Eurostat's Business Cycle Clock: Methodology and Results

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Outline

- *Introduction*
- *Different economic cycles*
- *The αABβCD approach*
- *The BBC*
- *Methodological aspects*
- *Input variables*
- *Graphical output and assessment*

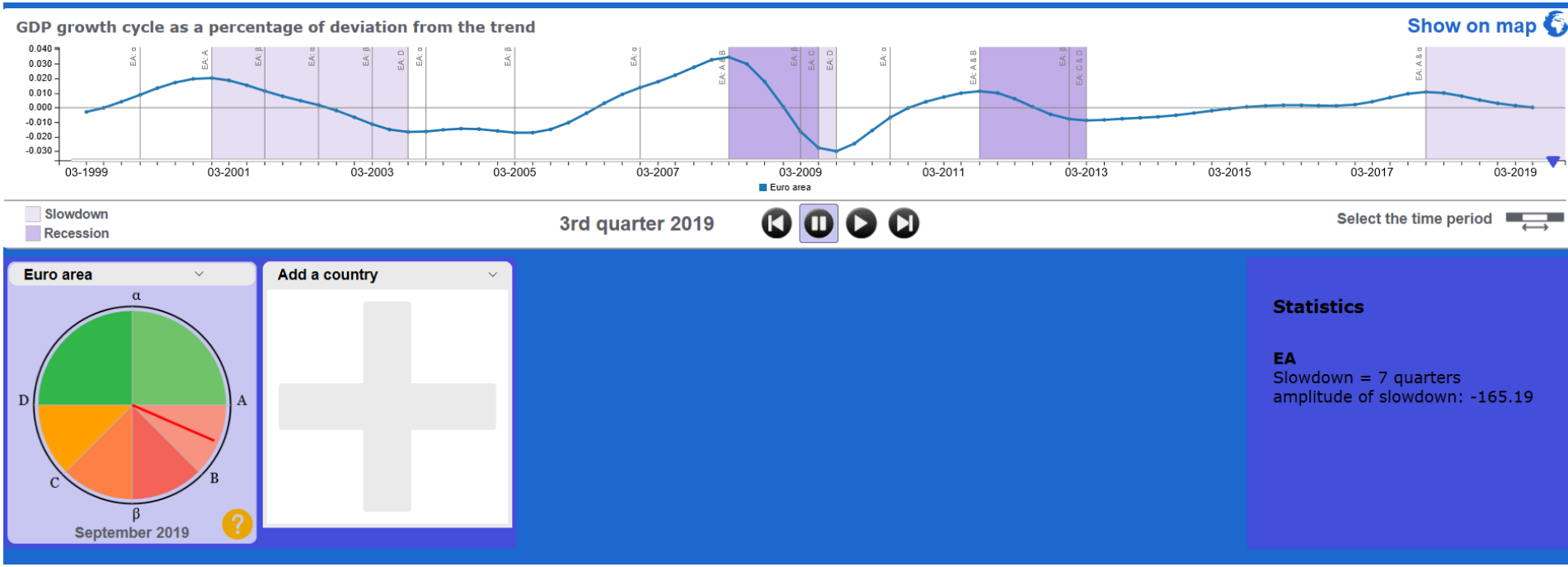
Introduction

- Great interest of users in a detailed picture of the cyclical situation
- Growing attention to cyclical facts, especially after the global economic and financial crisis
- Cyclical features often hidden when looking at PEEIs and more generally to official statistics
  - Irregular component, trend, etc.
- Need of extracting cyclical signals from PEEIs
  - Constructing turning points coincident indicators

What is the Business Cycle Clock?

- The BCC is a visualisation tool provided on the Eurostat website to convey information about the cyclical situation in the euro area and its member states
- Turning points and coincident turning point indicators as the engine of the tool
- Different phases of economic activity are visualised using a clock-type graph
- Dynamic application
  - **Evolution over the time**
  - **Cross-country comparison**

BCC – the main view



The web application is composed of 3 elements:

- the upper part of the window displays a linear graph giving a global view of the evolution of the situation
- the lower left corner of the window is dedicated to the business cycle clock
- the lower right corner is used to present cycle statistics

The clock and graph representation are dynamic

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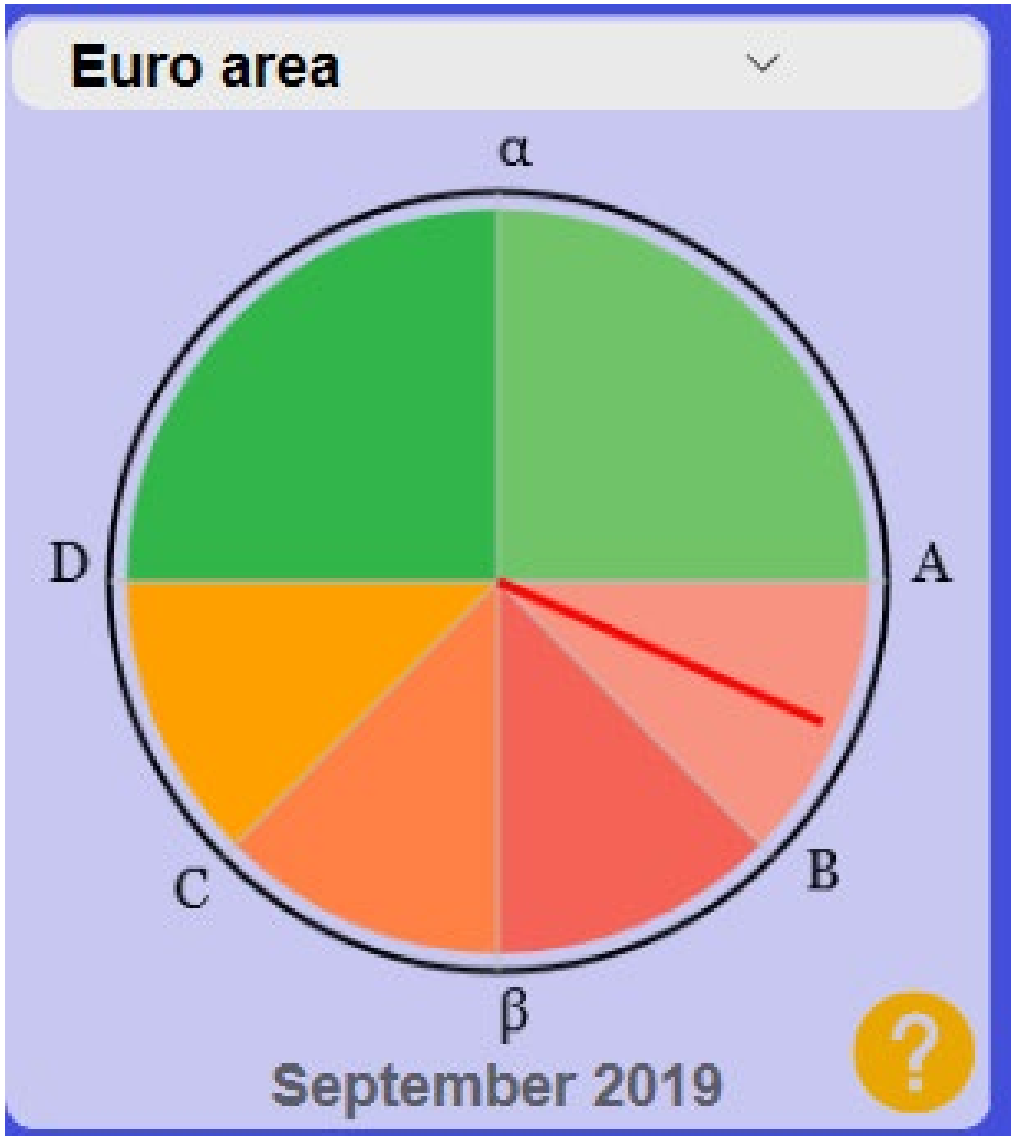
Clock : graphical synthesis



The status of an economy is depicted using a **single hand** against the background of a clock with sectors for different cycle phases

The clock is structured according to the so-called **αABβCD** approach

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Different cycles (I)

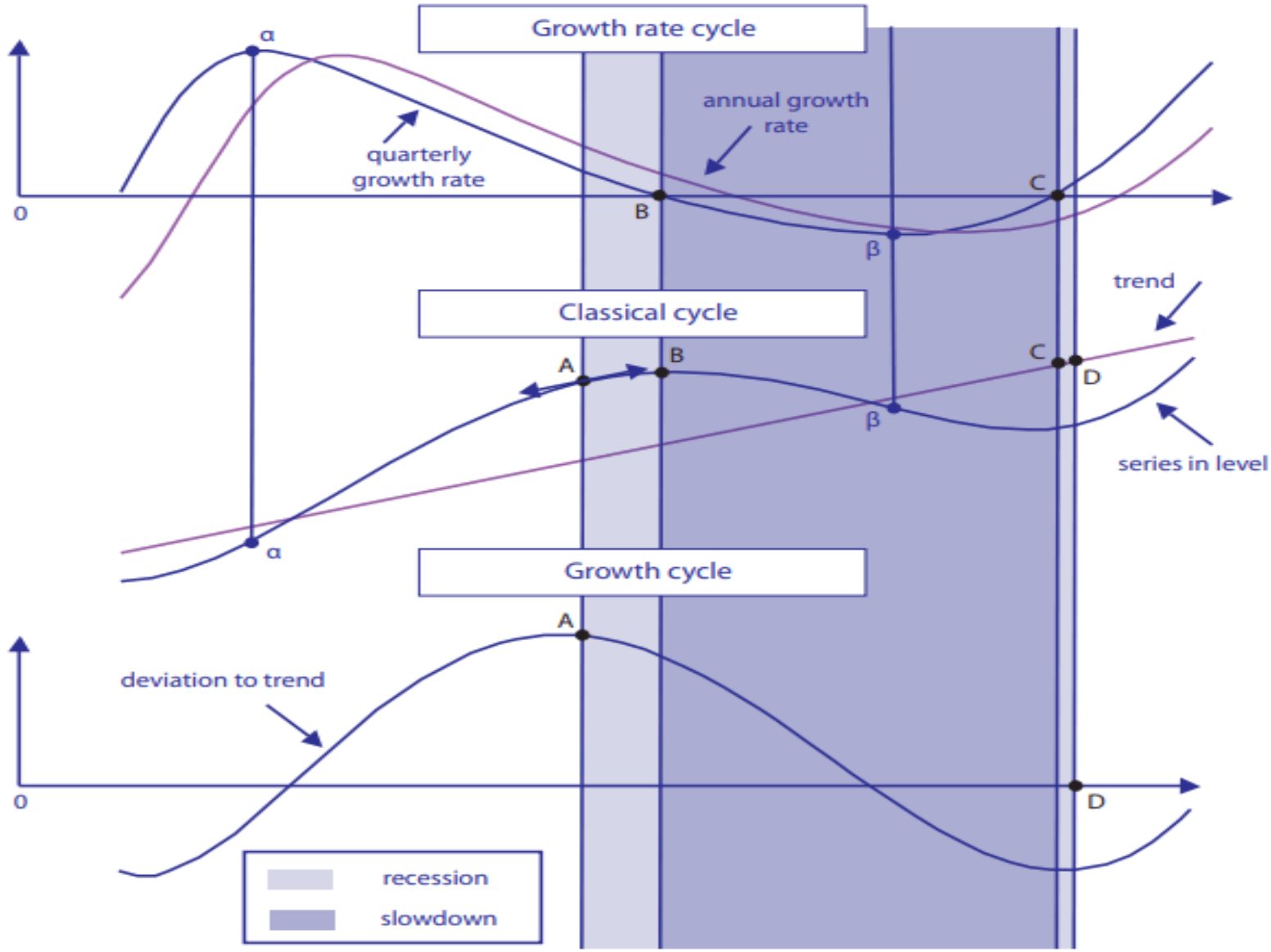
- *Classical Business cycle (Burns and Mitchell definition)*
  - Very relevant for detecting recessions
  - Not very informative during (possibly) quite long expansion phases

- *Growth cycle (Output gap)*
  - Very relevant to understand the position with respect to the potential output
  - More informative also during the expansion phases of business cycle
  - Anticipating business cycle peaks
  - Unable to detect the start and the end of recessions

Different cycles (II)

- *Growth rate cycle (Acceleration cycle)*
  - Highest number of fluctuations
  - High degree of volatility
  - Anticipating growth cycle peaks and business cycle troughs

- *Jointly monitoring several reference cycles (Anas, Ferrara 2004)*
  - Growth cycle and Business cycle (ABCD sequence)
  - Also including Acceleration cycle (αABβCD sequence)
  - Approach retained by Eurostat



Source: Anas and Ferrara (2004)

αABβCD approach

The clock is structured according to the so-called αABβCD approach with six types of "turning points" in the economic cycle:

- **α**: maximum of the GDP growth rate
- **A**: the growth rate slips below the trend
- **B**: the growth rate becomes negative
- **β**: minimum of the growth rate
- **C**: the growth rate becomes positive
- **D**: the growth rate surpasses the trend

where

- **α** and **β** are the turning points of the **acceleration cycle**
- **A** and **D** are the turning points of the **growth cycle**
- **B** and **C** are the turning points of the **business cycle**

And corresponding composite indicators

- **Growth Cycle Coincident Indicator** (GCCI)

provides the probability of a slowdown in the economy
signals the peaks and troughs of the growth cycle

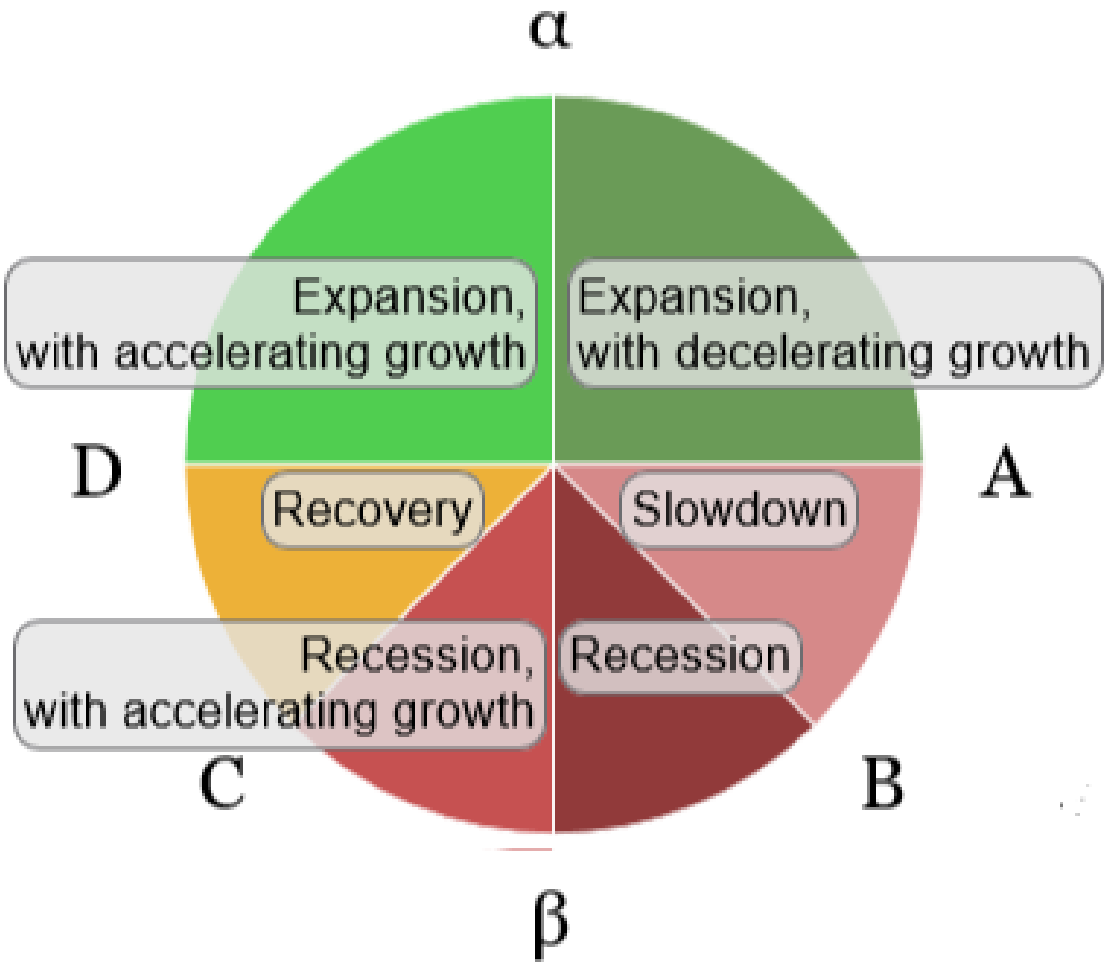
- **Business Cycle Coincident Indicator** (BCCI)

provides the probability of a recession
signals the peaks and troughs of the business cycle

- **Acceleration Cycle Coincident Indicator** (ACCI)

provides the probability of a deceleration in the growth rate
signals the peaks and troughs of the growth rate cycle

A visual representation of the αABβCD approach



α: maximum of the growth rate

A: the growth rate slips below the trend

B: the growth rate becomes negative

β: minimum of the growth rate

C: the growth rate becomes positive

D: the growth rate overpasses the trend

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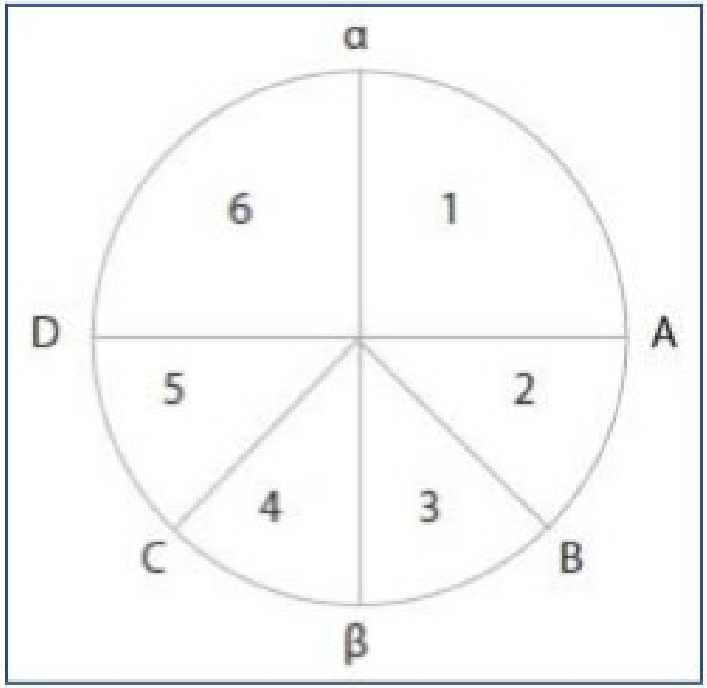
Combining the values of the cyclical indicators to compute the hand position in the BCC



Sector 1: Expansion, with decelerating growth

Sector 2 Slowdown

Sector 3 Recession

Sector 4 Recession, with accelerating growth

Sector 5 Recovery

Sector 6 Expansion, with accelerating growth

Growth, Business and Acceleration cycle indicators give the hand position

		ACCI			
		<0.5		>0.5	
		BCCI		BCCI	
		<0.5	>0.5	<0.5	>0.5
GCCI	<0.5	6		1	
	>0.5	5	4	2	3

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Methodological aspects (I)

1) Which model? Multivariate Markov-Switching models to jointly estimate a pair of probabilistic coincident indicators of the classical business cycle and growth cycle

- Euro Area as a whole (direct indicator)
- Largest Member Countries
- Unfeasible jointly modelling also of acceleration cycle for mathematical reasons

2) Ensure the correct sequence of peaks and troughs: MVMSM to satisfy, by construction, the ABCD approach

3) Model specification: comparison of a huge number of alternative coincident indicators obtained by considering

- presence of heteroskedasticity
- number of lags of the autoregressive part
- number of regimes
- endogenous variables
- rules to associate regimes and economic cycles (threshold)

Methodological aspects (II)

- *Selected variables are used to identify and estimate a number of autoregressive Markov-Switching models (MS-VAR)*

  MSIH (K) – VAR (L)

- *Where H indicates the presence of heteroskedasticity, (K) is the number of regimes and (L) the number of lags of the autoregressive part*
- *Number of regimes not smaller than 4*

Coincident indicators: input variables

Input variables for the MVMS models BCCI and GCCI:

- industrial production index
- unemployment rate
- manufacturing employment expectations for the months ahead
- financial situation of consumers over last 12 months

*The **Acceleration Cycle Coincident Indicator** (ACCI) is estimated using:*

- Economic Sentiment Indicator

Assessment of the performance of the coincident indicators

The behaviour of the coincident indicators is regularly benchmarked with historical dating chronologies obtained by means of non-parametric dating rules

Statistics is computed as a goodness-of-fit measure to the reference chronology:

- the Concordance Index
- the Brier's Score defined by the quadratic probability score

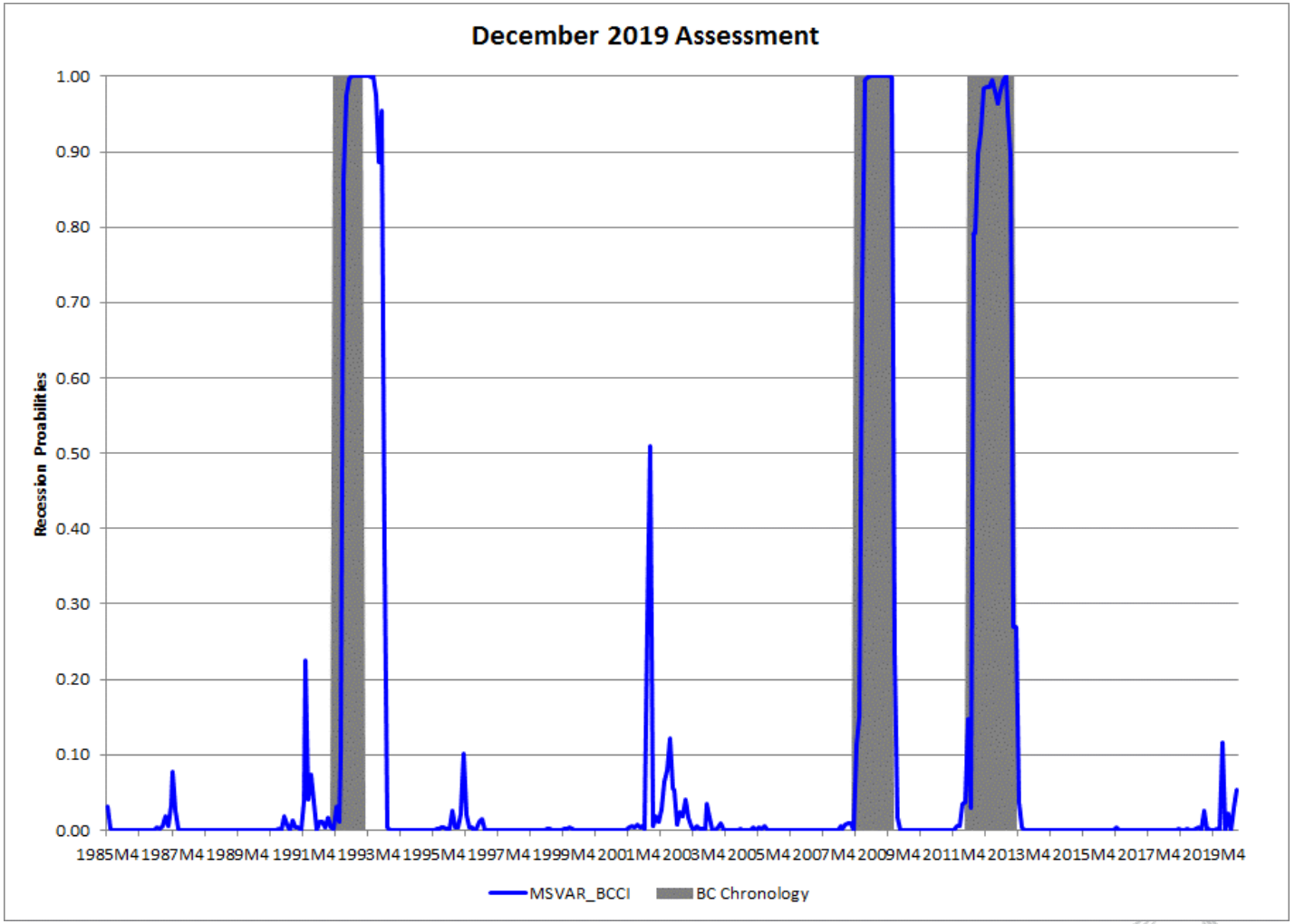
The type-1 error and type-2 error associated to our indicators are also regularly monitored where:

- the type-1 error is defined as the inability of the model to signal an existing slowdown/recession/deceleration
- the type-2 error is defined as the identification by the model of false slowdown/recession/decleration

  Due to the trade-off between type-2 and type-1 errors, the simultaneous minimisation of both is unachievable. A conservative approach suggests privileging the minimisation of type-2 errors

Benchmarking with historical dating chronologies

BCCI for the euro area



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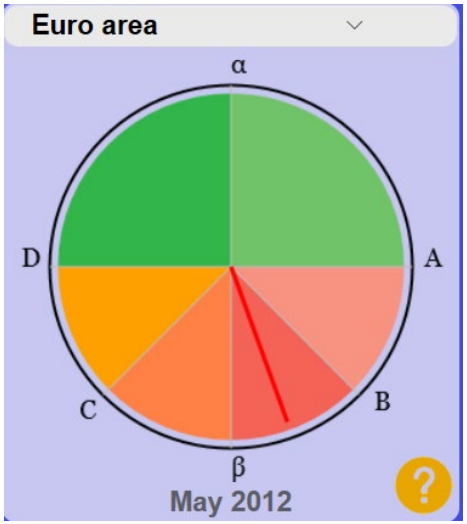
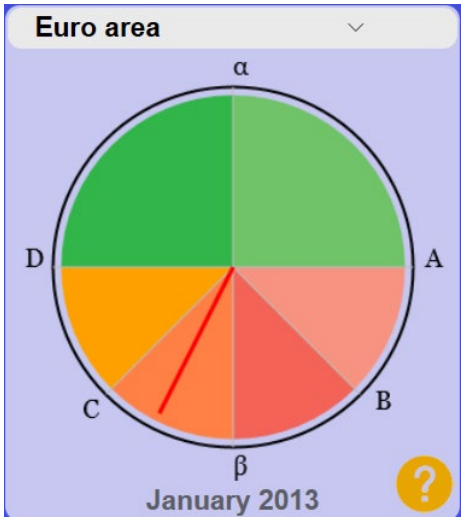
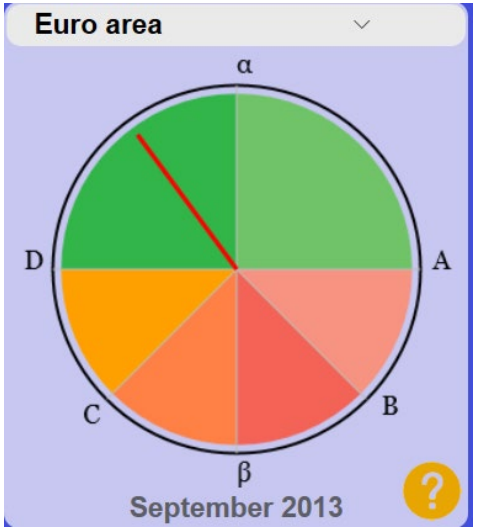
Application of BCC

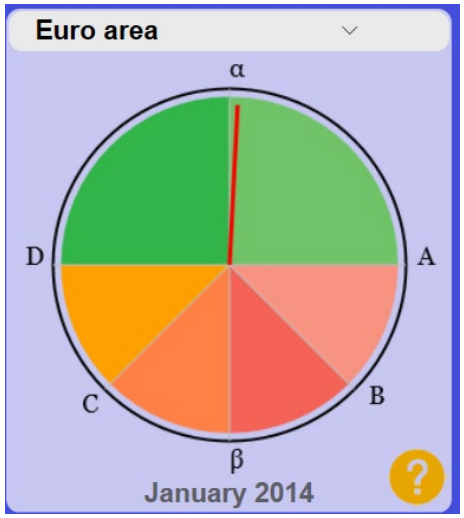
- Using the clock for a comparative study of the exit from the slowdown and the recession
- Useful information in terms of synchronisation and diffusion of turning points across euro area member countries
- Possibility of deriving synchronisation and diffusion measures based on the clock outcomes

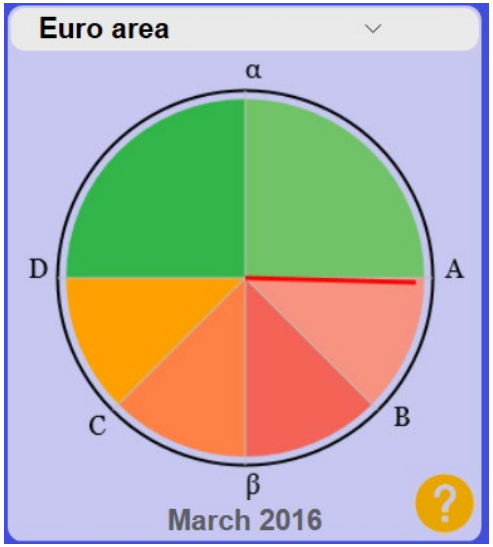
BCC indications for the euro area

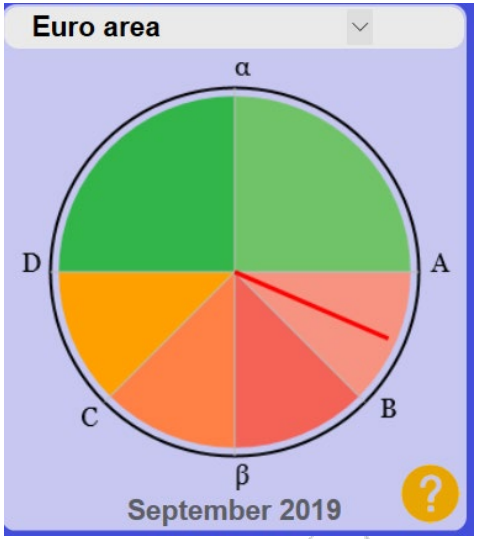












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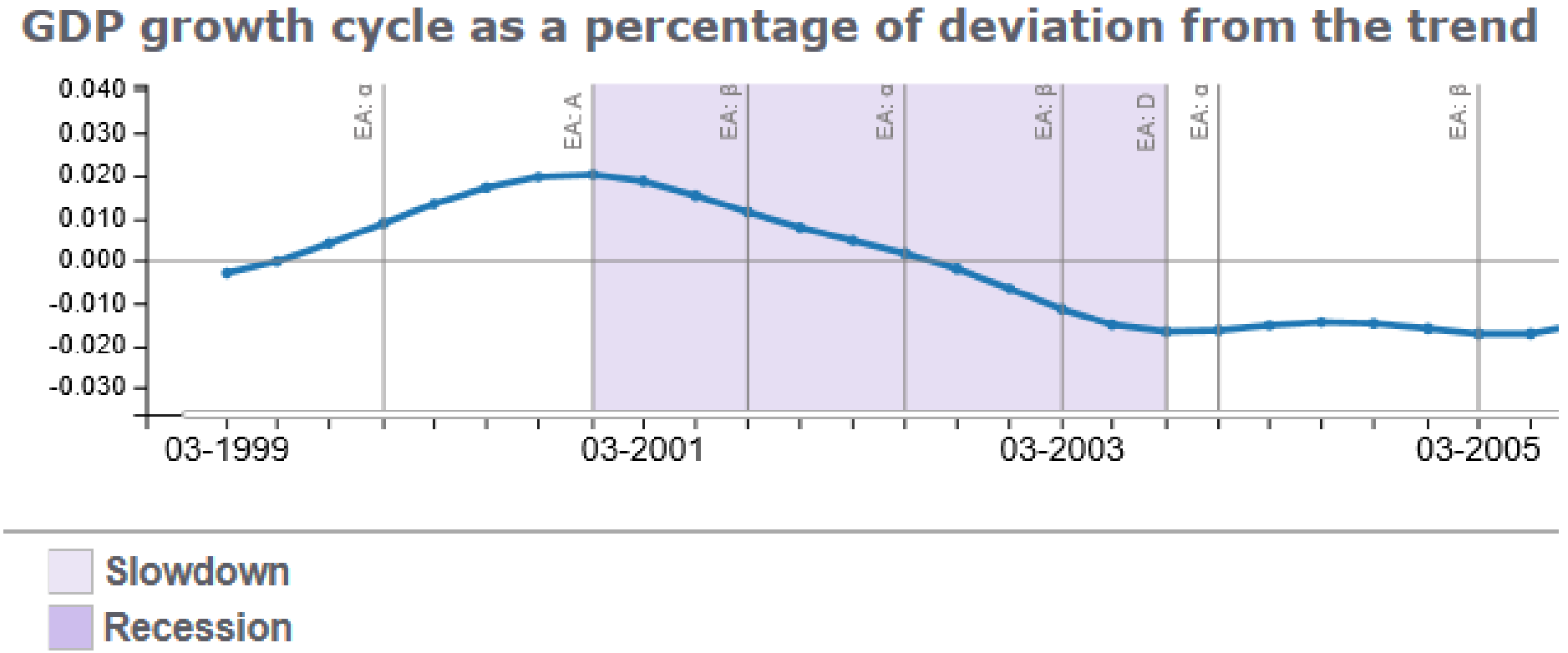
BCC - linear graph for the euro area



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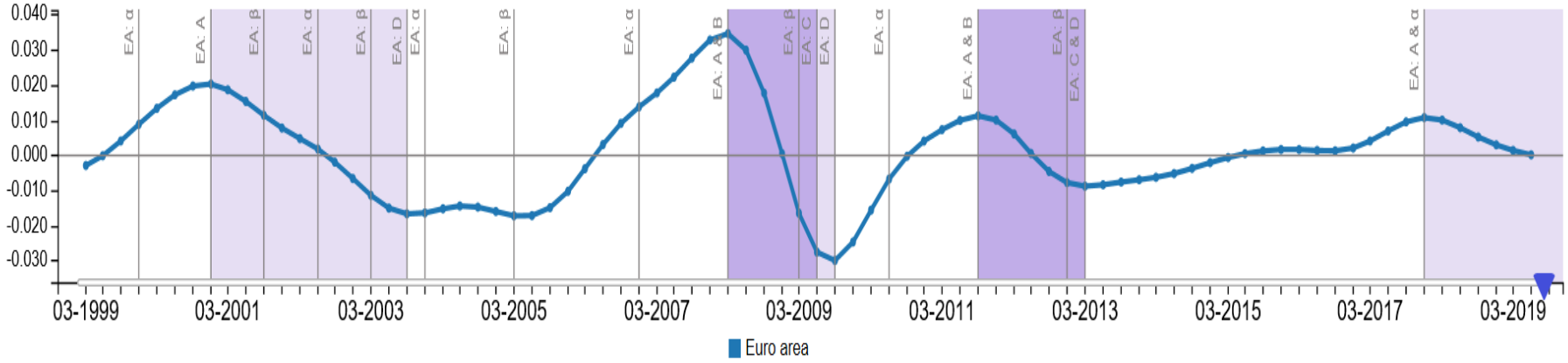
GDP growth cycle as a percentage of deviation from the trend

Show on map



Slowdown

Recession

3rd quarter 2019

Select the time period

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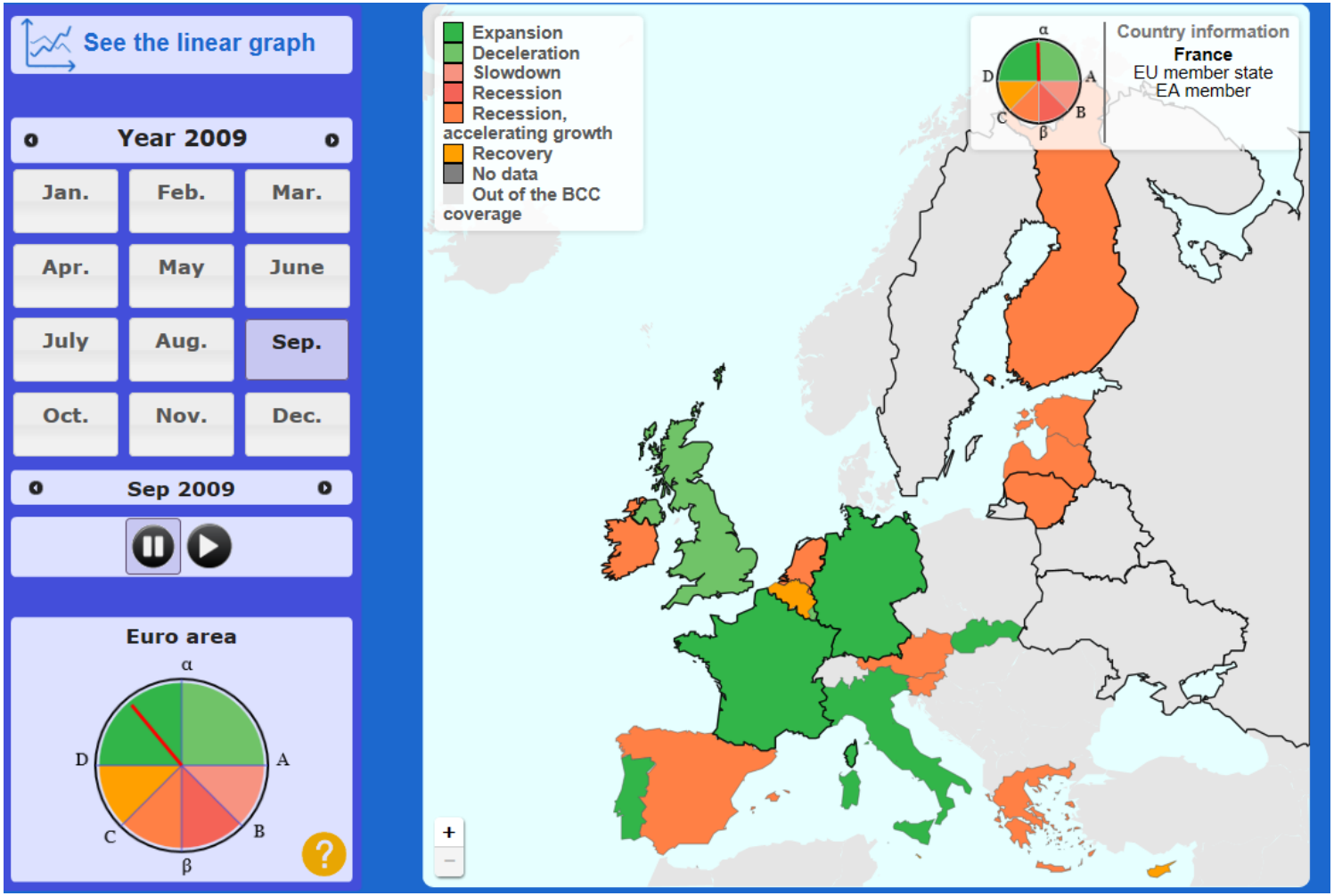
BCC – the map view

September 2009



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Thank you for your attention