The credit-to-GDP gap and complementary indicators for macroprudential policy: Evidence from the UK

Julia Giese, Henrik Andersen, Oliver Bush, Christian Castro, Marc Farag and Sujit Kapadia

Federal Reserve Bank of Cleveland/Office for Financial Research conference: Financial Stability Analysis

31st May 2013

The views given in this presentation are those of the authors and not necessarily those of the Bank of England or any other institution.
Outline

• Background: the UK’s macroprudential framework

• The credit-to-GDP gap

• Challenges for the credit-to-GDP gap and complementary indicators

• A univariate framework for evaluating these indicators

• Future work
Role of the Financial Policy Committee (FPC)

- FPC set up to take a top-down macroprudential view

- Mandate to “remove or reduce systemic risks with a view to enhancing and protecting the resilience of the UK financial system”
  - cannot act “in a way that would in its opinion be likely to have a significant adverse effect on the capacity of the financial sector to contribute to the growth of the UK economy in the medium or long term”
  - secondary objective to support the economic policy of the Government, including its objectives for growth and employment
FPC’s powers

- General Recommendations
  - eg to HM Treasury over regulatory perimeter

- Comply or Explain Recommendations
  - Better suited for tackling structural, cross-sectional risks

- Directions
  - Binding instructions on the countercyclical capital buffer and sectoral capital requirements
Countercyclical capital buffer (CCB)

- Part of Basel III framework
- Additional **temporary** capital buffer applied at an aggregate level
  - Home authority sets CCB rate for domestic lending
  - Other countries set national CCB rate for overseas lending
  - Mandatory reciprocity in EU up to 2.5% RWAs
Core indicators to guide decision making

• Serve two broad purposes
  – Internally: Starting point for analysis, consistency of decision-making
  – Externally: Transparency, accountability, predictability

→ But not meant as a substitute for judgment: limited knowledge about regime; trade-off between rules and discretion

• Which indicators?
  – Basel III: Credit-GDP gap
  – Complements to the credit-to-GDP gap
UK banking crises 1965 onwards

• Secondary banking crisis (1973Q4 to 1975Q4)
  – Credit growth fell from 29% to 8% p.a.; distress limited to ‘fringe’ institutions

• Small banks’ crisis (1990Q3 to 1994Q2)
  – Credit growth fell from 15% to 4% p.a.; distress limited to small banks

• Global financial crisis (2007Q3 onwards)
  – Credit growth fell from 13% to 0% p.a.; widespread distress
Credit-to-GDP gap

Broad private non-financial credit-to-GDP gap
Narrow private non-financial credit-to-GDP gap

Sources: Bank of England, ONS and Bank calculations.
Empirical challenges: Data revisions

Initial and revised estimates of the credit-to-GDP gap

- Edge and Meisenzahl (2011) question reliability of credit gap in real time
- But they find that data revisions are not material in the US
- The same is true for the UK: revisions are autocorrelated, so they affect both ratio and trend and gap is less affected
Empirical challenges: Choice of trend

Credit-to-GDP gaps calculated with one- and two-sided HP filter

- Edge and Meisenzahl (2011) also argue against the one-sided HP filter
- Evidence for the UK shows that the choice of trend matters
- But this does not mean that policy errors result: the one-sided gap still appears to have informational content
Empirical challenges: Definition of credit

Broad and narrow credit-to-GDP gap (including intra-financial)

- We need to consider what we would like to count in the credit series
- For the UK, intra-financial lending is important
- While there might be double-counting, intra-financial activities add to complexities in the system
Complements: Levels matter

Household debt-to-income and PNFC debt-to-profit ratios

- The level of credit ratios may also matter
- Deleveraging from a high level might be more painful than from a low level
Complements: Sources of credit

UK banks’ leverage and loan to deposit ratio

- Interquartile range (RHS)
- Max-Min range (RHS)
- Median (RHS)

Sterling lending to deposit ratio


Ratio: 0.0, 0.5, 1.0, 1.5, 2.0, 2.5, 3.0
Complements: Quality of credit

House price indicators and lending spreads

[Graph showing house price-to-rent ratio and commercial property price-to-rent ratio indices from 1987 to 2011, with a 1987-2006 average of 100.]

[Graph showing blended UK mortgage spread and blended UK corporate lending spread from 1997 to 2012, with basis points on the y-axis.]
Complements: Release phase

Flow measures of credit and banks’ funding spreads
Framework for comparing indicators

• Univariate non-parametric approach (building on e.g. Kaminsky and Reinhart, 1999, Schularick and Taylor, 2012)
  – Signal ratio at the minimum noise ratio (for policymakers that dislike type II errors)
  – Noise ratio at the maximum signal ratio (for policymakers that dislike type I errors)
  – Area under the receiver operator characteristic curve (AUROC) (which summarizes the informational content without taking a stand on policymaker preferences)
Classification

• Each observation of the indicator classified as one of:
  – Good signal
  – Type I error
  – Type II error
  – Good silence

• Signal ratio = Good signals / (Good signals + Type I errors)

• Noise ratio = Type II errors / (Type II errors + Good silences)

• Weighting scheme applied to Good signals and Type I errors
ROC curve

- ROC curve for useful indicator
- ROC curve for useless indicator

- Noise ratio at signal-maximising threshold
- AUROC (yellow area)
- Signal ratio at noise-minimising threshold
Statistical significance

• Used recursive bootstrap for significance tests
  – Indicator modeled as AR(p) process where p was chosen using BIC
  – Residuals scaled up by hat matrix
  – Random sampling from residuals of AR(p) and coefficients from AR(p) used to construct bootstrap samples
  – Significance statistics calculated by comparing actual NR/SR/AUROC with distribution of NR/SR/AUROC for bootstrapped series

• Where residuals are heteroskedastic, the recursive wild bootstrap was used
  – Same as above, except the residuals were kept in the same order but multiplied by random draws from the Rademacher distribution (1 with p=0.5, -1 with p=-0.5)
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Ranking method</th>
<th>AUROC</th>
<th>Minimum noise ratio</th>
<th>Maximum signal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Threshold</td>
<td>Signal ratio</td>
</tr>
<tr>
<td>AGGREGATE GAPS</td>
<td>Broad HH and PNFC credit gap</td>
<td>0.87*</td>
<td>12.5</td>
<td>0.39**</td>
</tr>
<tr>
<td>AGGREGATE GAPS</td>
<td>Narrow HH and PNFC credit gap</td>
<td>0.84*</td>
<td>9.4</td>
<td>0.33**</td>
</tr>
<tr>
<td>AGGREGATE GAPS</td>
<td>Broad HH, PNFC and OFC credit gap</td>
<td>0.79</td>
<td>22.9</td>
<td>0.41**</td>
</tr>
<tr>
<td>AGGREGATE GAPS</td>
<td>Narrow HH, PNFC and OFC credit gap</td>
<td>0.87**</td>
<td>13.6</td>
<td>0.45**</td>
</tr>
<tr>
<td>AGGREGATE GROWTH RATES</td>
<td>Nominal broad HH and PNFC credit growth</td>
<td>0.69</td>
<td>26.4</td>
<td>0.08</td>
</tr>
<tr>
<td>AGGREGATE GROWTH RATES</td>
<td>Nominal narrow HH and PNFC credit growth</td>
<td>0.71</td>
<td>24.2</td>
<td>0.08</td>
</tr>
<tr>
<td>AGGREGATE GROWTH RATES</td>
<td>Nominal broad HH, PNFC and OFC credit growth</td>
<td>0.74</td>
<td>24.8</td>
<td>0.14</td>
</tr>
<tr>
<td>AGGREGATE GROWTH RATES</td>
<td>Nominal narrow HH, PNFC and OFC credit growth</td>
<td>0.73</td>
<td>25.5</td>
<td>0.14</td>
</tr>
<tr>
<td>AGGREGATE GROWTH RATES</td>
<td>Real broad HH and PNFC credit growth</td>
<td>0.77</td>
<td>19.8</td>
<td>0.08</td>
</tr>
<tr>
<td>AGGREGATE GROWTH RATES</td>
<td>Real narrow HH and PNFC credit growth</td>
<td>0.81**</td>
<td>17.8</td>
<td>0.21**</td>
</tr>
<tr>
<td>AGGREGATE GROWTH RATES</td>
<td>Real broad HH, PNFC and OFC credit growth</td>
<td>0.82**</td>
<td>17.2</td>
<td>0.35**</td>
</tr>
<tr>
<td>AGGREGATE GROWTH RATES</td>
<td>Real narrow HH, PNFC and OFC credit growth</td>
<td>0.79*</td>
<td>19.9</td>
<td>0.14</td>
</tr>
</tbody>
</table>
## Results (2)

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Ranking method</th>
<th>AUROC</th>
<th>Minimum noise ratio</th>
<th>Maximum signal ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Threshold</td>
<td>Signal ratio</td>
</tr>
<tr>
<td>OTHER INDICATORS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HH DTI gap</td>
<td>0.85*</td>
<td>15.7</td>
<td>0.50**</td>
<td>-1.7</td>
</tr>
<tr>
<td>PNFC DTP gap</td>
<td>0.82*</td>
<td>68.6</td>
<td>0.00</td>
<td>-20.0</td>
</tr>
<tr>
<td>OFC credit-to-GDP gap</td>
<td>0.60</td>
<td>23.5</td>
<td>0.21</td>
<td>-0.4</td>
</tr>
<tr>
<td>Current account deficit</td>
<td>0.67</td>
<td>3.9</td>
<td>0.18*</td>
<td>-3.0</td>
</tr>
<tr>
<td>Loan-to-deposit ratio gap</td>
<td>0.78</td>
<td>0.1</td>
<td>0.32**</td>
<td>0.0</td>
</tr>
<tr>
<td>Leverage ratio</td>
<td>0.48</td>
<td>26.4</td>
<td>0.30**</td>
<td>12.2</td>
</tr>
<tr>
<td>Real house price gap</td>
<td>0.88**</td>
<td>33.7</td>
<td>0.21</td>
<td>-3.5</td>
</tr>
<tr>
<td>Real commercial property price gap</td>
<td>0.83*</td>
<td>15.0</td>
<td>0.53***</td>
<td>-4.3</td>
</tr>
<tr>
<td>Real equity price gap</td>
<td>0.32</td>
<td>110.7</td>
<td>0.00</td>
<td>-34.8</td>
</tr>
<tr>
<td>Corporate bond spread</td>
<td>0.61</td>
<td>3.2</td>
<td>0.00</td>
<td>0.0</td>
</tr>
</tbody>
</table>
Future work

• Ultimate goals (?):
  – A general equilibrium model of banking crises, consistent with the empirical evidence on FSIs
  – A (within model) policy rule as a cross-check to policy

• Intermediate goals (cross-country analysis, multivariate framework):
  – Why does the credit-to-GDP gap perform well as an early warning indicator?
  – To what extent do the other factors mentioned earlier matter (e.g. sources and quality of credit)?
  – If the buffer is ‘on’ or ‘off’, how can we determine the thresholds of our FSIs at which this should occur?
Conclusion

• This paper gives a narrative of how the credit-to-GDP gap might be complemented by other indicators

• We provide evidence based on UK data on the signaling abilities of the credit-to-GDP gap and complementary indicators

• In future work we seek to test the narrative on a cross-country panel and to get a better understanding of thresholds given policymakers’ preferences