Discussion of

Characterising the financial cycle: a multivariate and time-varying approach

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The views presented are those of the author and do not necessarily represent those of the Bank for International Settlements.
The paper in a nutshell

- Propose new methodology to estimate the financial cycle
  - Select financial cycle frequencies through power cohesion
  - Aggregate individual cycle variables with time-varying weights
- Apply methodology to 13 European countries from 1970 until now
- Results
  - Financial cycle is longer than the business cycle
  - High degree of cross country heterogeneity
The variables

- Financial cycle:
  - Total credit
  - Residential property prices
  - Equity prices
  - 10y government bond yield
  - *Wish list: commercial property prices, credit spreads*

- Business cycle
  - GDP
  - Unemployment
  - CPI inflation
  - In paper 10y bond yield, now slope of the yield curve
Select financial cycle frequencies through power cohesion

- \( PCohx(\omega) = \frac{1}{(M-1)M} \sum_{i \neq j} \frac{1}{\pi} \sum_{k=-\infty}^{\infty} \frac{Cov(x_{i,t}, x_{j,t+k})}{\sigma_{x_i} \sigma_{x_j}} e^{ik\omega} \)

  Normalised cross-spectral density

  Average

- Identify peak in co-movement and span window around it
- Use this frequency to apply standard filter
  - Individual series
  - Financial cycle index
Build financial cycle index

- Pre-multiply variables with -1 so that rise indicates upswing in financial cycle
- Normalise each variable with historical EDF
- Weight by time-varying correlation with

\[ \text{financial index} = \frac{1}{i'C_t} i'C_t Y_t' \]

- and \( c_{ij,t} = \rho_{ij,t} = \frac{\sigma_{ij,t}}{\sqrt{\sigma_{ii,t}\sigma_{jj,t}}} \)

\[
\sigma_{ij,t} = \lambda \sigma_{ij,t-1} + (1 - \lambda)(y_{i,t} - 0.5)(y_{j,t} - 0.5) \quad \text{if} \; > 0 \\
0 \quad \text{if} \; \leq 0
\]

Where \( \lambda = 0.89 \)
Key question: financial cycle dynamics are not intuitive

- Dominant cycle frequency: 15 years
  - In line with other papers in the literature
- Average length of the financial cycle: 7 ½ years
- Business cycle has odd dynamics
Key question: financial cycle dynamics are not intuitive (II)

- Idea 1: Variable selection
  - Why do you include equity prices and yields?
  - Have high weight but different spectral densities and not clear peak in cross-spectrum (e.g., credit and yields)
  - They can go in offsetting direction to credit and house prices such as now

- Idea 2: Use of normalisation with historical EDF
  - Unclear how this works in real time?

- Idea 3: Forecasting endpoints
  - Does this generate the odd business cycle
Key question: financial cycle dynamics are not intuitive (III)

- Idea 4: Aggregation
  - Why aggregate first and then take the filter?
  - Can short term fluctuation swamp medium term frequencies?
  - How about phase shifts?
  - What happens if cycles of individual series are aggregated?

- Idea 5: Time-varying correlations
  - How do the results look with fixed correlations

- Would be great to explore step by step different drivers
Theory

- Main problem of the literature
  - Cycles are purely statistical
- Link to theory welcome
- Main frictions
  - Credit-in-advance
  - Leverage constraints
  - Time-varying risk aversion
- Unlikely to be the key frictions
Decomposing the financial cycle
Juselius and Drehmann (2015)

- Leverage gap: Deviations of credit-to-GDP ratio from real asset prices
- Debt service gap: Deviation of credit-to-GDP ratio from lending rates
## Effects on growth

<table>
<thead>
<tr>
<th>Effect on:</th>
<th>$\Delta \text{credit}_{t}$</th>
<th>$\Delta (\text{consumption + investment})_{t}$</th>
<th>$\Delta \text{asset prices}_{t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>from steady-state deviations</td>
<td></td>
<td></td>
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<tr>
<td>Leverage gap$_{t-1}$</td>
<td>Negative</td>
<td>–</td>
<td>–</td>
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<tr>
<td>DSR gap$_{t-1}$</td>
<td>Negative</td>
<td>Negative</td>
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<tr>
<td></td>
<td>from short-run dynamics</td>
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<tr>
<td>$\Delta \text{credit}_{t-k}$</td>
<td>Positive</td>
<td>Positive</td>
<td>Positive</td>
</tr>
</tbody>
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- Interaction between gaps lead to *endogenous cycles*
(Pseudo) real-time prediction of the Great Recession

Credit growth

Expenditure growth