WAVELET ANALYSIS OF LOANS IN GERMANY

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Overview

- Motivation
- Survey of literature
  - theoretical
  - empirical
- Methodology
- Data
- Empirical results
- Conclusions
Motivation

- renewed interest in credit growth after outbreak of financial crisis
- academics: inflation targeting without any role for monetary aggregates
- Goodhart: indicator of changes in expectations on future income
- ECB
  - two-pillar strategy
  - credit growth as indicator
- propagating role in transmission process
Literature: theory

- procyclical
  - financing working capital requirements (Bernanke and Blinder (1988))
  - expectations of future growth

- counter-cyclical
  - smoothing the impact of business cycle (Bernanke and Gertler (1995))
  - demand for external financing depends on internal sources (Friedman et al. (1993))

- financial accelerator (Bernanke, Gertler and Gilchrist (1996))
  - asymmetric information
  - collateral
  - cannot explain excessive credit developments
Literature: empirics (euro area)

- **time domain**
  - cointegration analysis a la money demand (Calza (2003,2006))
  - cointegration analysis for loan demand and supply (Sorensen et al. (2009))
  - correlation analysis (ECB (2009))
  - large BVAR (Giannone et al. (2010))

- **frequency domain**
  - Fourier analysis (Deutsche Bundesbank (2011))

- **mixed** (Aikman et al. (2010)): correlation of bandpass filtered series
Frequency methods

- Fourier analysis
  - spectral density
  - coherency

- Wavelets
  - small waves
  - translation
  - dilation

- CWT
  - wavelet spectral density
  - wavelet coherency
  - phase difference (time lag)
  - partial wavelet coherency
Data

- sectoral differentiation of loans
  - loans to non-financial corporations
  - loans to private households
  - mortgages
- national accounts data: GDP, investment, consumption
- calculation of real variables for loans using GDP deflator
- sample: 1971Q1 - 2011Q2
- quarterly growth rates
Loans to non-financial corporations and GDP

Loans to NFCs (blue) and GDP (green)
Spectral densities

Power Spectral Density: loans (blue) and GDP (green)
Time-varying lead-lag structure
Wavelet power spectrum of GDP

Wavelet Power Spectrum

Time
Period (years)


1.5 3 4 5 6 8 10 12
Wavelet power spectrum of loans to NFCs
Wavelet coherency: Loans to NFCs, GDP
Phase-difference

Phases and Time-Lag: 7~10 frequency band

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Wavelets
Wavelet coherency: Loans to NFCs, investment
Wavelet coherency: Loans to PHs, GDP
Wavelet coherency: Loans to PHs, consumption
Wavelet coherency: Mortgages, GDP
Wavelet coherency: Mortgages, house prices

Wavelet Coherency

Period (years)

1 10


1

0

1

3

4

5

6

7

8

9

10

"Wavelets"
Conclusions

- time-varying correlation of loans and GDP
- correlation of loans and specific scale variables more robust