Has the Financial Crisis changed the Business Cycle Characteristics of the PIIGS Countries?

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1 Introduction

☐ The question whether business cycles converge goes back at least to Hume (1758).

☐ Two directions:

■ Neoclassical growth models converge once they reach their steady state (Solow, 1956).

■ Endogenous growth models converge due to investment spill over effects (Romer, 1986 and Lucas, 1988).
1 Introduction

Empirical results:

- Baumol (1986), Barro (1991), Sala-I-Martin (1996) and Mankiw et al. (1992) find convergence of OECD countries which are on the same development level.

In terms of the European business cycle:
1 Introduction

- Artis and Zhang (1997), Frankel and Rose (1998), Razzak (1998) find convergence as long as e/r are successfully pegged.

- Inklaar and de Haan (2000), Hughes Hallett and Piscitelli (2002), and Stock and Watson (2003) find divergence

- Hughes Hallett (2003) and Suardi (2001) find divergence of the UK business cycle to the European one.
1 Introduction

- What drives convergence (Evans and Karras, 1996)?
  - Identical 1st order AR structure
  - Diminishing returns
  - Trade
  - E/r

- Problems (Stock and Watson, 2003):
  - Structural breaks change business cycle properties
1 Introduction

☐ Aims:

■ Find structural breaks
■ How did structural breaks change the business cycle?
■ Find correlation (coherence) between business cycle
  ☐ These coherences may change as well!
■ Which countries converge which diverge?
☐ We use a time-frequency approach to tackle these questions.
2 Time-Frequency Analysis

☐ How we do it:

- We estimate each growth rate individually using an AR(X) specification.
  ☐ This AR(X) specification is time-varying.

- For each point in time we calculate the Fourier transform.
  ☐ That gives us the time-varying spectrum.

- This step allows us already to highlight differences in the growth rate.
2 Time-Frequency Analysis

- We then estimate the link between two countries using the Kalman filter.
  - This step results in a time-varying gain.
- Given the individual spectra and the gain, we can now calculate the coherence.
  - This coherence is also time-varying.
- Why?
  - Exploit small samples
2 Time-Frequency Analysis

- We can test AR(X) processes separately.
- We can distinguish components where convergence takes place and components which diverge.
- More advanced technique than just ECM.

The coherence is defined as:

\[ K_{YX,t}^2 = \frac{1}{\left(1 + f_{VV}(\omega)_t / \left( |A(\omega)|_t f_{XX}(\omega)_t \right) \right)} \]
3 Empirical Results

- Here we estimate the following relationship:

\[ Y_t = \alpha_{1,t} + \alpha_{2,t} Y_{t-1} + \ldots + \varepsilon_t \]

- Data are from 1980Q1 – 1991Q4 from Oxford Economic Forcasting.
- From 1991Q4 – 2005Q4 NAQ.
- For all countries we took the log of real GDP and differenced it once.
3 Empirical Results

Figure 1: Spectrum of the Italian Growth Rate
3 Empirical Results

Figure 2: Spectrum of the Spanish Growth Rate
3 Empirical Results

Figure 3: Spectrum of the Irish Growth Rate
3 Empirical Results

Figure 4: Spectrum of the Portuguese Growth Rate
3 Empirical Results

Figure 5: Spectrum of the Greek Growth Rate
3 Empirical Results

Figure 6: Coherence between Italy and the Eurozone
3 Empirical Results

Figure 7: Coherence between Spain and the Eurozone
3 Empirical Results

Figure 8: The Coherence between Ireland and the Eurozone
3 Empirical Results

Figure 9: The Coherence between Portugal and the Eurozone
3 Empirical Results

Figure 10: Coherence between Greece and the Eurozone
4 Conclusion

- We presented a technique by which business cycles can be decomposed into their component cycles.
  - We showed that business cycles vary over time.
  - As a result we could show that the data generating processes are different to each other.
4 Conclusion

☐ We showed how to extend univariate analysis to the coherence between different economies and that it varies over time.

☐ The Euro did not lead to a greater convergence, but (in some cases) to a more stable link between the countries and the Eurozone.

☐ Not every financial crisis leads to divergence, but
4 Conclusion

- The greater convergence was short lived.
- It seems that the recent turmoil causes a greater divergence.
- So some financial crises have the potential to increase convergence whilst others lead to divergence.