

Detection of Business Cycle Turning Points in the Serbian Economic Activity

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Introduction

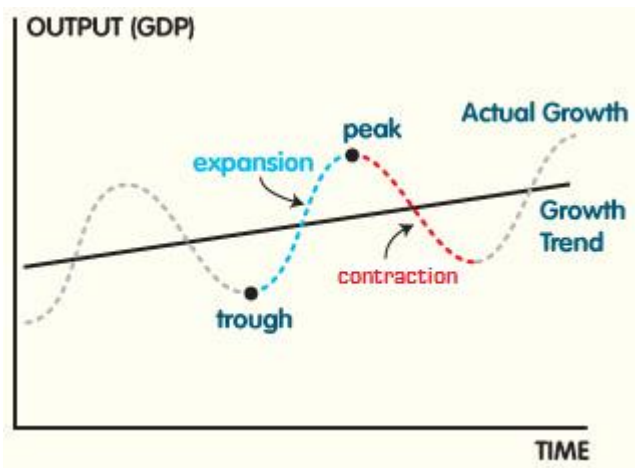


- Prompt and Complex Reporting and Public Policy Support Division
- Provide **decision-making support** through:
 - Combining data from different sectors (and institutions)
 - Econometric analyses
 - *Time series analysis, modelling and forecasting*
 - *Hypothesis testing*
 - Policy analyses
 - Descriptive indicators
 - *Economic Stability Indicator*
 - *Macroeconomic Imbalances Procedure indicator*
 - *MK30 – monthly indicator of GDP movement*
 - Reports
 - *Scheduled reports (monthly, quarterly, etc.)*
 - *On-demand reporting*

Motivation

Business Cycle

- Business cycle (a.k.a. economic cycle or trade cycle) - periodic but irregular up-and-down movements in economic activity

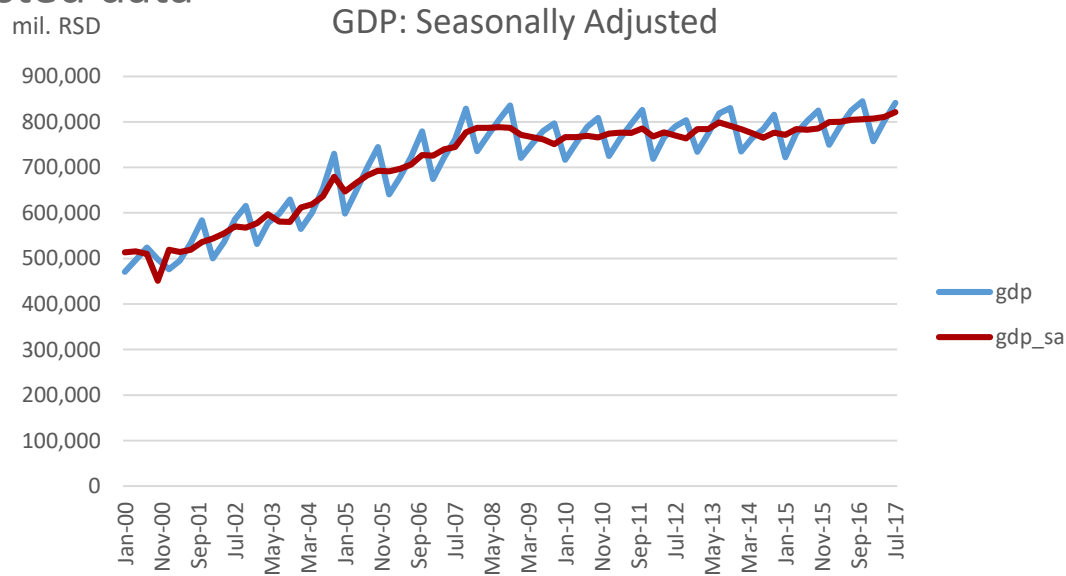


Our Task

- Detect (and possibly predict) turning points of the business cycle
- Valuable input for many stakeholders (government, policy makers, businesses)
 - Understanding economic activity
 - Preparing and carrying out economic regulation actions
- Steps:
 - Historical analysis
 - Leading (a.k.a. early-warning) indicators

Data

- Official data producers (SORS, NBS, MFIN...)
- Publicly available data
- Data series:
 - Since 2000
 - Proxy for economic activity – GDP
 - Leading indicator candidates – industry, turnover, CPI, ESI...
- Seasonally adjusted data



Business Cycle Detection

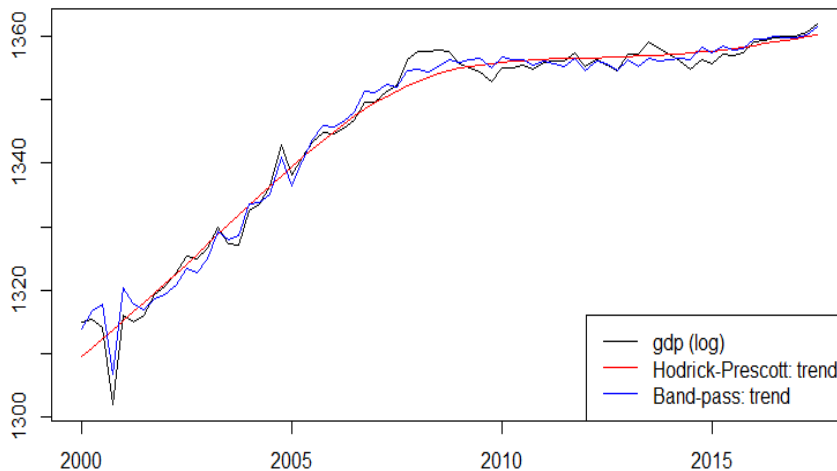
- Filtration techniques:

- Hodrick-Prescott filter (Hodrick & Prescott, 1997) – smoother trend, noisier cycle
- Band pass filter (Christiano & Fitzgerald, 1999) – noisier trend, smoother cycle
- We didn't use multivariate methods, such as Kalman filter (Kalman, 1960)

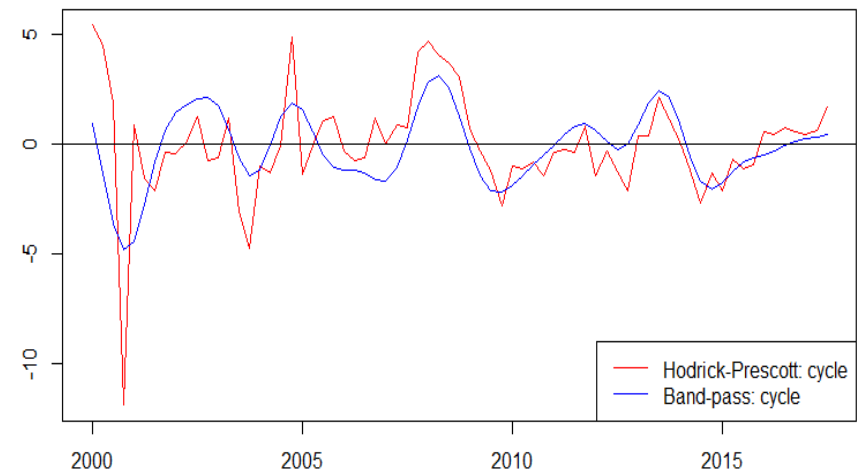
- Implemented through *mFilter* package

```
hp = hpfilter(lgdp, freq = 1600, type = "lambda")  
bp = cffilter(lgdp, root = 1, pl = 6, pu = 32)
```

Filtered trends

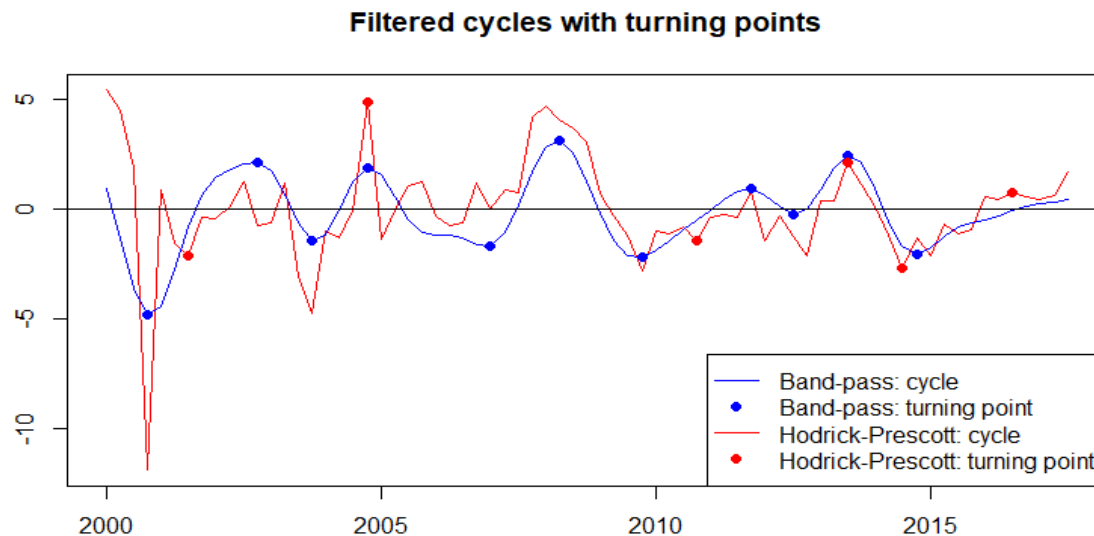


Filtered cycles



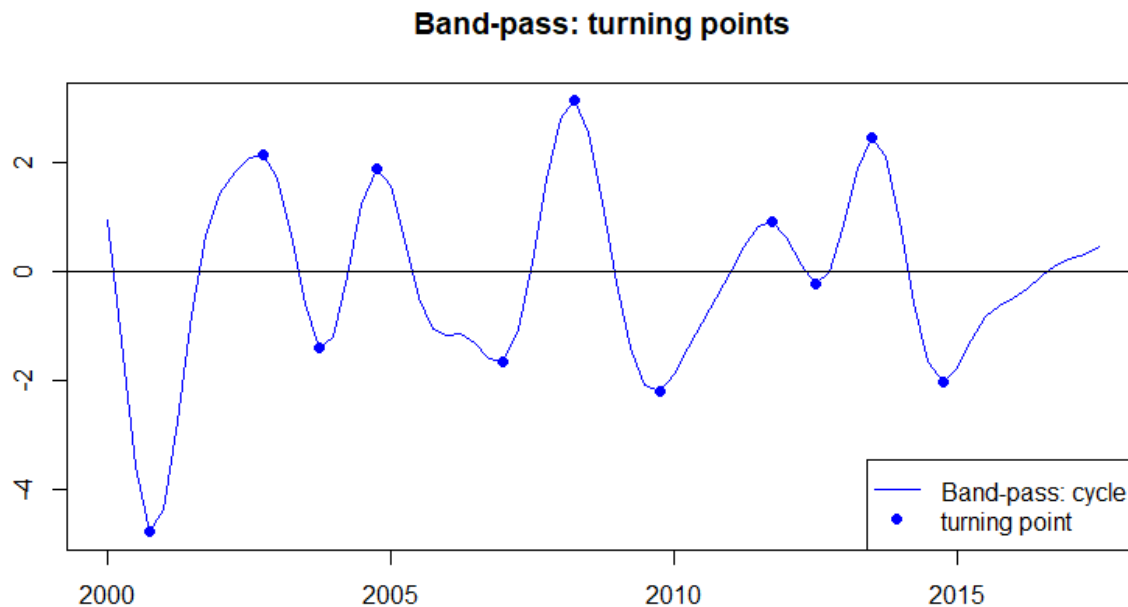
Turning Points Detection

- No already built solution or package
- Approach used by Eurostat (Anas, Billio, Ferrara & Mazi, 2008)
- Rules:
 - First and last several points of the series are disregarded
 - Every turning point is a local optimum
 - Turning points alternate (i.e. there can't be two consecutive peaks or troughs)
 - Minimum length criteria for every cycle and every phase



Economic Interpretation

- Analysis of results through economic perspective
 - Consultation with National Accounts
- Band-pass chosen as more appropriate filter



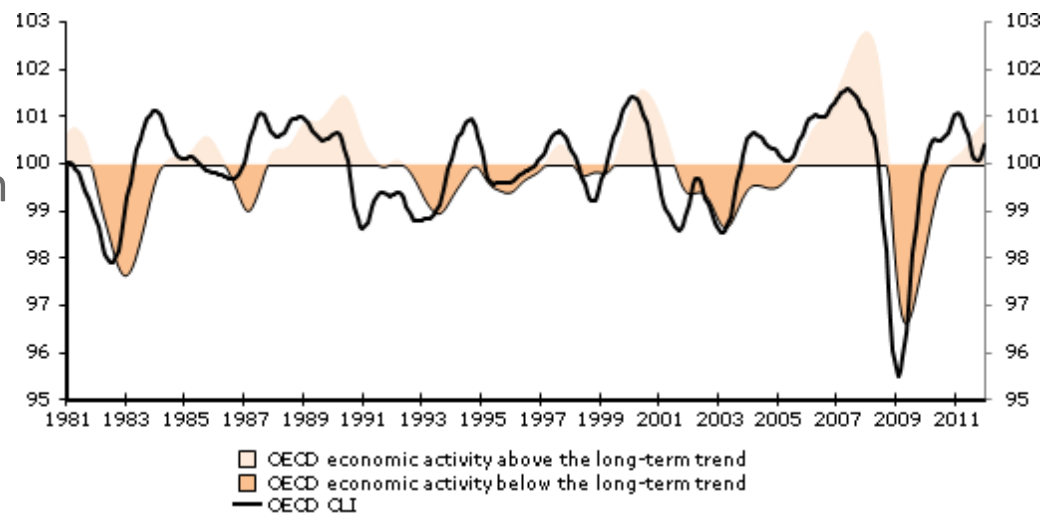
Visualization

- Available on [SORS website](#)
- Refreshes automatically
- Not in R



Leading Indicators

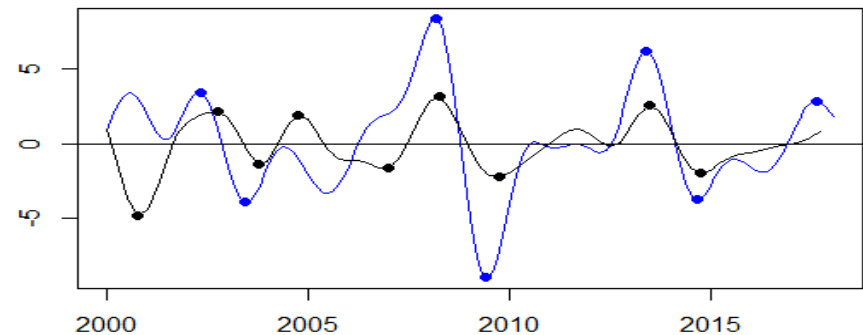
- Early detection mechanism of the economic fluctuations
- Higher frequency (i.e. monthly)
- Simple indicators: industrial production, manufacturing, turnover in retail trade, CPI, M2, M3, Economic Sentiment Indicator (ESI)
 - Not available for Serbia: wages, employment, wholesale trade...
- Criteria – OECD (Nardo et al., 2005):
 - Targeted tuning points
 - Missed
 - Extra
 - Average lead
 - Standard deviation of lead
- Additional criterion – series length



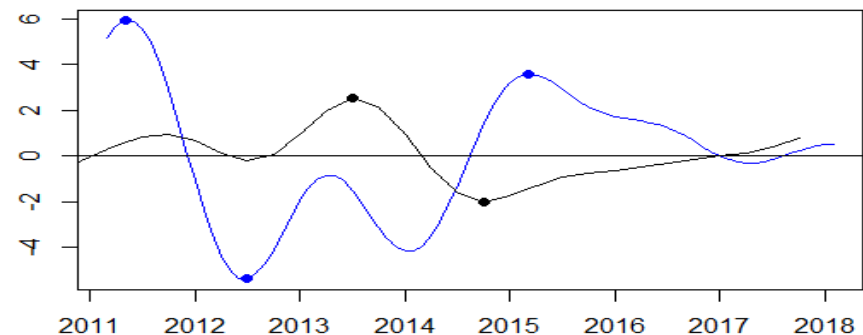
Leading Indicators - Results

- Best – Manufacturing Production Index
 - 2 quarters ahead
 - Detected (6), missed (2) and extra (0)
- Promising – ESI
 - Available only since 2011

Turning points - Manufacturing (blue)



Turning points - ESI (blue)



Next Steps

- Continuous evaluation and monitoring
- Composite indicators
- ESI as leading indicator– when more data becomes available

Questions?



Thank you!