



Business cycle convergence in Europe: A first look at the second moment

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Outline

- The costs of joining a currency area: The theory of optimum currency areas.
- Business cycle synchronization in Europe:
 - Sigma convergence in business cycles.
 - Patterns of business cycle synchronization.
- Business cycle synchronization and fiscal policy in EMU: A first assessment.
- Conclusions and paths of further research.



Optimum currency area criteria

- **Costs of Fixing the exchange rate** (Mundel 1961, McKinnon, 1963, and Kenen, 1969):
 - **Reacting to asymmetric shocks:**
 - Exchange rate and interest rate policy.
 - Wage Flexibility and labour mobility.
 - **Symmetry of shocks** (synchronization of business cycles) minimizes the costs of joining a currency area.
- **Critiques to OCA theory:**
 - **How likely are asymmetric shocks in a monetary union?**
 - The European Commission/Krugman controversy.
 - Fiscal policies as asymmetric shocks.
 - **Endogeneity of OCA criteria** (Frankel and Rose, 1998).



Business cycle synchronization in Europe

- **Is there a eurozone business cycle?**
 - Agresti and Mojon (2001): "Some stylised facts on the euro area business cycle", ECB WP 95.
 - ... so maybe there is one.....
- **The empirics of business cycle correlation in Europe:**
 - Artis and Zhang (1997, 1999): Exchange rate stability contributed to BC homogenization in Europe.
 - Inklaar and de Haan (2001): There is no systematic relationship between BC convergence and exchange rate stability.
 - Massmann and Mitchell (2005): BC convergence since the early 90s in EMU.
 - All correlation-based studies.



A continuous BC synchronization indicator

- We propose using the dispersion of the cycle across EMU countries as a measure of BC homogeneity (in the spirit of the sigma-convergence literature in economic growth).
- Procedure:
 - estimate business cycles (unobserved components model),
 - compute dispersion of business cycles,
 - test for significant changes in dispersion,
 - identify convergence/divergence periods.



Extracting the cyclical component of GDP

- **Unobserved components model:**

$$y_{it} = \tau_{it} + \phi_{it} + \varepsilon_{it}^y, \quad \varepsilon_{it}^y \sim \text{NID}(0, \sigma_{\varepsilon^y}^2),$$

- **Trend component:**

$$\tau_{it} = \tau_{it-1} + \beta_{t-1} + \varepsilon_{it}^\tau, \quad \varepsilon_{it}^\tau \sim \text{NID}(0, \sigma_{\varepsilon^\tau}^2),$$

$$\beta_{it} = \beta_{it-1} + \varepsilon_{it}^\beta, \quad \varepsilon_{it}^\beta \sim \text{NID}(0, \sigma_{\varepsilon^\beta}^2).$$

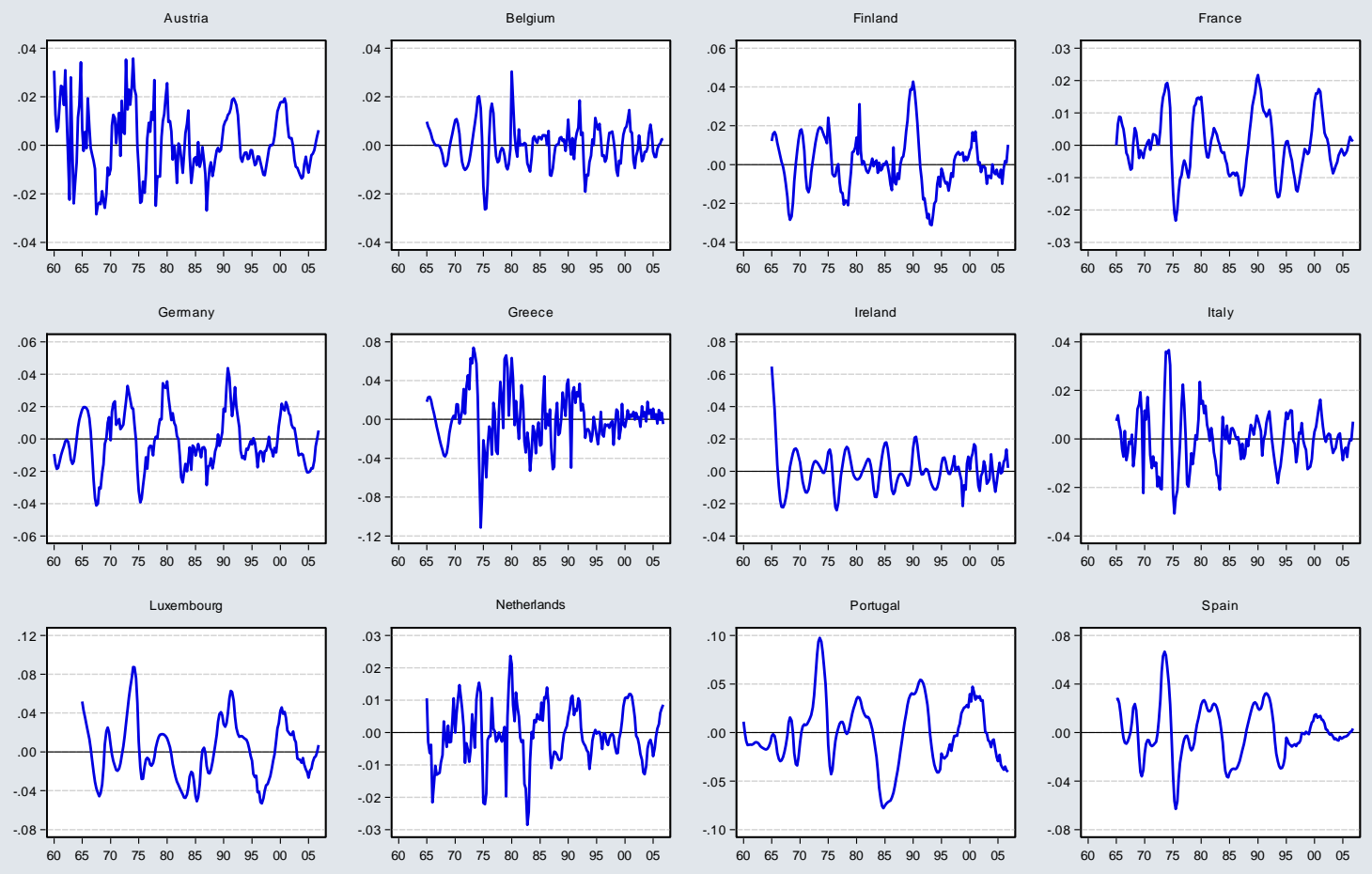
- **Cyclical component:**

$$\begin{bmatrix} \phi_t \\ \phi_t^* \end{bmatrix} = \rho \begin{bmatrix} \cos \lambda & \sin \lambda \\ -\sin \lambda & \cos \lambda \end{bmatrix} \begin{bmatrix} \phi_{t-1} \\ \phi_{t-1}^* \end{bmatrix} + \begin{bmatrix} \theta_t \\ \theta_t^* \end{bmatrix}$$



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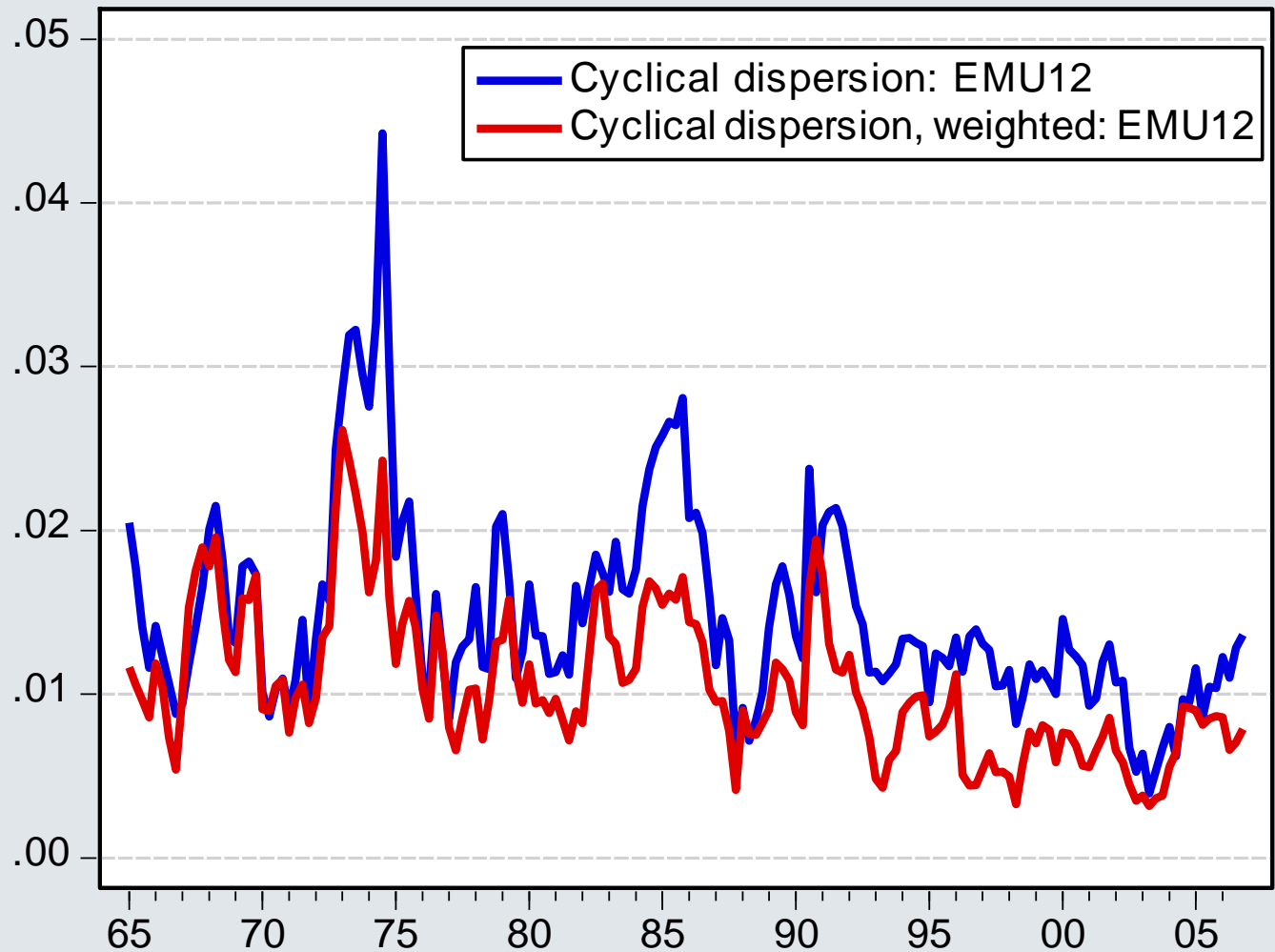
Cyclical component of GDP: EMU 12





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Cyclical synchronization: EMU 12





Testing For BC convergence/divergence

- **Carree-komp (1997) test for equality of variances:**

$$T_{2,t,\tau} = (N - 2.5) \log[1 + 0.25(\hat{\sigma}_t^2 - \hat{\sigma}_{t+\tau}^2)^2 / (\hat{\sigma}_t^2 \hat{\sigma}_{t+\tau}^2 - \hat{\sigma}_{t,t+\tau}^2)],$$

distributed as $\chi^2(1)$ under the null of no change in the variances.

- **Identification of significant convergence/divergence periods at different horizons.**

$$c_t = (\hat{\sigma}_t - \hat{\sigma}_{t+\tau}) I[T_{2,t,\tau} > \chi_{0.95}^2(1)]$$



BC cohesion periods: A parametric approach

- We approximate the dynamics of the dispersion variable with an AR(1) process and assess the existence of structural breaks using the methodology in Bai and Perron (1998).

$$s_t = \sum_{j=1}^R (\alpha_{0,j} + \alpha_{1,j} s_{t-1}) I(T_{j-1} \leq t < T_j) + \varepsilon_t,$$

- Estimate the breakpoints as

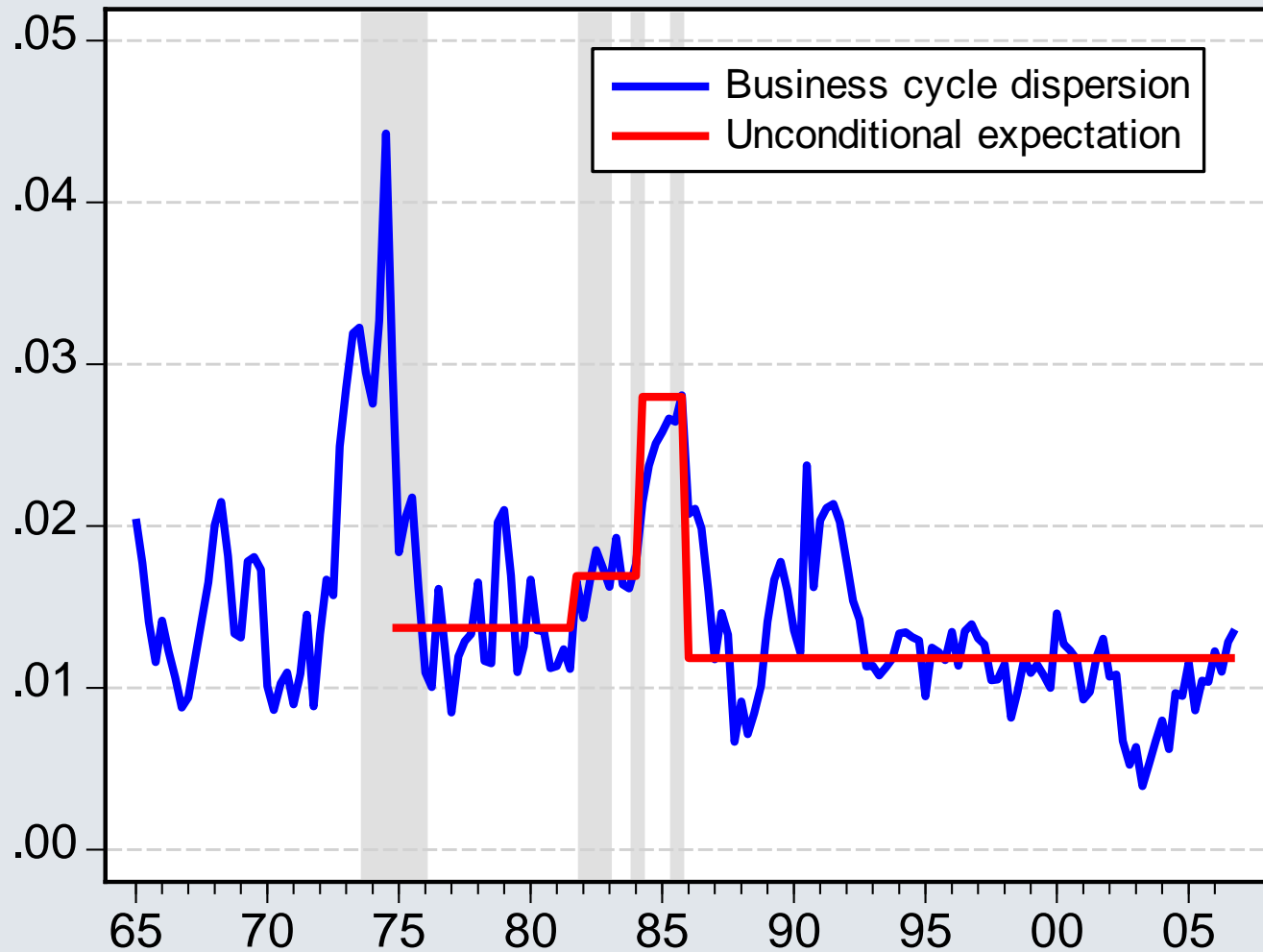
$$\{\hat{T}_1, \dots, \hat{T}_{R-1}\} = \arg \min \sum_{t=1}^{T_R} \hat{\varepsilon}(T_1, \dots, T_{R-1})_t^2,$$

- Testing problems:
 - Lack of identification of the breakpoint under the null.
 - Simulate the distribution of the sup-F test under the null (using Bai-Perron, 1998).



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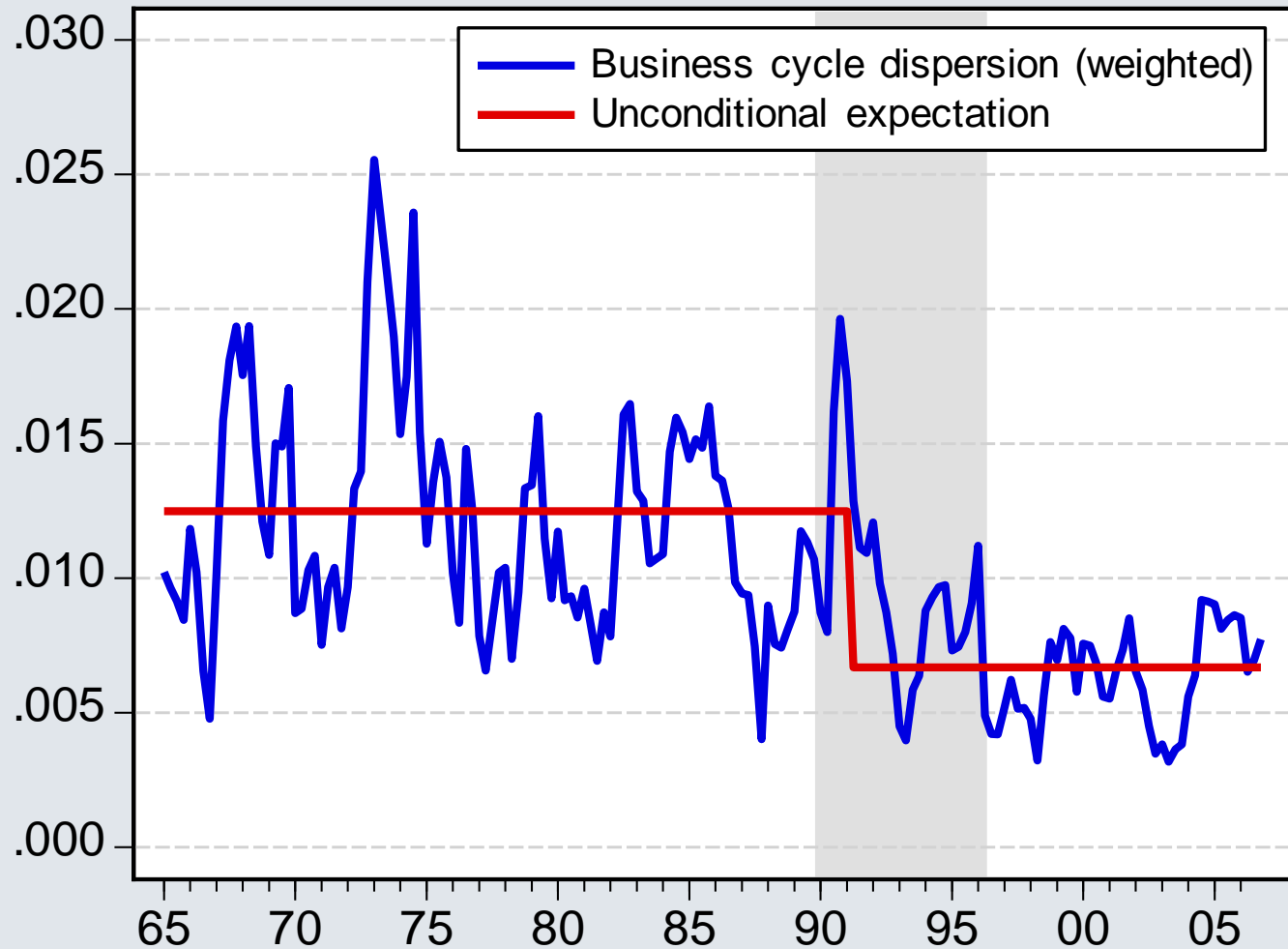
Business cycle cohesion periods





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Business cycle cohesion periods



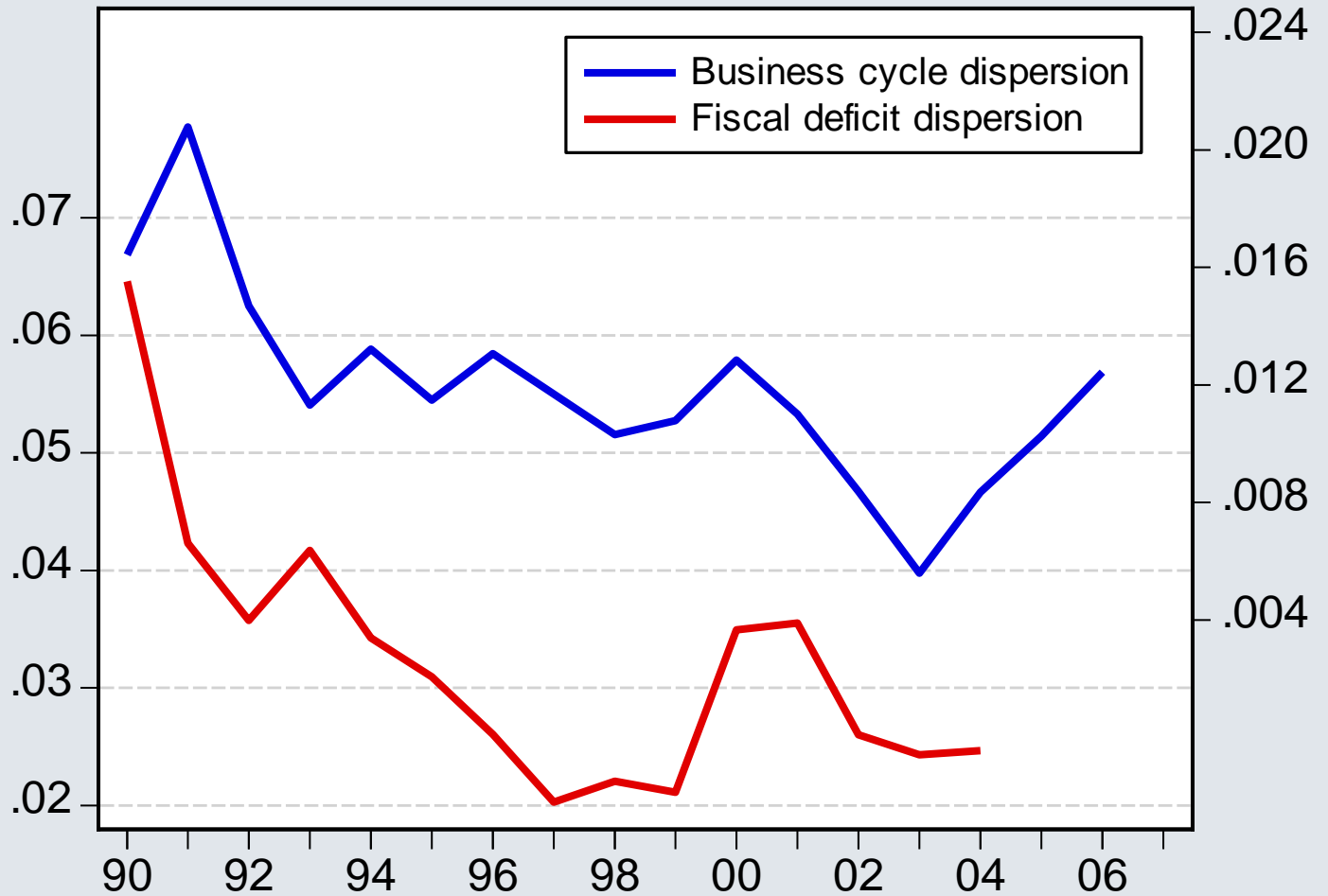


Where is the OCA criteria endogeneity?

- Changes in business cycle dispersion:
 - Strong, alternating periods of convergence/divergence until the 1990s.
 - 1990s: long and persistent period of convergence.
 - 1990s: more stable, low level of business cycle dispersion.
 - First indications of divergence after EMU's start?
- Evidence against endogeneity of OCA criteria?
- Which asymmetric shocks were not present in the 90s, but started to play a role with the birth of EMU?
 - Maastricht treaty.
 - Fiscal policy and business cycle synchronization.
 - Darvas et alia (2005), Böwer and Guilleminau (2006), Akin (2006): Fiscal policy as a robust determinant of BC synchronization.
 - Theoretical underpinnings: Coordination of fiscal and monetary policy (Onorante, 2004).



Fiscal policy and BC synchronization





Fiscal policy and BC synchronization

- Preliminary evidence on the link between Fiscal convergence and business cycle convergence:
 - Contemporary correlation: 0.63 [0.78] for unweighted [weighted] dispersion measures.
- Granger causality tests indicate that the direction of causality goes from Fiscal to cycle convergence.



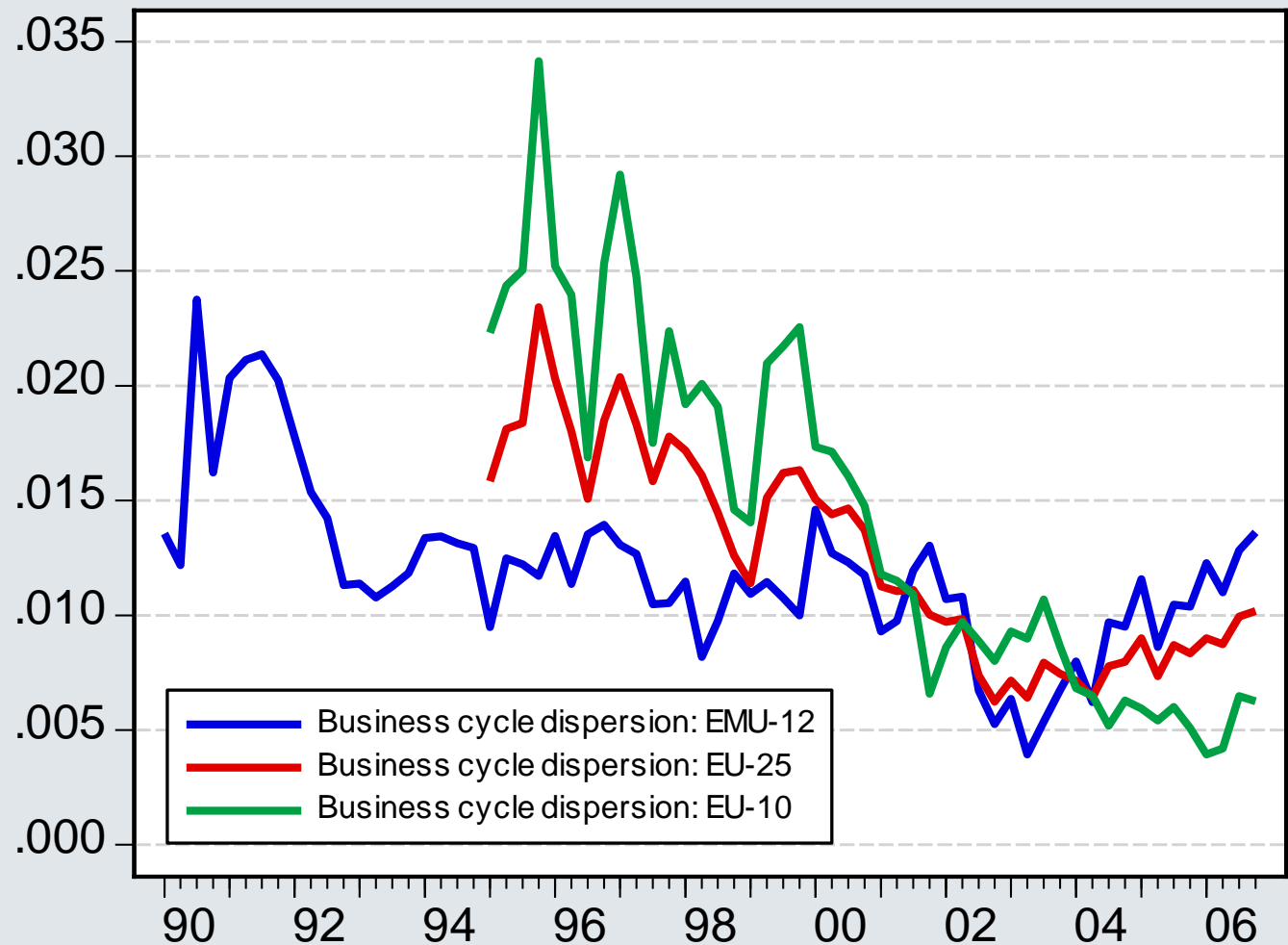
BC synchronization in an enlarged EMU

- How would the degree of optimality of EMU change with the inclusion of new economies?
- Consider the following groups:
 - EMU-12
 - EU-25
 - CEEC-10
- How does each economy contribute to the optimality of EMU as a currency area?
 - Country-specific measure of "cohesion" with the considered monetary union.
 - Measure refers to the difference in synchronization of the MU with and without that economy (std with - std without).
 - Example: Enlarged EMU case



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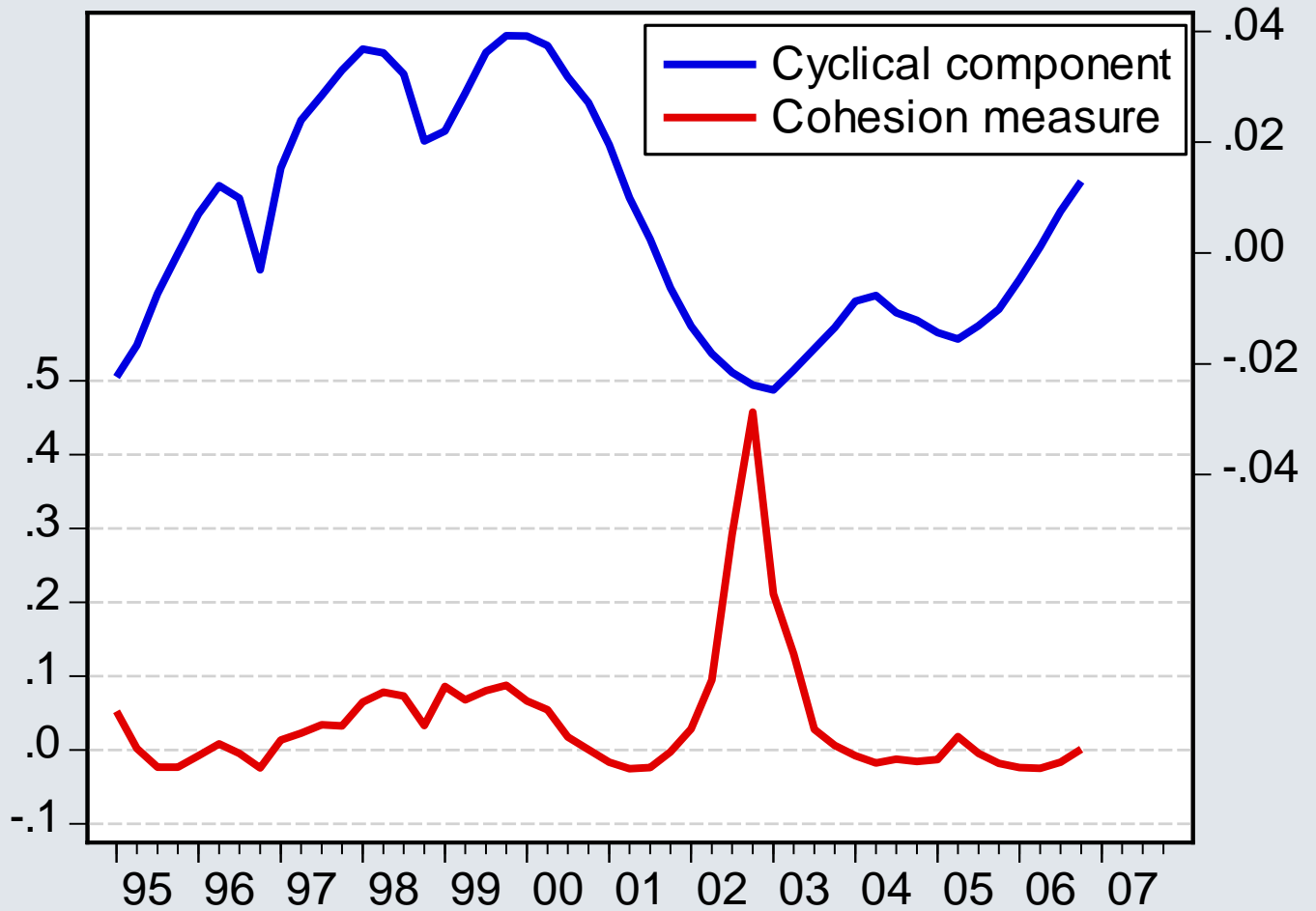
BC synchronization in an enlarged EMU





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The Polish case





Conclusions

- We propose approaching the issue of BC synchronization using instruments of the sigma-convergence literature.
- Different periods of BC convergence/divergence are identified in the EMU sample, with clear level and persistence differences in the 90s.
- Structural break testing identifies four periods concerning the level of synchronization.
- Fiscal policy seems to be behind the Maastricht-driven convergence and the short divergent period initiated after EMU was in place.
- We propose a new measure of cyclical cohesion with a currency area.
- This measure can be used to evaluate prospects of future EMU members in terms of BC synchronization with the full monetary area.