs. | 1602650 | 1602650 |
| $R^2$ (within) | 0.207 | 0.469 |
| Bank controls (lagged) | Yes | Yes |
| Borrower risk controls | Yes | Yes |
| Bank x Postcode FE | Yes | Yes |
| Postcode x Time FE | Yes | Yes |

*Notes:* ***/**/* indicate significance at the 1%, 5%, and 10% level respectively. Robust standard errors clustered at bank and postcode are in brackets

▶ **High Capital-Relief** banks maintained **lower interest rates** (by 3.7%) and **higher loan values** (by 2.3%) after the onset of the pandemic compared to peers ▸ PTH - CCyB

▶ Having **High Capital-Relief** **partially offsets the impact of buffer usability frictions** on deleveraging

Impacts on risk-taking behaviour

# Empirical strategy: Risk-taking analysis

For loan to individual $i$ in postcode $l$ issued by bank $b$ at time $t$:

$$Y_{i,l,b,t} = \phi_1 \text{Cap-Constrained}_b \times \text{Post-Covid}_t \times \textbf{Risky loan}_{l,t} \qquad (3)$$
$$+ \phi_2 \text{High Capital-Relief}_b \times \text{Post-Covid}_t \times \textbf{Risky loan}_{l,t}$$
$$+ \delta_1 \text{Post-Covid}_t \times X_{i,l,b,t} + \delta_2 X_{b,t-1} + f_{l,t} + f_{l,b} + f_{b,t} + \epsilon_{i,l,b,t}$$

▶ Two types of **risky loan** definition: **Covid-specific** and **Conventional**

▶ Same controls as before but now also with *bank-time* fixed effects, $f_{b,t}$

▶ **Evidence buffers are not 'usable'**: $\phi_1 > 0$ for interest rates, $\phi_1 < 0$ for loan values

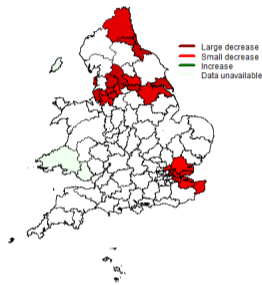▶ **Evidence for value of capital 'release'**: $\phi_2 < 0$ for interest rates, $\phi_2 > 0$ for loan values

# I. Risk-taking: Exploiting Covid specific shocks to borrower risk

Source: Covid-19 case rate dashboard https://coronavirus.data.gov.uk/
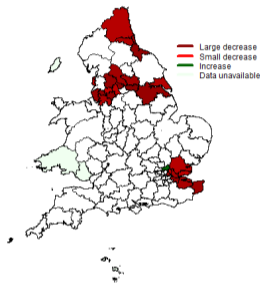


- **High case rate**$_{l,t}$: local areas above the $75th$ percentile of the cross-sectional distribution of case rates (per 100,000 people)
- Case rates correlated with govt. pandemic policies and adverse macro outcomes
  (Temesvary and Wei, 2021)
- Cash flow constraints + likelihood of negative house equity = Higher default probabilities
  (Ganong and Noel, 2022; Goldberg and Capone, 1998; Riddiough, 1991; Foster and Van Order 1984)

# I. Risk-taking: Exploiting Covid specific shocks to borrower risk

High case rate = 1 if postcode > $75^{th}$ percentile of 2020 average

|  | Interest rate (Log) | Loan value (Log) |
|---|---|---|
|  | (1) | (2) |
| Post-Covid x **Cap-Constrained** x **High case rate** | 0.002 | −0.014*** |
|  | (0.002) | (0.003) |
| Post-Covid x **High Capital-Relief** x **High case rate** | −0.015*** | 0.006* |
|  | (0.002) | (0.003) |
| No. of obs. | 1368512 | 1368512 |
| $R^2$ (within) | 0.161 | 0.462 |
| Borrower risk controls | Yes | Yes |
| Bank×postcode | Yes | Yes |
| Bank×Time | Yes | Yes |
| Postcode×Time FE | Yes | Yes |

*Notes:* \*\*\*/\*\*/\* indicate significance at the 1%, 5%, and 10% level respectively. Robust standard errors clustered at bank and postcode are in brackets

▶ **More Capital-Constrained** banks maintained lower loan values in areas that were particularly struck by Covid, but interest rates did not vary.

▶ **High Capital-Relief** continued to support lending in these areas. ▸ PTH - interest rate

# II. Risk-taking: Exploiting conventional measures of borrower risk

**Risky loan** is LTI $> 4.5$ & LTV$> 90$ vs LTI $< 4.5$ & LTV$< 90$

1. First, based on "high" LTIs and LTVs because they:
   - ▶ Attract **riskier borrowers**, have higher **default probabilities** & expected **losses**, and should be considered in conjunction
     (Corbae and Quintin, 2015; Benetton et al., 2018; Lazarov and Hinterschweiger, 2018)
   - ▶ Are **costlier in capital** terms and subject to **regulatory limits**
     (eg. Campbell and Cocco, 2015; PRA, 2021; Peydró et al., 2020)
   - ▶ Are sensitive to material **cash-flow shocks** (eg. Covid-19)

2. Second, zooming in on **first-time buyers** as a particularly risky category of borrowers
   - ▶ Higher default risk
     Kelly, 2015

# II. Risk-taking: Exploiting conventional measures of borrower risk

**Risky loan** is LTI > 4.5 & LTV> 90 vs LTI < 4.5 & LTV< 90

|  | Interest rate (Log) | | Loan value (Log) | |
|  | (1) | (2) | (3) | (4) |
|---|---|---|---|---|
| Post-Covid x **Cap-Constrained** x **High LTV,LTI** | 0.071** | 0.117*** | −0.020 | −0.062*** |
|  | (0.030) | (0.021) | (0.021) | (0.013) |
| Post-Covid x **High Capital-Relief** x **High LTV,LTI** | −0.087*** | −0.092*** | 0.086*** | 0.051*** |
|  | (0.029) | (0.014) | (0.018) | (0.012) |
| No. of observations | 1272317 | 319075 | 1272317 | 319075 |
| $R^2$ (within) | 0.121 | 0.083 | 0.552 | 0.672 |
| Borrower type | All | First-time buyers | All | First-time buyers |
| Borrower risk controls | Yes | Yes | Yes | Yes |
| Bank×Postcode FE | Yes | Yes | Yes | Yes |
| Bank×Time | Yes | Yes | Yes | Yes |
| Postcode×Time FE | Yes | Yes | Yes | Yes |

Notes:                                              ***/**/* indicate significance at the 1%, 5%, and 10% level respectively. Robust standard errors clustered at bank and postcode are reported in brackets

▶ **More Capital-Constrained** banks tightened terms on riskier mortgage lending to a greater extent than peers  ▸ PTH: 1&2  ▸ PTH: 3&4

▶ In contrast **High Capital-Relief** banks maintained looser lending terms  ▸ PTH: 1&2  ▸ PTH: 3&4

Conclusions and policy implications

# Conclusions

### The 'usability' of buffers did **not** alleviate capital constraints during Covid-19

▶ All UK banks **increased capital ratios** but the *relative* increase was **larger for more capital-constrained** banks

▶ Capital-constrained banks maintained **tighter lending terms** and exhibited **higher risk aversion** relative to their peers

### But the explicit 'release' of capital **did**; mitigating pro-cyclical credit dynamics

▶ Banks that received greater capital relief from the CCyB cut maintained **more stable capital ratios**, **looser lending terms**, and **lower risk aversion** relative to their peers

Thank you.
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