The effect of macroprudential policies on credit developments in Europe 1995-2017

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Macroprudential policy: from research to implementation

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Motivation: General

- Macroprudential authorities have at their disposal a **diversity of instruments**, that incl. a standarized set of tools under CRDIV, but also an even richer set of tools that remain within the national remit (e.g. borrower-based standards)

- There is (still) relatively little empirical evidence supporting the selection of these instruments to address specific systemic risks

- We make a step in this direction by looking at a **broad set of measures** and **comparing** their effectiveness in **controlling credit growth**

- We also assess their **interactions** with **monetary policy** in order to provide an additional guidance to macroprudential policy-makers on the optimal use of instruments in the monetary policy cycle
Motivation: Narrative approach

- **Diversity** of instruments and their **limited comparability in time and across borders** is also one of the key challenges in the empirical studies on the effectiveness of macroprudential policies.

- This makes the use of **narrative information** a viable option: the identification is achieved via knowledge of the **type of a measure and the timing of its application**.

- MaPPED (Budnik and Kleibl, 2018) provides a detailed account of policies **with a macroprudential character** for over 20 years and for 38 countries.

- It also separates **policy actions** and **policy instruments** allowing the **construction of different policy indicators**.
**Motivation:** Studies based on a larger sample of countries

- Earlier empirical findings on the effect of macroprudential instruments on credit growth…

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Capital based</td>
<td>Countercyclical effect of <strong>CCyB-type buffers</strong>, negative effect of <strong>profit</strong></td>
<td>Negative effect of <strong>dynamic</strong></td>
<td>Negative effect of <strong>capital</strong></td>
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<td></td>
<td><strong>distribution restrictions</strong> and <strong>dynamic provisioning</strong></td>
<td><strong>provisioning</strong></td>
<td><strong>requirements</strong>, and other</td>
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<td></td>
<td></td>
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<td>housing policies (incl. RW)</td>
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<td>Borrower-based</td>
<td>Counter-cyclical effect of <strong>LTV and DTI caps</strong></td>
<td>Negative effect of <strong>LTV, DTI caps</strong></td>
<td>Negative effect of <strong>LTV</strong></td>
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<tr>
<td>Reserve requirements and other</td>
<td>Counter-cyclical effect of <strong>reserve requirements</strong></td>
<td>Negative effect of <strong>reserve requirements</strong>, limits on FX loans, concentration limits</td>
<td>Positive effect of <strong>reserve</strong></td>
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<td></td>
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<td></td>
<td><strong>requirements</strong></td>
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<tr>
<td>Sample</td>
<td>49 countries incl. 20 EU Member States</td>
<td>64 countries incl. 27 EU Member States</td>
<td>57 countries incl. 28 EU Member States</td>
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<tr>
<td>General takeaways</td>
<td><strong>All above instruments not significant for developing countries</strong> (incl. borrower</td>
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<td>based instruments)**</td>
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• Macroprudential policies can have a significant impact on the evolution of credit to non-financial sector also in **developed (EU) economies**

• **Capital based-measures** supress the growth rate (or procyclicality) of credit to NFCs, and the transmission of monetary policy. Overwhelming evidence on a positive and complementary to monetary policy impact of profit distribution restrictions.

• **Borrower-based measures**, such as LTV or DSTI limits, affect the growth rate of credit persistently and **positively**. There are however likely to have a significant countercyclical impact on credit due to their positive interactions with monetary policy. Sectoral exposure exhibit a reverse pattern.

• **Caps on** longer- and shorter-term maturity mismatches have (if anything) a **positive** impact on the credit growth and negatively affect the transmission of monetary policy. Strongest evidence of the negative and counterbalancing impact of FX limits.
Data: Overview

- **Sample period**: 1995Q1-2017Q4
- **Countries**: all 28 EU
- **Macroeconomic variables**: LHS real bank credit to the NFPS (GDP deflator adjusted, BIS & national sources), to households and enterprises, RHS GDP (SDW), real monetary policy interest rate (BIS & national sources)
- **Macroprudential (and other) policies**:
  - **Borrower-based**: (i) LTV, (ii) DSTI/DTI/LTI, (iii) Other income based eligibility requirements, (iv) Other lending standards
  - **Liquidity requirements**: (i) Liabilities based reserve requirements, (ii) Asset based reserve requirements, (iii) FX exposure limits, (iv) Short-term liquidity requirements, (v) Long-term liquidity requirements
  - **Other**: (i) Exposure limits to sectors, (ii) Large exposure/concentration limits, (iii) Taxes
Methodology: Cross-country panel

\[ \Delta cr_{i,t} = \alpha_i + \alpha^c_i \Delta cr_{i,t-1} + \beta^y_i \Delta y_{i,t} + \beta^r_i r_{i,t} + \]

\[ + \theta^0 I_{i,t} + \theta^1 I_{i,t} \Delta y_{i,t} + \theta^2 I_{i,t} r_{i,t} + \gamma_i X_{i,t} + \epsilon_{i,t} \]

- \( \Delta cr_{i,t} \) - change in real credit (q-o-q) at time \( t \) in country \( i \)
- \( \Delta y_{i,t} \) - change in GDP (q-o-q) at time \( t \) in country \( i \)
- \( r_{i,t} \) - monetary policy interest rate at time \( t \) in country \( i \)
- \( I_{i,t} \) - policy index variable at time \( t \) in country \( i \)
- \( X_{i,t} \) - other control variables at time \( t \) in country \( i \)
- \( \epsilon_{i,t} \) - residual
- \( \alpha_i \) - country (fixed) effects
- \( \alpha^c, \beta^y, \beta^r, \theta^0, \theta^1, \gamma \) - regression coefficients
Cross-country panel: Problem areas

1. Measurement of policy $I_{i,t}$
2. Endogeneity of RHS variables, $\Delta y_{i,t}$, $r_{i,t}$, $I_{i,t}$
3. No strict exogeneity of $\Delta cr_{i,t}$ in a panel setup
4. Time-effects and cross-sectional correlation of residuals (Pesaran, 2006):

$$
\Delta cr_{i,t} = \alpha_i + \alpha_i^c \Delta cr_{i,t-1} + \beta_i^c \Delta y_{i,t} + \beta_i^r r_{i,t} + \theta^0 I_{i,t} + \theta^1 I_{i,t} \Delta y_{i,t} + \theta^2 I_{i,t} r_{i,t} + \gamma_i X_{i,t} + \varepsilon_{i,t}
$$

$$
\varepsilon_{i,t} = \delta_t + \sum_{p=0}^{P} \sum_{k=1}^{K} \delta_{p,k,i} F_{k,t-p} + \nu_{i,t}
$$

- $\delta_t$ - time-effects
- $\delta_{p,k,i}$ - country-specific heterogenous slopes
- $F_{k,t-p}$ - $K$ common factors ($p$-th lag)
- $\nu_{i,t}$ - i.i.d. error
Measuring policy intensity: Various options to construct policy indices

- **1996Q1**: introduction of an LTV limit on mortgage loans of 90% [level] for second-home buyers [scope] [activation]

- 1998Q2: an introduction of a stricter LTV limit of 80% for FX mortgage loans [currency] for first-and second-home buyers

- 1999Q1: tightening of the LTV limit on FX loans to 70% and extending the LTV limit on domestic currency loans to second-home buyers

- 2003Q1: loosening of the LTV limit on mortgage loans in domestic and FX currency – 10% of loans in bank portfolio can be exempted from the limit [exemptions]

- 2008Q2: LTV limit on FX currency loans removed

- **2014Q4**: LTV limit on mortgage loans in domestic currency removed [deactivation]
• (Most) **Systematic approach** to testing the impact of policy instruments

• **Policy measurement**: three types of indices, a *dummy*, a *number of instruments in place*, a *cumulated index of net tightenings*

• **Estimator**: the common correlated effects (partially) pooled (CCEP) by Pesaran (2006) and Chudik & Pesaran (2015)

• **Endogeneity treatment**: IV or lagged RHS variables specifications

• **Control variables**: ‘a sum’ of other policies, including the interactions of the aggregated policy index with GDP growth rate and interest rate
### Results: Example (capital-based policies)

<table>
<thead>
<tr>
<th>Outcome variable</th>
<th>Real credit to private sector (Q-d-Q)</th>
<th>Real credit to private sector (D-n)</th>
<th>Real credit to private sector (S-Cumulative)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>d (0.1)</td>
<td>D (0-n)</td>
<td>S (Cumulative)</td>
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<tr>
<td><strong>MINCAP</strong></td>
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<tr>
<td>( I_{MINCAP} )</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>( I_{MINCAP} \times \Delta y )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>( I_{MINCAP} \times r )</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CAPBUF</strong></td>
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<td></td>
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<tr>
<td>( I_{CAPBUF} )</td>
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<tr>
<td>( I_{CAPBUF} \times \Delta y )</td>
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<td>( I_{CAPBUF} \times r )</td>
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<tr>
<td><strong>PROFIT</strong></td>
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<td>( I_{PROFIT} )</td>
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<td>( I_{PROFIT} \times \Delta y )</td>
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<tr>
<td>( I_{PROFIT} \times r )</td>
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</tbody>
</table>

- As a rule the **measurement of policies matters**, many results sensitive to the change in policy index.
- A change in the estimator matters less and affects mostly significance levels (not signs).
- (Not seen) controlling for other policies, and especially their interactions with GDP and interest rates, significantly affects the results.
Results: Persistent or cycle-dependent impact on credit growth

- Significant and positive impact on credit growth of profit distribution restrictions, DTI caps (weaker on remaining lending standards), caps on FX mismatch (weaker on long- and short-term liquidity limits)

- Significant and negative impact on credit growth of sectoral exposure limits

- Little evidence on counter- or procyclical impact of policy instruments

Legend: +/- a positive/negative persistent impact of an instrument on credit growth, PC/CC pro-/countercyclical impact, () low statistical significance
Results: **Interactions with monetary policy**

- **Amplifying (complementary)** impact on the transmission of monetary policy of profit distribution restrictions, LTV, DTI, income related lending standards

- **Dampening (counterbalancing)** impact on the transmission of monetary policy of general provisioning rules, sectoral exposure limits, (weaker evidence on other capital-based and short-term liquidity caps)

- This affects the assessment of the effect of macroprudential instrument **on the (credit) cycle**…

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Total credit</th>
<th>NFC credit</th>
<th>Household credit</th>
</tr>
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<tbody>
<tr>
<td>MINCAP</td>
<td></td>
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<tr>
<td>CAPBUF</td>
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<td></td>
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<tr>
<td>PROFIT</td>
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</tr>
<tr>
<td>RW</td>
<td>(+)</td>
<td>(+)</td>
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<tr>
<td>SPECPROV</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>GENPROV</td>
<td>+</td>
<td>+</td>
<td>(+)</td>
</tr>
<tr>
<td>LTV</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>DTI</td>
<td>-</td>
<td>(-)</td>
<td>-</td>
</tr>
<tr>
<td>INCOME</td>
<td>-</td>
<td>(-)</td>
<td>-</td>
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<tr>
<td>LENDSTD</td>
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<tr>
<td>ABRR</td>
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<td>+</td>
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<tr>
<td>RR</td>
<td></td>
<td></td>
<td>(+)</td>
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<tr>
<td>LIQLT</td>
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<td></td>
<td>(-)</td>
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<tr>
<td>LIQST</td>
<td>+</td>
<td>(+)</td>
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<tr>
<td>FXLIM</td>
<td>+</td>
<td></td>
<td>(+)</td>
</tr>
<tr>
<td>LAREXP</td>
<td>(-)</td>
<td>(+)</td>
<td>(-)</td>
</tr>
<tr>
<td>SECEXP</td>
<td>+</td>
<td>+</td>
<td>(-)</td>
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<tr>
<td>TAX</td>
<td>(+)</td>
<td></td>
<td>(+)</td>
</tr>
</tbody>
</table>

**Legend:** +/- a moderating/amplifying effect of an instrument on monetary policy transmission, () low statistical significance
Results: Robustness checks

• Change in the measurement of monetary policy stance: the nominal instead of the real monetary policy interest rates

• Controlling the regressions for a banking crisis dummy (as in Cerutti at al., 2015)

• Dropping one country at a time
Conclusions: Take aways

• Panel regressions and narrative evidence provide a useful framework for the ‘selection’ of effective policy measures (here: the effectiveness measured in terms of the impact on credit growth)

• A share of macroprudential instruments appears to have a lasting (across the cycle) positive impact on credit growth (profit distribution restrictions, borrower-based standards, caps on maturity and FX mismatches)

• A share of instruments affects mostly sectoral credit growth leading to the redirection rather than the reduction of the overall credit e.g. capital buffers on NFC credit, and reserve requirements on household credit.
The transmission of many macroprudential policies (capital-, borrower- and liquidity-based alike) to a substantial degree hangs on their interactions with monetary policy.

With countercyclical monetary policy, borrower-based policies, or profit distribution restrictions (and specific provisioning standards) will act countercyclically, whereas capital buffers, general provisioning, RW, liquidity standards and sectoral exposure limits ‘procyclically’

Countercyclical macroprudential policy should take into account monetary policy stance. E.g. when monetary policy is loose, LTV, DTT bite less whereas (other borrower standards) sectoral exposure limits (alike) more.
Conclusions: Caveats

- The outcomes are silent about the appropriate calibration of policy measures (weak measurement of policy intensity)
- No account is taken for announcement effects
- Not all measures used in the analysis targeted credit growth (pros – exogeneity, cons – the assessment of effectiveness is not fully valid)
- For some instruments e.g. sectoral risk weights or capital buffers, an additional analysis on a higher degree of granularity could be justified
- Endogeneity concerns prevail – these can be addressed looking forward by employing bank-level (rather than country-level) data as in Claessens et al. (2014)
Literature