BANK FOR INTERNATIONAL SETTLEMENTS

Discussion of

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

by Y Schüler, P Hiebert and T Peltonen

Mathias Drehmann, 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

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

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

$$financial\ index = \frac{1}{i' C_t'} i' C_t Y_t'$$

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

$$\sigma_{ij,t} = \begin{matrix} \lambda\sigma_{ij,t-1} + (1-\lambda)\left(y_{i,t} - 0.5\right)\left(y_{j,t} - 0.5\right) if > 0 \\ 0 \quad if \quad \leq 0 \end{matrix}$$

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

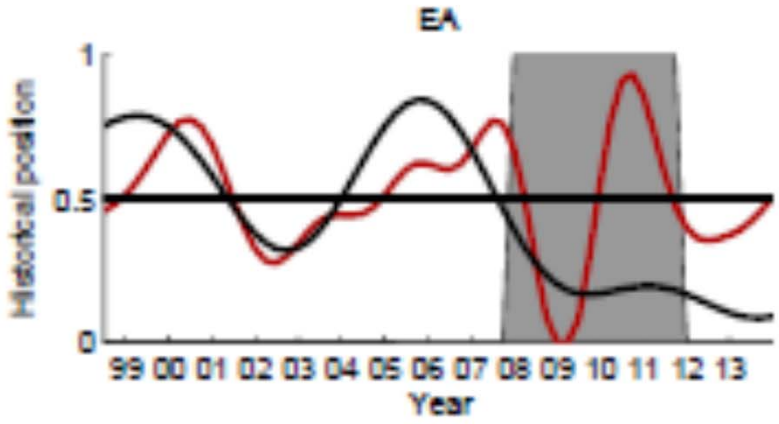


Figure 6: Euro area financial (black) versus business (red) cycle

Notes: The x-axis measures the date and the y-axis the relative historic position, where 0/1 represents the min/max and 0.5 is the historic median. The grey shaded area indicates a systemic banking crisis as identified by Laeven and Valencia (2012).

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 (eg 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

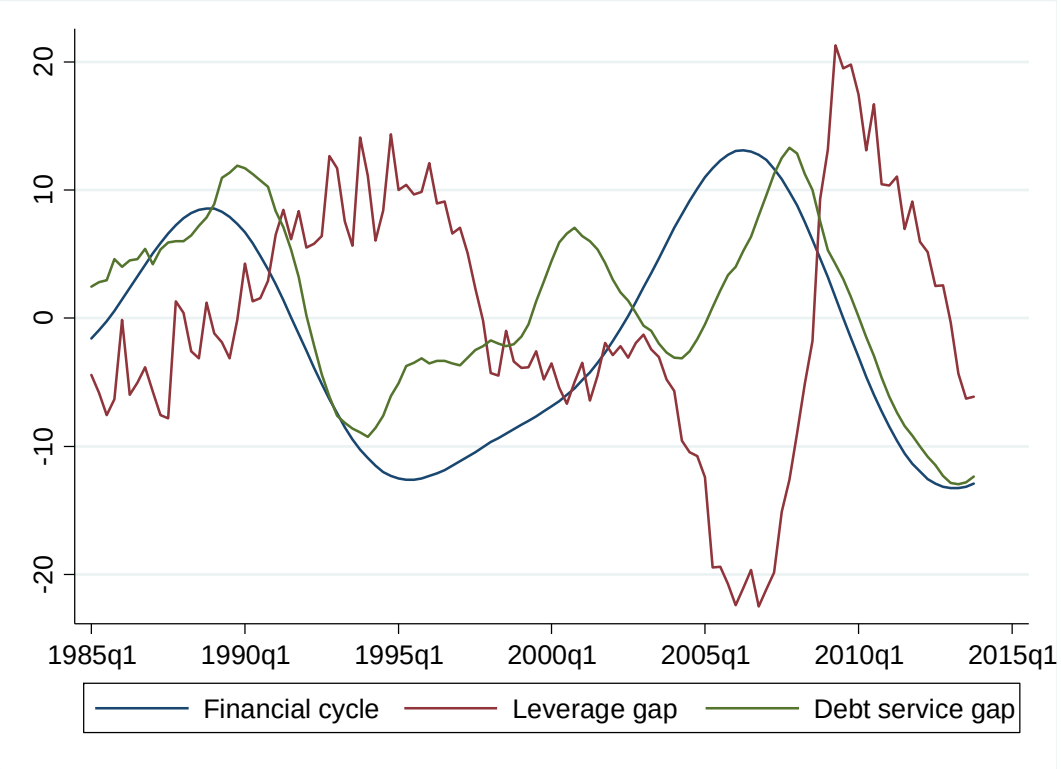
- Would be great to explore step by step different drivers

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

Effect on:	**Δcredit$_t$**	**Δ(consumption +investment)$_t$**	**Δasset prices$_t$**
from steady-state deviations			
Leverage gap$_{t-1}$	*Negative*	–	–
DSR gap$_{t-1}$	*Negative*	*Negative*	*Negative*
from short-run dynamics			
Δcredit$_{t-k}$	*Positive*	*Positive*	*Positive*

- Interaction between gaps lead to *endogenous cycles*

(Pseudo) real-time prediction of the Great Recession