The Use and Effectiveness of Macroprudential Policies: New Evidence

By Eugenio Cerutti (IMF), Stijn Claessens (BIS) and Luc Laeven (ECB)

New Challenges in Central Banking: Monetary Policy Governance and Macroprudential Issues

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Introduction/Overview

• With the recent crisis macro-prudential policies (MAPs) have received greater attention

• But knowledge on MAPs remains still limited
  – Limited experiences (many MAPs introduced after GFC).
  – Incomplete data on the use of prudential tools
Structure of presentation

- Quick Review
  - Why are MAPs needed?
  - How effective have MAPs been?
    - Focus on reducing procyclicality risks
- 2017 JFS Paper (large 119 countries sample)
  - Which MAPs have countries used?
  - What effects on credit and house prices?
- Some results from Cerutti, Correa, Fiorentino & Segalla (IBRN project/dataset)
  - Intensity in usage across selected MAPs
- Conclusions
Why are MAPs Needed?

- Macroprudential Policy
- Microprudential Policy
- Macroeconomic Policies (monetary/fiscal/external)
- Price Stability
- Economic Activity
- Financial Stability
- Systemic Risk
- Idiosyncratic Risk
How Effective Have MAPs Been? Cross-Country Analyses

• Advantages/disadvantages
  – Can consider overall effects and some country differences
  – But identification of channels, endogeneity of MAP harder

• Examples (up to 57 countries)
  – Lim et al. (2011): LTV and DTI caps, credit growth, reserve requirements, dynamic provisioning mitigate procyclicality
  – IMF (2013): capital, RRs lower credit; LTV, capital reduce house prices; RR reduce portfolio inflows in floating EMs; effects of MAPs on GDP growth, sectoral allocations
  – Akinci and Olmstead-Rumsey (2015): Housing related MAPs (e.g., LTV) curb bank credit, housing credit, and house price inflation.
How Effective Have MAPs Been?
Country Case Studies (More Micro)

• Advantages/disadvantages
  – Better identification, control for specifics (e.g., banks’ cap)
  – But no ability to investigate role of country circumstances

• Examples
  – Jiménez et al (2015), Spain: dynamic provisioning tame credit supply and help smooth downturn, uphold credit
  – Aiyar, Calomiris and Wieladek (2016), UK: higher capital adequacy requirements can help mitigate lending booms
  – Wong, Fong, Li and Choi (2011), Hong Kong: targeted at real estate borrowing reduce real estate cycles
Overall Evidence: Still Early Days

• Evidence on effectiveness of MAPs
  • Some evidence of temporary cooling effect and building buffers for bad times. But not always sustained, seldom sufficient for bust
  • Rarely explicitly at externalities/market failures

• Don’t know side effects of MAPs
  – Financial, economic, political costs and risks

• Partly due to data and other limitations
  – Smaller samples. Limited time-periods. Sometimes only certain financial segments
How does our paper fit in the Literature?

External Validity:
Cross-country studies

<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>119</td>
<td>2000-13</td>
<td>12</td>
</tr>
</tbody>
</table>

Documents MAPs usage (whether it is in use or not) and analyzes their effectiveness

Internal Validity:
Identification

<table>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spain</td>
<td>1998Q4-2010Q4</td>
<td>DP</td>
</tr>
</tbody>
</table>

Identification: micro-level demand controls (e.g., firm*time FE's)
Cerutti, Claessens and Laeven (2015)

- Country coverage: 119 (31 AEs, 64 EMs, and 24 LICs)
- Time coverage: 2000-2013 (annual data)
- Usage = binary measure (whether in place or not)
- 12 MAPs out of the 18 surveyed in GMPI (IMF Survey):
  - Loan-to-Value Cap (LTV)
  - Debt-to-Income Ratio (DTI)
  - Time-Varying/Dynamic Loan-Loss Provisioning (DP)
  - Counter-Cyclical Requirements (CTC)
  - Leverage Ratio (LEV)
  - Capital Surcharges on SIFIs (SIFI)
  - Limits on Interbank Exposures (INTER)
  - Concentration Limits (CONC)
  - Limits on Foreign Lending (FC)
  - Reserve Requirements (RR)
  - Credit Growth Caps (CG)
  - Levy/Tax on Financial institutions (TAX)
More MAPs Use Over Time
ACs Less Than EMs & DCs

Figure 1. The Macroprudential Policy Index, by Income Level
ACs Use More Borrower-based
EMs Use Broad Set of MAPs

Advanced Countries

Emerging Markets

LTV_CAP  DTI  DP  CTC  LEV  SIFI
INTER  CONC  FC  RR_REV  CG  TAX
Regression setup

- Panel investigation of effects of MAPs. Model:
  \[ Y_{i,t} = \alpha Y_{i,t-1} + \beta \times \text{Macropru}_{i,t-1} + \theta \times X_{i,t-1} + \mu_i + \varepsilon_{i,t} \]

- Lagged dependent variable
- Macropru = MPI (overall index); Individual; Groups: Borrower based; Financial institutions based
- Country-level: time-varying controls (lagged GDP growth+ crisis+ interest rate), fixed effects
- Arellano Bond GMM panel (to limit endogeneity, to take advantage of our large N & small T sample)
### Table 4. Macroprudential Policies and Credit Growth: Main Regression Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>All (1) - GMM</th>
<th>Advanced (2) - OLS</th>
<th>Emerging (3) - GMM</th>
<th>Developing (4) - GMM</th>
<th>Open (5) - GMM</th>
<th>Closed (6) - GMM</th>
<th>(7) - GMM</th>
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</thead>
<tbody>
<tr>
<td>MPI</td>
<td>-7.637***</td>
<td>-2.112***</td>
<td>-1.376*</td>
<td>-5.327***</td>
<td>-6.743**</td>
<td>-2.910**</td>
<td>-6.605***</td>
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<tr>
<td></td>
<td>[1.876]</td>
<td>[0.651]</td>
<td>[0.781]</td>
<td>[1.619]</td>
<td>[3.076]</td>
<td>[1.251]</td>
<td>[2.073]</td>
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<td>Credit Growth</td>
<td>0.245***</td>
<td>0.324***</td>
<td>0.485***</td>
<td>0.264***</td>
<td>0.157*</td>
<td>0.351***</td>
<td>0.231***</td>
</tr>
<tr>
<td></td>
<td>[0.0715]</td>
<td>[0.0512]</td>
<td>[0.134]</td>
<td>[0.0897]</td>
<td>[0.0872]</td>
<td>[0.0869]</td>
<td>[0.0798]</td>
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<tr>
<td>GDP Growth</td>
<td>0.399</td>
<td>0.649***</td>
<td>0.123</td>
<td>0.427</td>
<td>0.902*</td>
<td>0.343</td>
<td>0.586**</td>
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<tr>
<td></td>
<td>[0.243]</td>
<td>[0.144]</td>
<td>[0.215]</td>
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<td>[0.517]</td>
<td>[0.226]</td>
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<td></td>
<td>[6.669]</td>
<td>[1.706]</td>
<td>[1.984]</td>
<td>[11.17]</td>
<td>[2.702]</td>
<td>[2.904]</td>
<td>[11.55]</td>
</tr>
<tr>
<td>Policy Rate</td>
<td>-1.071***</td>
<td>-0.697***</td>
<td>-0.952**</td>
<td>-0.645</td>
<td>-1.389***</td>
<td>-0.544</td>
<td>-0.958***</td>
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<tr>
<td></td>
<td>[0.340]</td>
<td>[0.196]</td>
<td>[0.417]</td>
<td>[0.394]</td>
<td>[0.284]</td>
<td>[0.346]</td>
<td>[0.358]</td>
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<tr>
<td>Countries</td>
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<td>106</td>
<td>31</td>
<td>56</td>
<td>19</td>
<td>47</td>
<td>58</td>
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<td>Observations</td>
<td>972</td>
<td>972</td>
<td>318</td>
<td>525</td>
<td>129</td>
<td>452</td>
<td>509</td>
</tr>
</tbody>
</table>

- MPI significant across specifications, also w/ OLS
- Lagged credit growth + significant, especially in AC
- Demand, GDP growth, +
- Crisis, drop in credit
- Some decrease with policy rate
- EM and closed countries driving the results more
Economic Effects are Large, but Controls Vary in Importance

- For ACs, a one standard deviation (STD) in MPI reduces credit growth by 2.2 percentage points. Large effect, equivalent to about 1/4\textsuperscript{th} STD in credit growth (9.04) for ACs
- Even larger for EMs. A one STD in MPI reduces credit growth by 8.3 percentage points, about 2/3\textsuperscript{rd} STD credit growth
- But MPI less effective in open economies, suggesting evasion
### Table 5: Effects of Instrument by Subgroups

<table>
<thead>
<tr>
<th>Variables</th>
<th>BORROWER</th>
<th>FINANCIAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>Advanced</td>
</tr>
<tr>
<td></td>
<td>(1)</td>
<td>(2)</td>
</tr>
<tr>
<td>BORROWER</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-11.06**</td>
<td>-2.16</td>
</tr>
<tr>
<td></td>
<td>[4.496]</td>
<td>[2.288]</td>
</tr>
<tr>
<td>FINANCIAL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Credit Growth</td>
<td>0.277***</td>
<td>0.487***</td>
</tr>
<tr>
<td></td>
<td>[0.0707]</td>
<td>[0.125]</td>
</tr>
<tr>
<td>GDP Growth</td>
<td>0.428*</td>
<td>0.136</td>
</tr>
<tr>
<td></td>
<td>[0.241]</td>
<td>[0.210]</td>
</tr>
<tr>
<td></td>
<td>[9.170]</td>
<td>[2.094]</td>
</tr>
<tr>
<td>Policy Rate</td>
<td>-0.833**</td>
<td>-0.937**</td>
</tr>
<tr>
<td></td>
<td>[0.391]</td>
<td>[0.428]</td>
</tr>
<tr>
<td>Countries</td>
<td>106</td>
<td>31</td>
</tr>
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<td>Observations</td>
<td>972</td>
<td>318</td>
</tr>
</tbody>
</table>

- Borrower based are important, even more so in EMs and closed.
- Financial institutions based matter as well, again less so in ACs.
### Table 6: Effects of Individual Instruments on Several Variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Corp Credit Growth</th>
<th>HH Credit Growth</th>
<th>House Price Growth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All (1) Advanced (2) Emerging (3) Developing (4)</td>
<td>Advanced (5) Emerging (6)</td>
<td>Advanced (7) Emerging (8)</td>
</tr>
</tbody>
</table>

- **MPI**: -7.637*** -1.376* -5.327*** -6.743** -0.763*** 0.678 -1.022 -0.0449 -0.907
- **BORROWER**: -11.06** -2.16 -8.389** -14.45*** -1.047* -7.636** -0.982 -3.068 -1.039
- **FINANCIAL**: -8.838*** -0.983 -6.625*** -7.007 -0.487 -0.0857 1.552 -0.584 0.174 -1.159
- **DTI**: -24.16** -0.499 -15.56** -1.780* -11.72*** 0.584 -3.561* -0.477 -3.322
- **DP**: -16.39*** -12.73*** 1.233 6.182*** -3.297
- **CTC**: -8.629 -12.75 -5.731***
- **LEV**: -2.716 1.426 -3.963** 5.714* 1.332 13.12* 4.073*** 1.538 1.796
- **SIFI**: 9.853 -1.242 29.63*** 1.332 4.073*** 0.885 1.796
- **INTER**: -35.46** -0.462 -39.37** -10.53*** -1.228 3.899 0.72 -16.91***
- **CONC**: -29.84* -2.028 -9.287 2.861 -4.044 7.481 4.333** 6.218 3.503*
- **FC**: -9.489* -3.132 -12.23*** -17.46*** -2.644*** -1.146 0.0281 -8.596*** -3.627 1.565***
- **RR_REV**: -42.84* -22.74* -8.661*** -14.68*** 9.732***
- **CG**: -46.16 -14.35 -12.99
- **TAX**: -5.196 -1.356 -5.333 -1.701*** -0.637 6.413 0.0129 1.187 0.426 -2.616**
- **Countries** 106 31 56 19 22 9 22 9 31 18
- **Observations** 972 318 525 129 241 79 241 79 307 142

- Household credit responsive to borrower based, in EMs especially
- House prices not to borrower based
- Corporate sector credit not
- LTV affects overall credit, HH credit in EMs, corp. in ACs
- DTI also, espec. HH credit and corp. in EMs
- DP in EMs (users few), not corp. (+)
- FC strong, espec. in EMs, not HP
- RR in EMs, for all credit types, not HP (positive)
- INTER some effect on credit, HP EMs
Cross-Border and Country Effects

• Higher MPI → increases share of cross-border claims
• One STD increase in MPI increases cross-border ratio in open countries by 6 pp, about 1/3\textsuperscript{th} its STD
⇒ Consider MAPs together with CFM tools
• Country characteristics, besides type, can matter
  • MPI not more effective with higher GDP/Capita or institutional development
  • But MPI less impact on credit in more developed financial systems, more flexible exchange rate, but not for de-jure more open
⇒ More developed, tap alternatives, circumvent MAPs
Additional Interaction Effects

• Higher Credit Growth $\rightarrow$ extra decrease MPI impact
  • MAPs more effective in dampening when credit growth is high, especially in ACs and EMs
• Lower Credit Growth $\rightarrow$ MPI impact increases
  • MAPs can be effective in maintaining credit growth in ACs and open economies
⇒ Impact of MAPS is asymmetric: less credit in upswing, more in downswing
⇒ Suggests need to consider phase of financial cycle
## 2017 IBRN Project: Measuring Intensity

### External Validity:

Cross-country studies

<table>
<thead>
<tr>
<th>Cerutti, Claessens &amp; Laeven (2017)</th>
<th>Countries</th>
<th>Period</th>
<th>Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>119</td>
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Documents MAPs usage (whether it is in use or not) and analyzes their effectiveness

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<th>Period</th>
<th>Policies</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>2000Q1-2014Q4</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Objective: Capture changes in prudential policy intensity in a cross-country, cross-time consistent way

### Internal Validity:

Identification

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<tbody>
<tr>
<td>Spain</td>
<td>1998Q4-2010Q4</td>
<td>DP</td>
<td></td>
</tr>
</tbody>
</table>

Identification: micro-level demand controls (e.g., firm*time FE's)
Cerutti, Correa, Fiorentino, and Segalla (2017)

- Documents usage intensity of prudential policies
- Country coverage: 64 (30 AEs and 34 EMs)
- Time coverage: 2000-2014 (quarterly data)
- “Prudential” = wider coverage to avoid omissions
- “Usage intensity” = recording a tightening (+1), or loosening (-1) or no-change in each given quarter when the instrument is in place.
- 5 type of prudential instruments: interbank exposure limits, concentration limits, LTV caps, reserve requirements, and capital buffers.
Cerutti, Correa, Fiorentino, and Segalla (2017)

Usage of Prudential Policies

- RR and LTV have the largest number of tightening and loosening episodes
- CONC and INTER not often adjusted in intensity
- Cap. Req. tightened especially after GFC

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Distinct countries with instrument changes</th>
<th>Countries with tightening episodes</th>
<th>Countries with loosening episodes</th>
<th>Countries with instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSCB Real estate loans</td>
<td>22</td>
<td>20</td>
<td>9</td>
<td>64</td>
</tr>
<tr>
<td>SSCB Consumer loans</td>
<td>9</td>
<td>7</td>
<td>3</td>
<td>64</td>
</tr>
<tr>
<td>SSCB other loans</td>
<td>12</td>
<td>11</td>
<td>3</td>
<td>64</td>
</tr>
<tr>
<td>Concentration limits</td>
<td>22</td>
<td>21</td>
<td>2</td>
<td>36</td>
</tr>
<tr>
<td>Interbank exposures</td>
<td>14</td>
<td>13</td>
<td>1</td>
<td>22</td>
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<tr>
<td>RR foreign currency</td>
<td>21</td>
<td>20</td>
<td>17</td>
<td>64</td>
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<tr>
<td>RR local currency</td>
<td>46</td>
<td>29</td>
<td>44</td>
<td>64</td>
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<tr>
<td>Loan to value ratio limits</td>
<td>36</td>
<td>33</td>
<td>14</td>
<td>38</td>
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<tr>
<td>General capital requirements</td>
<td>55</td>
<td>55</td>
<td>0</td>
<td>57</td>
</tr>
</tbody>
</table>
Cerutti, Correa, Fiorentino, and Segalla (2017)

Usage of Prudential Policies

- RR loosening coincided with GFC and the European sovereign debt crisis
- LTV tightened often after GFC (counteracting loose monetary policies in several countries)
Cerutti, Correa, Fiorentino, and Segalla (2017)

Cyclical or counter-cyclical usage w.r.t. credit?

- Cap. SSB, CONC, INTER: not many statistically significant correlations and broadly distributed
- LTV and RR show more counter-cyclical usage
Cerutti, Correa, Fiorentino, and Segalla (2017)

Complementary usage with policy rates?

- LTV used with higher policy rates in some AEs, but also to tighten while lowering policy rates (e.g., Canada, Hong Kong)

- RR (Local) used more to (partially) offset policy rate changes, but there is general heterogeneity

![Graph showing correlations between LTV cap, RR foreign, and RR local for EM and AE]
General Conclusions

• Empirically: some evidence of impact of MAPs
  – Especially on credit (overall and HH credit)
  – But differentiate by country and individual MAPs
  – Also usage intensity analysis points in same direction

• Suggests scope for MAP
  – But need to be pragmatic, a times discretionary within frameworks, targeted at specific markets/objectives
  – Ensuring resilience can reinforce avoiding booms/busts

• But overall, MAP still at early stage
  – Interactions with other policies. Adaptations. Costs.
    Political economy concerns. Rules vs. discretion.
⇒ More data, research on effects, risks, calibrations, etc.