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

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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

PRA and FCA

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

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Countercyclical capital buffer (CCB)

- Part of Basel III framework
- Additional <u>temporary</u> 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
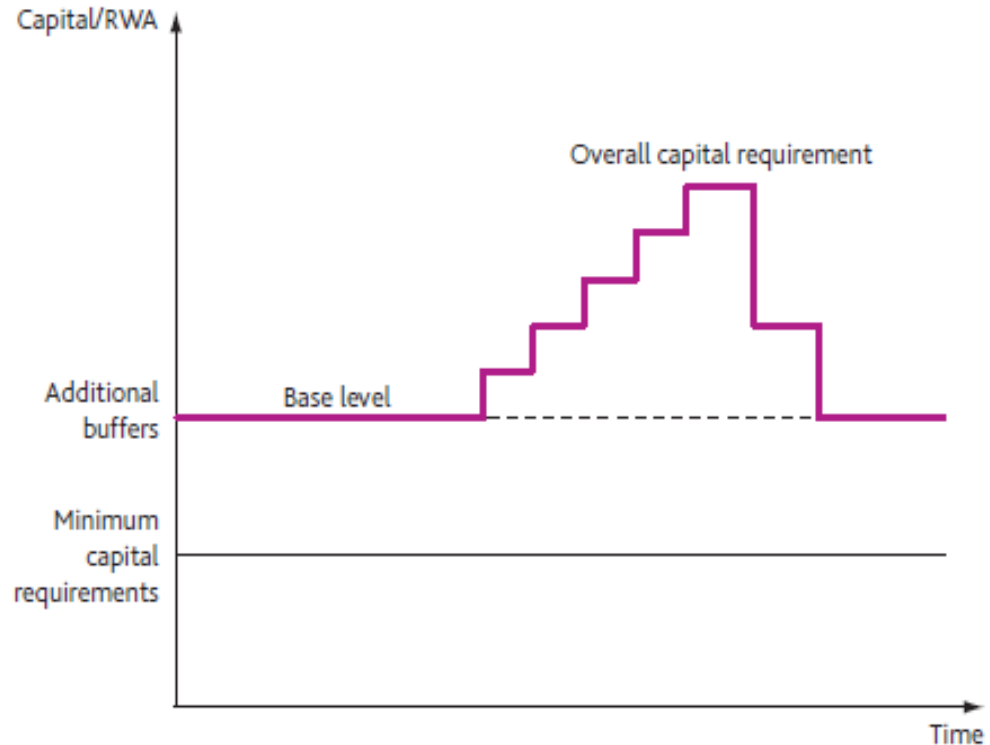
(a) 'Additional buffers' refers to the capital conservation buffer, systemic risk buffers and any forward-looking guidance on capital levels by the microprudential regulators.
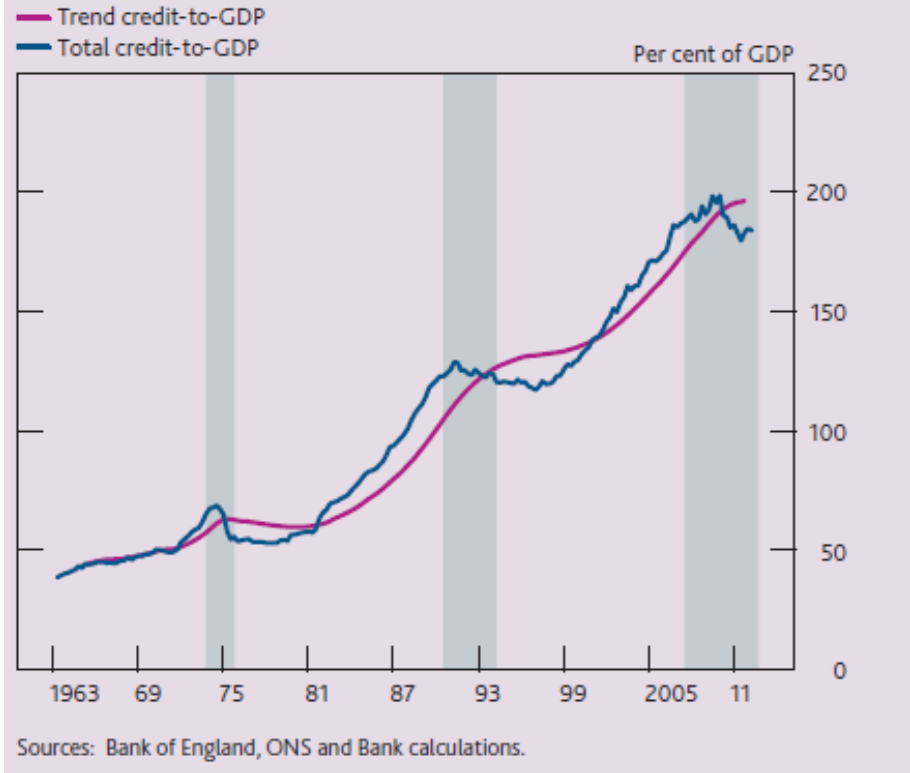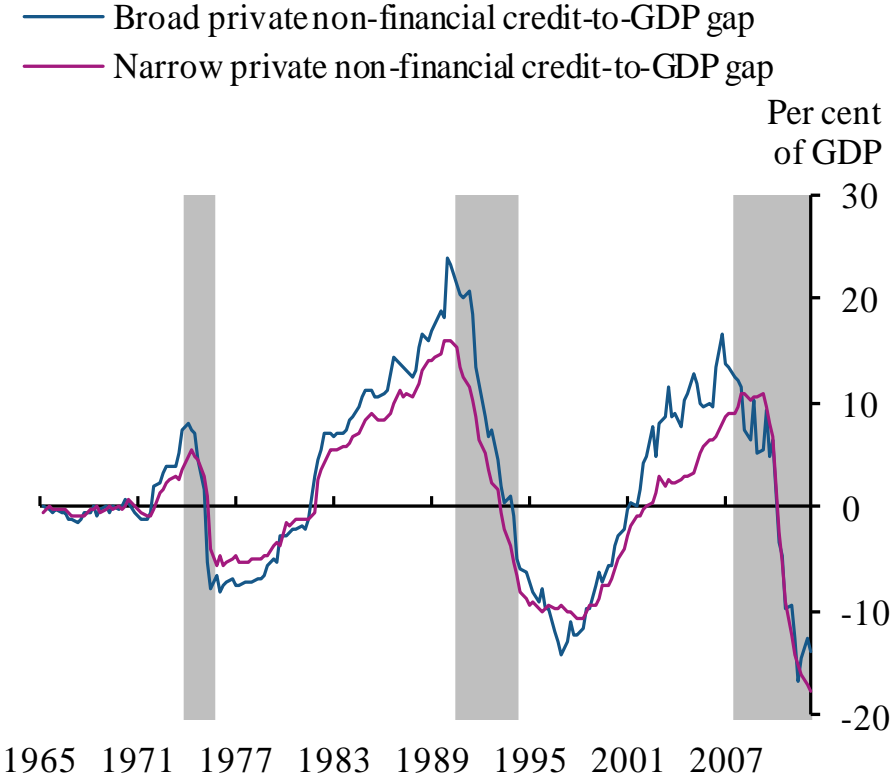
Core indicators to guide decision making

- 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

Per cent of GDP

Trend credit-to-GDP
Total credit-to-GDP

Per cent of GDP

Sources: Bank of England, ONS and Bank calculations.

Empirical challenges: Data revisions

Initial and revised estimates of the credit-to-GDP gap
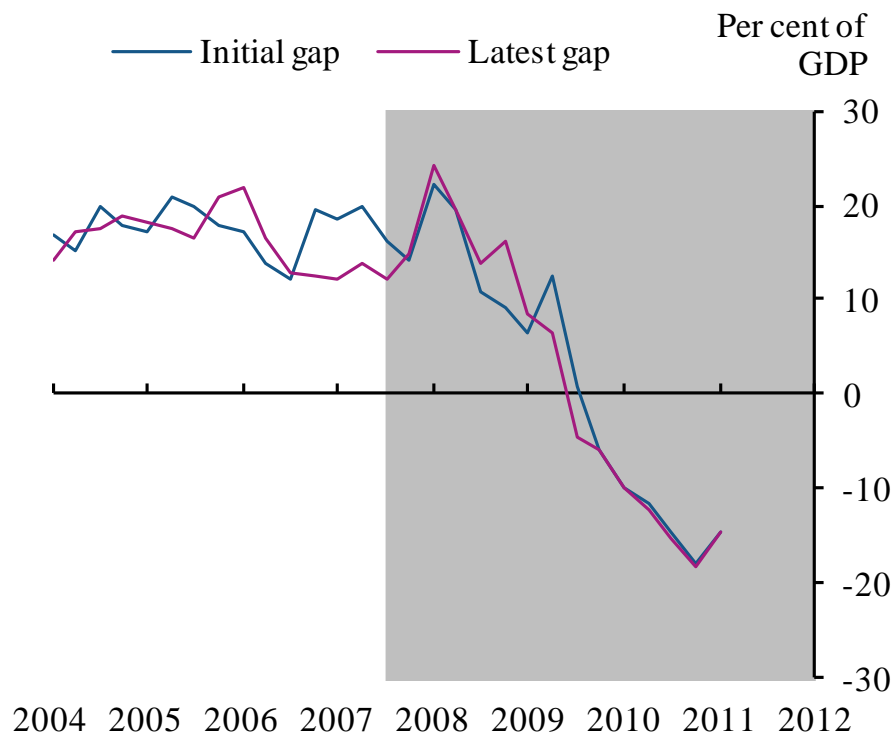
- Edge and Meisenzahl (2011) question reliability of credit gap in real time

- But they find that data revisions are not material in the US

- The same is true for the UK: revisions are auto-correlated, 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
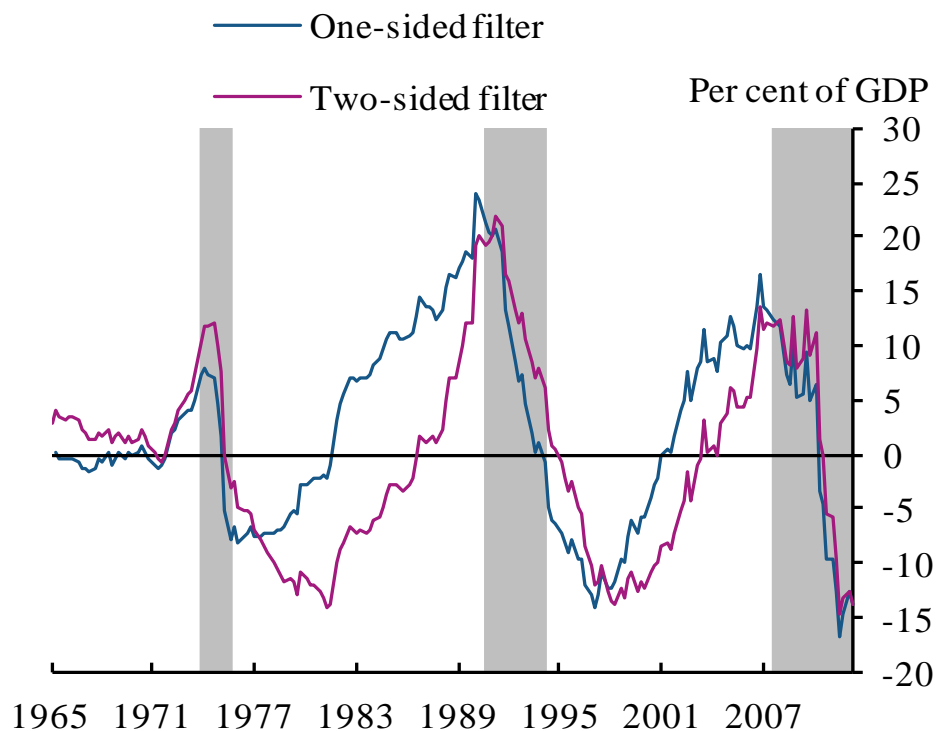
- Edge and Meisenzahl (2011) also argue against the one-sided HP filter

- 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
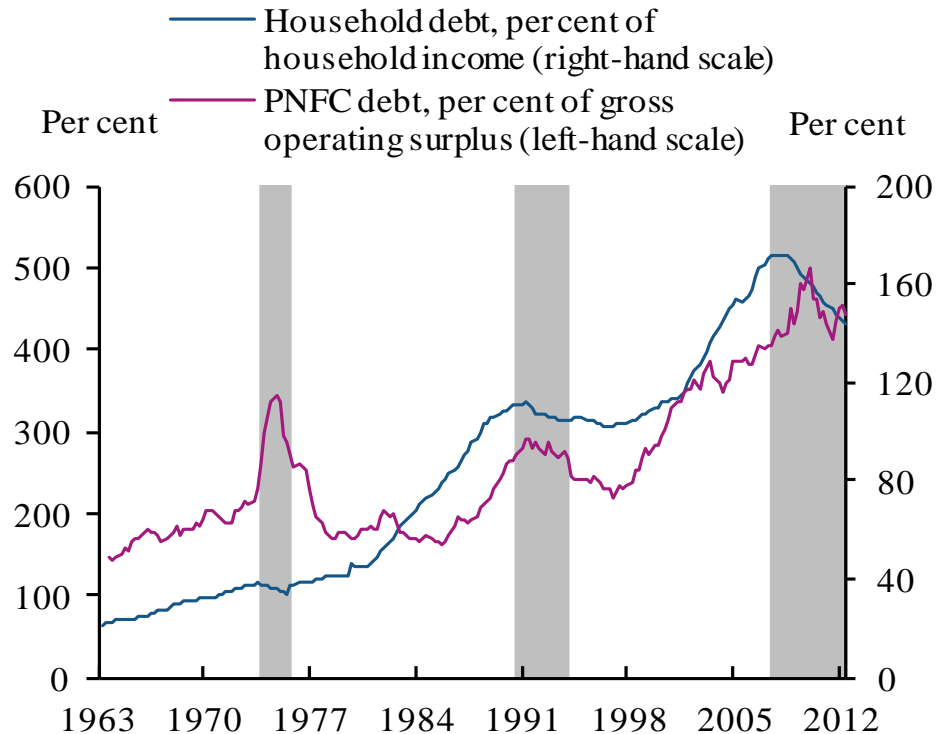
Empirical challenges: Definition of credit

Broad and narrow credit-to-GDP gap (including intra-financial)
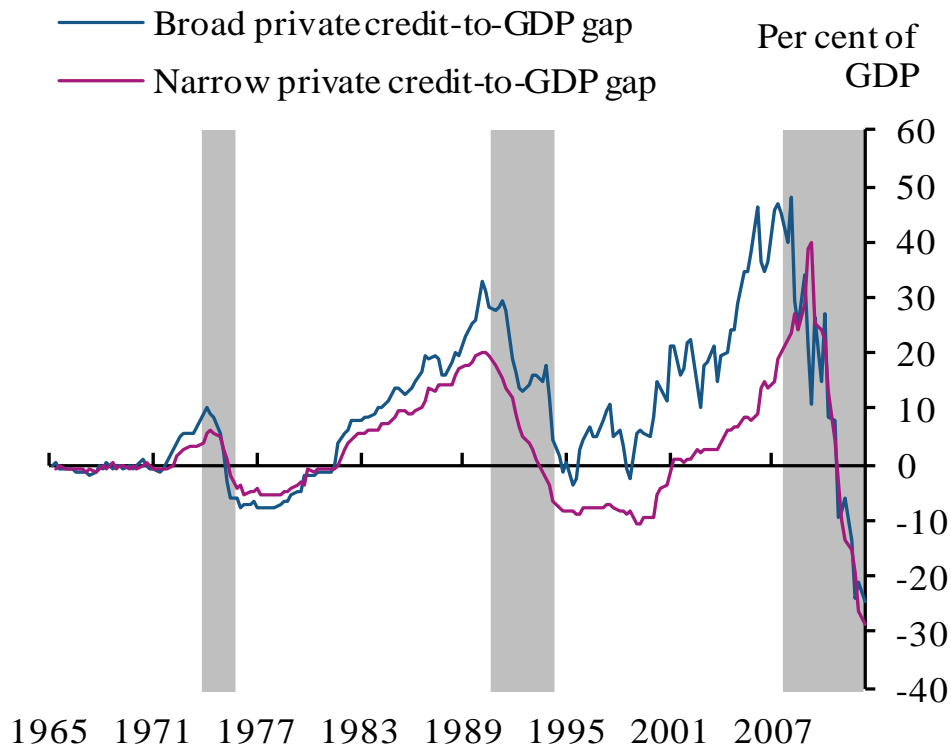
- We need to consider what we would like to count in the credit series
- For the UK, intra-financial lending is important
- While there might be double-counting, intra-financial activities add to complexities in the system

Complements: Levels matter

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

Household debt, per cent of household income (right-hand scale)

PNFC debt, per cent of gross operating surplus (left-hand scale)

- The level of credit ratios may also matter

- Deleveraging from a high level might be more painful than from a low level

- Evidence in Arcand et al (2012) and Cecchetti and Kharroubi (2012) points to inverse U-shape relation between economic growth and financial system growth

Complements: Sources of credit

UK banks' leverage and loan to deposit ratio
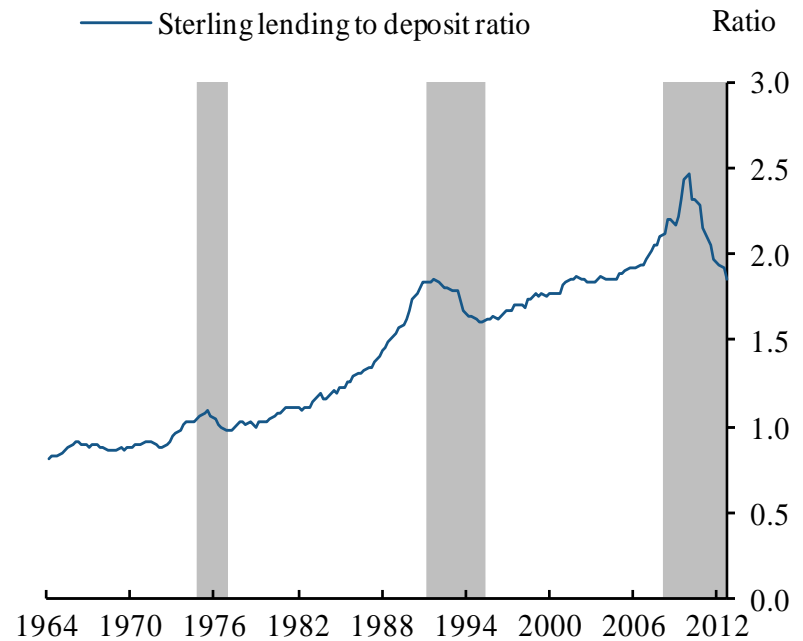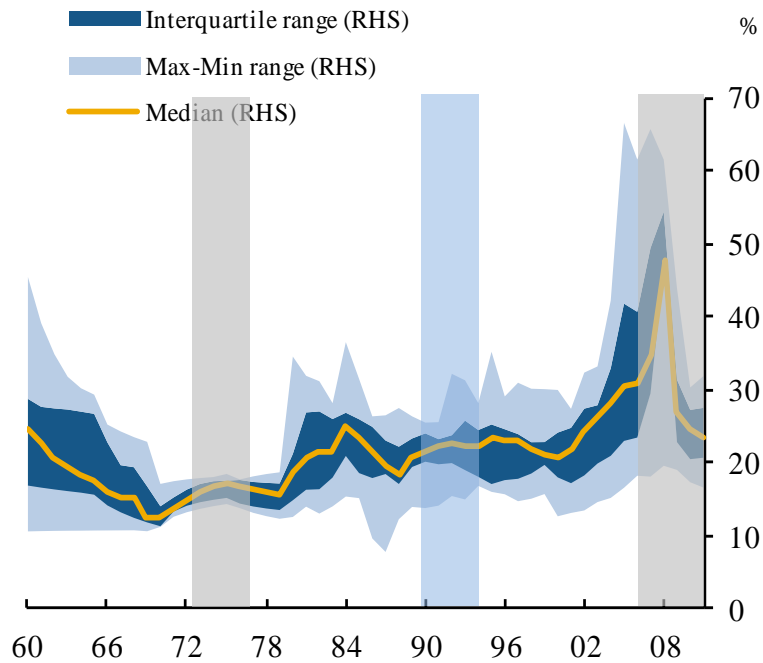
Complements: Quality of credit

House price indicators and lending spreads

Left chart legend:
- House price-to-rent ratio
- Commercial property price-to-rent ratio

Index, 1987-2006 average = 100

Right chart legend:
- Blended UK mortgage spread
- Blended UK corporate lending spread

Basis points
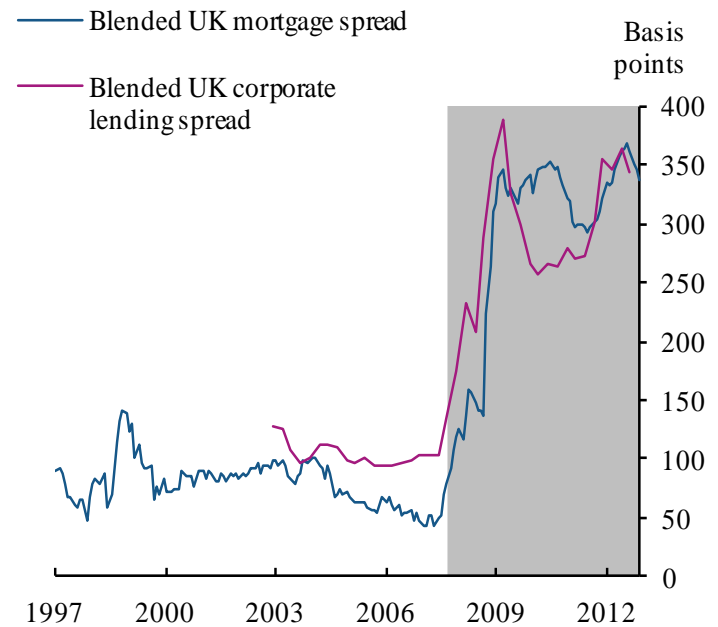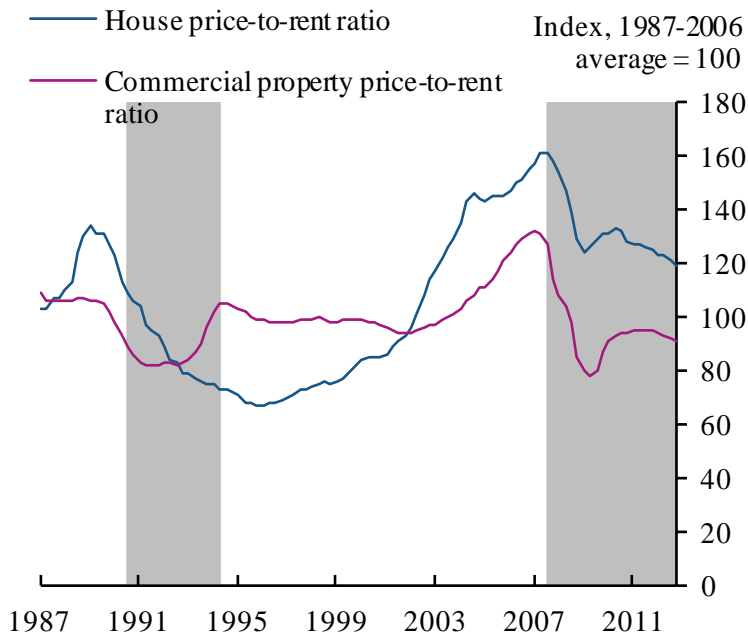
Complements: Release phase

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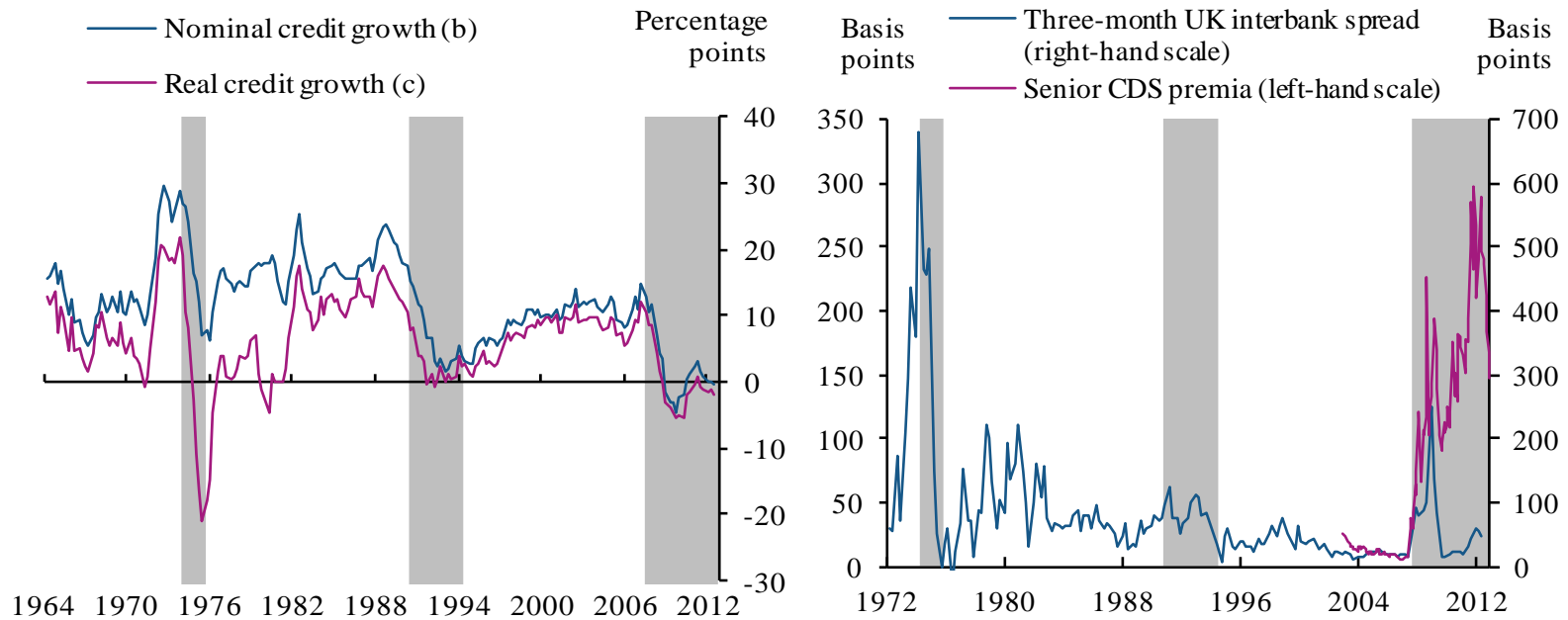
Framework for comparing indicators

- 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
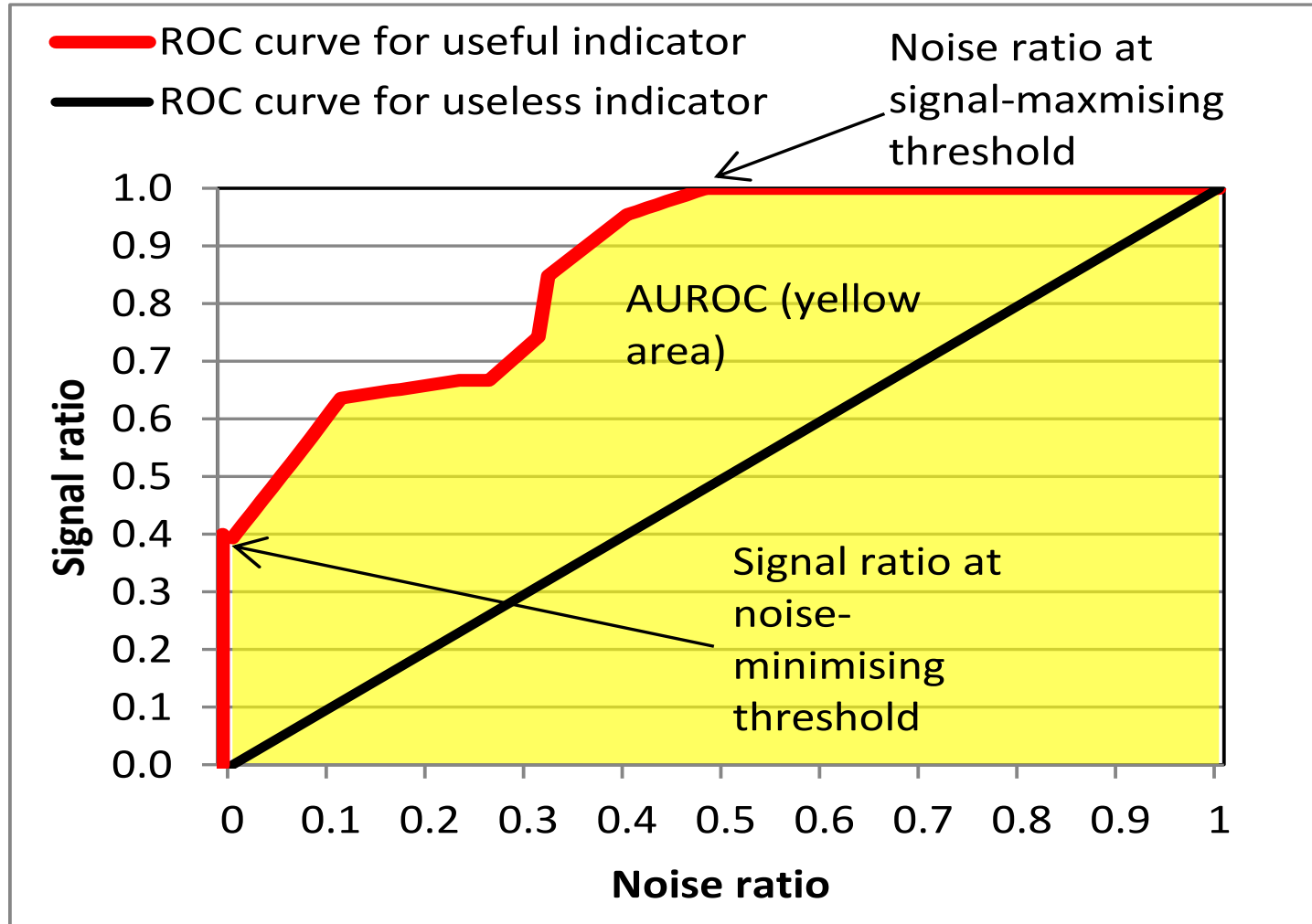
Statistical significance

- 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)

Results (1)

Indicator	Ranking method	AUROC	Minimum noise ratio		Maximum signal ratio	
			Threshold	Signal ratio	Threshold	Noise ratio
AGGREGATE GAPS						
Broad HH and PNFC credit gap		**0.87***	12.5	0.39**	-2.7	0.48**
Narrow HH and PNFC credit gap		**0.84***	9.4	0.33**	-1.4	0.44**
Broad HH, PNFC and OFC credit gap		**0.79**	22.9	0.41**	-2.3	0.79*
Narrow HH, PNFC and OFC credit gap		**0.87****	13.6	0.45**	-2.3	0.51**
AGGREGATE GROWTH RATES						
Nominal broad HH and PNFC credit growth		**0.69**	26.4	0.08	7.9	0.84
Nominal narrow HH and PNFC credit growth		**0.71**	24.2	0.08	8.6	0.73*
Nominal broad HH, PNFC and OFC credit growth		**0.74**	24.8	0.14	8.0	0.88
Nominal narrow HH, PNFC and OFC credit growth		**0.73**	25.5	0.14	8.9	0.69**
Real broad HH and PNFC credit growth		**0.77**	19.8	0.08	-1.6	0.95
Real narrow HH and PNFC credit growth		**0.81****	17.8	0.21**	-0.4	0.90
Real broad HH, PNFC and OFC credit growth		**0.82****	17.2	0.35**	-1.0	0.95
Real narrow HH, PNFC and OFC credit growth		**0.79***	19.9	0.14	-0.4	0.93

Results (2)

Indicator	Ranking method AUROC	Minimum noise ratio Threshold	Signal ratio	Maximum signal ratio Threshold	Noise ratio
OTHER INDICATORS					
HH DTI gap	**0.85***	15.7	0.50**	-1.7	0.63
PNFC DTP gap	**0.82***	68.6	0.00	-20.0	0.48**
OFC credit-to-GDP gap	**0.60**	23.5	0.21	-0.4	1.00
Current account deficit	**0.67**	3.9	0.18*	-3.0	0.99
Loan-to-deposit ratio gap	**0.78**	0.1	0.32**	0.0	0.85
Leverage ratio	**0.48**	26.4	0.30**	12.2	1.00
Real house price gap	**0.88****	33.7	0.21	-3.5	0.58**
Real commercial property price gap	**0.83***	15.0	0.53***	-4.3	0.80
Real equity price gap	**0.32**	110.7	0.00	-34.8	0.98
Corporate bond spread	**0.61**	3.2	0.00	0.0	1.00

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