Estimation of Potential Output for the Czech Republic: Some Issues

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Outline

- Idea and approaches to measurement of potential GDP and GDP gap
- Output gap resulting from linear trend
- Hodrick-Prescott filter
- SVAR approach: 3 alternative specifications
- Open issue: evaluation of alternative approaches

Idea and approaches to measurement

- One of many definitions:
  - „Potential output (natural real gross domestic product) refers to the highest level of real Gross Domestic Product output that can be sustained over the long term.“
- Why: gdp gap more relevant for co-movement of main economic indicators such as inflation and unemployment...
- Important for economic policy, for decision about key interest rates, evaluation of budget deficits etc.

Idea and approaches to measurement

- Approaches to potential output measurement:
- Univariate – removing linear trends, Hodrick-Prescott and various other filters
- Multivariate – SVAR, Multivariate filtering methods, State space models, production function method.
- Crucial point: How to compare them? Which gap is the true one?
- „How reliable is what you get?“ (Del Negro – Shorfeide 2006)

Linear trend

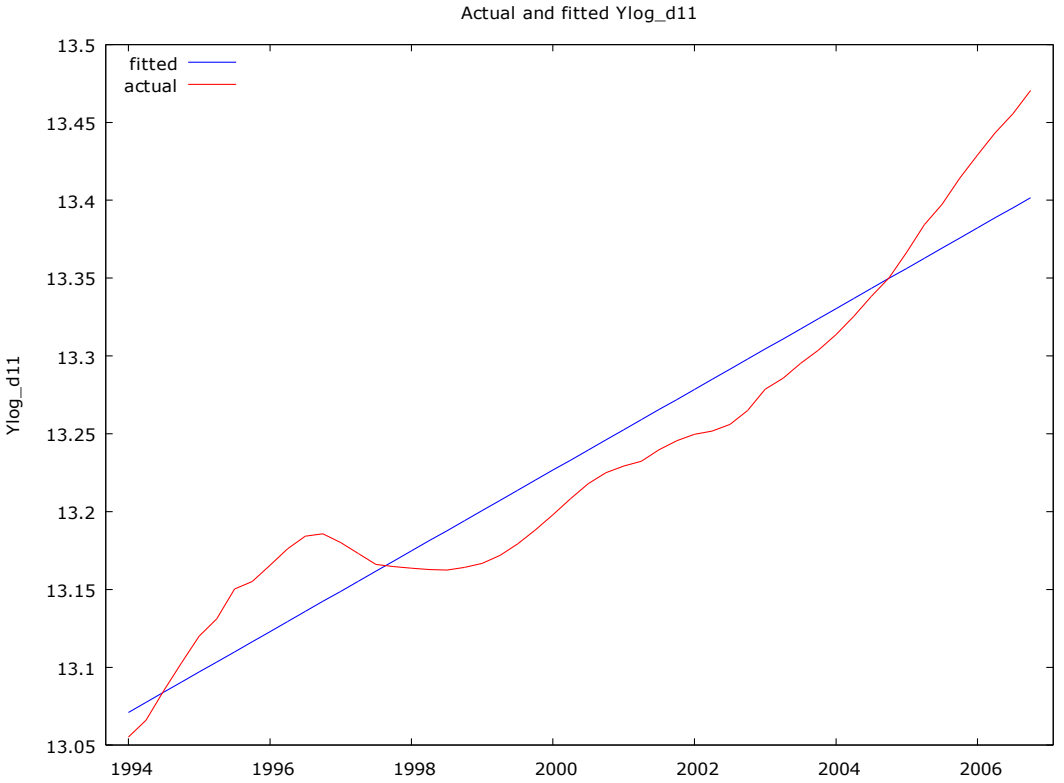
- Very simple:

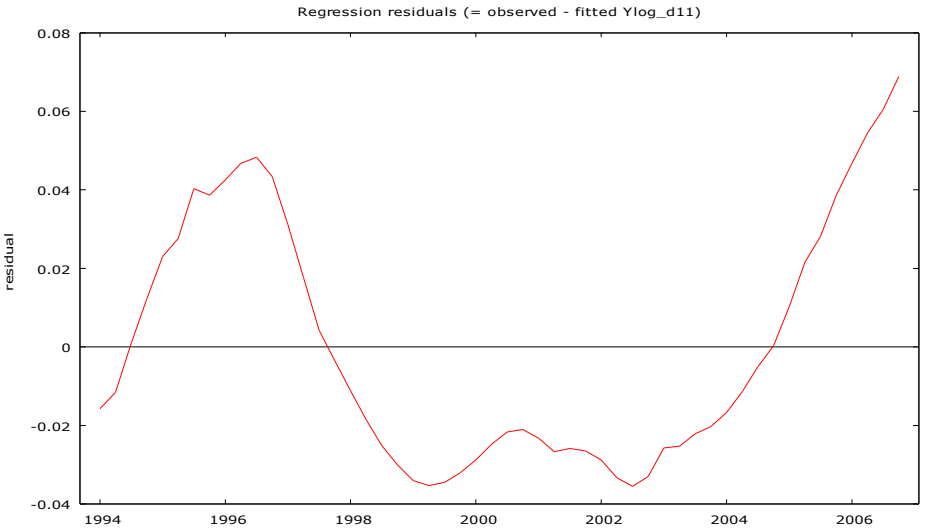
$$y_t = \beta_0 + \beta_1 t + u_t$$

- Results

$$y_t = 13.05 + 0.0064\, t$$
$$(0.0088)\quad (0.0003)$$

- Problems:
  - non-stationary output gap
  - original time-series not really linear (despite logarithm)



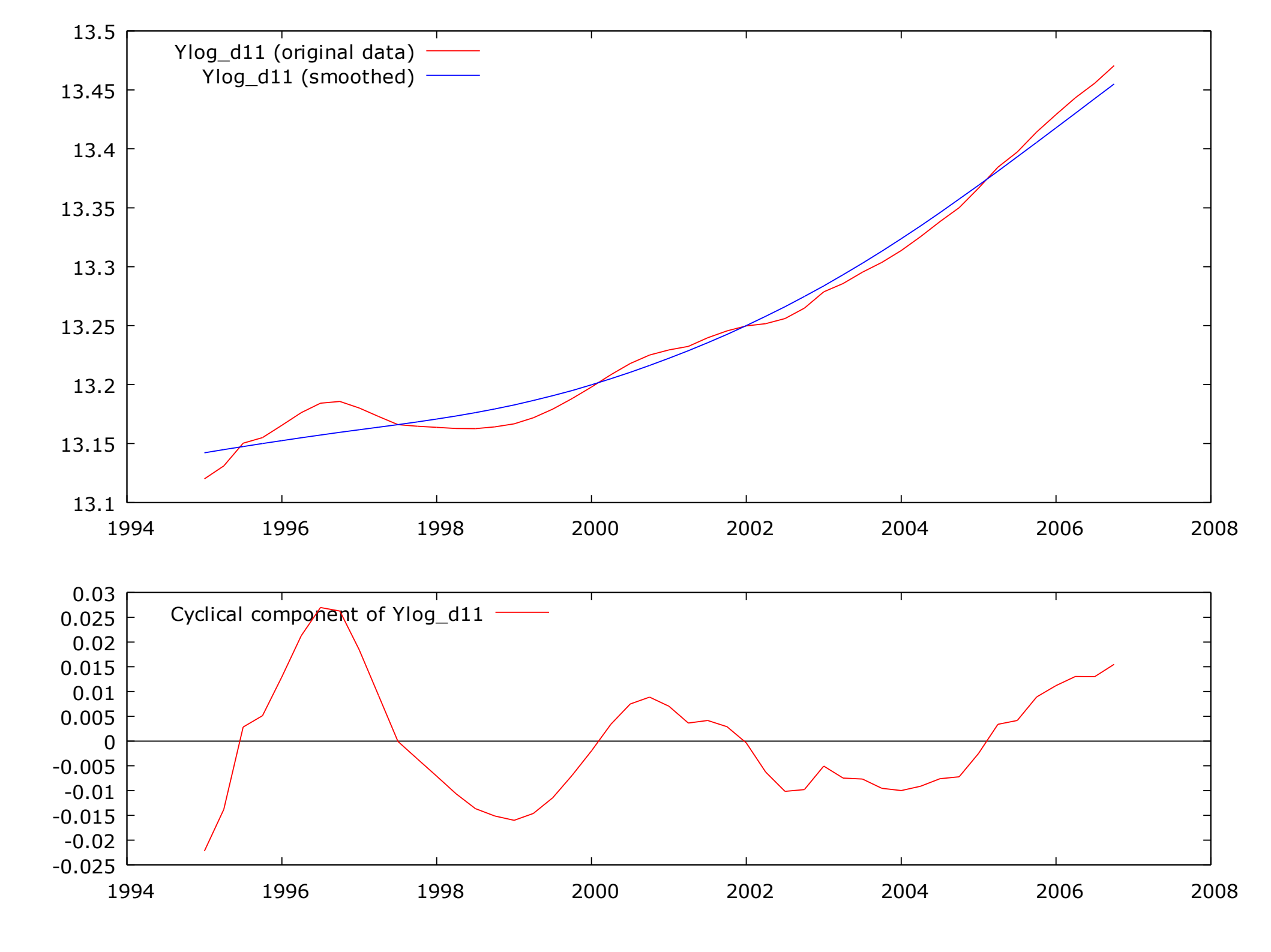


Hodrick-Prescott Filter

- Most commonly used.
- Minimize:

$$\sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} \left[(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1}) \right]^2.$$

- Disadvantages:
  - end-sample bias
  - contains information only from one time series
  - works like frequency filter (high-pass) – longer recession/boom evaluated as a shift in trend as such, not just a long-term deviation (longer than 3 years).


Ylog_d11 (original data)
Ylog_d11 (smoothed)
13.5
13.45
13.4
13.35
13.3
13.25
13.2
13.15
13.1
1994
1996
1998
2000
2002
2004
2006
2008
Cyclical component of Ylog_d11
0.03
0.025
0.02
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
-0.02
-0.025
1994
1996
1998
2000
2002
2004
2006
2008

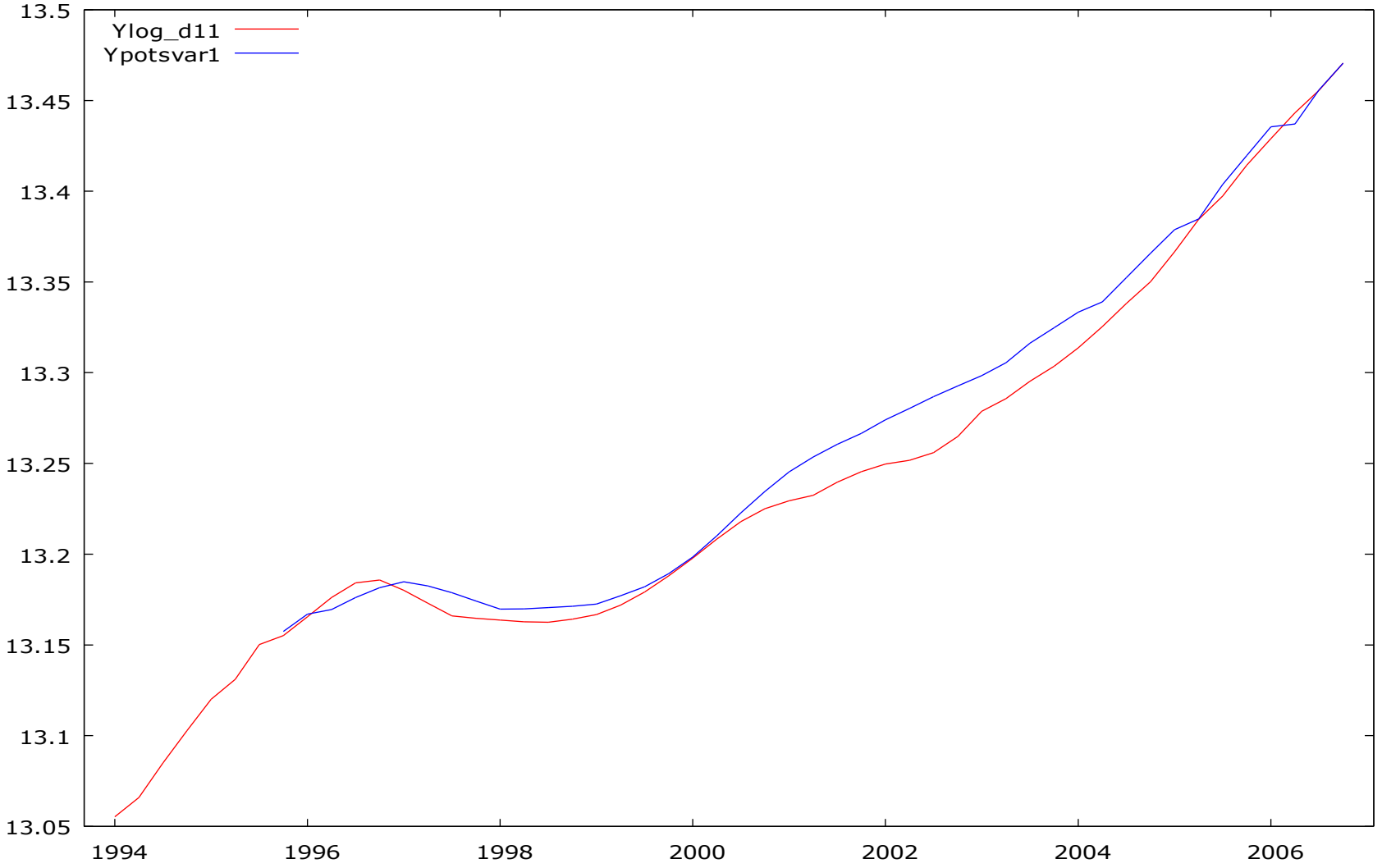
SVAR Method

- Method proposed by Blanchard and Quah (1989)
- Information about the method can be found elsewhere: Hamilton (1994) or Enders (2004) for example.
- Based on restrictions imposed on matrix in VMA representation of VAR (unrestricted) model.
- 3 model specifications used (Blanchard-Quah; „central bank's“, Iris Claus):

$$x_t = \begin{pmatrix} \Delta y_t \\ u \end{pmatrix} \qquad x_t = \begin{pmatrix} \Delta y_t \\ cpicore \end{pmatrix} \qquad x_t = \begin{pmatrix} \Delta y_t \\ \Delta \log(L_t) \\ cui_t \end{pmatrix}$$

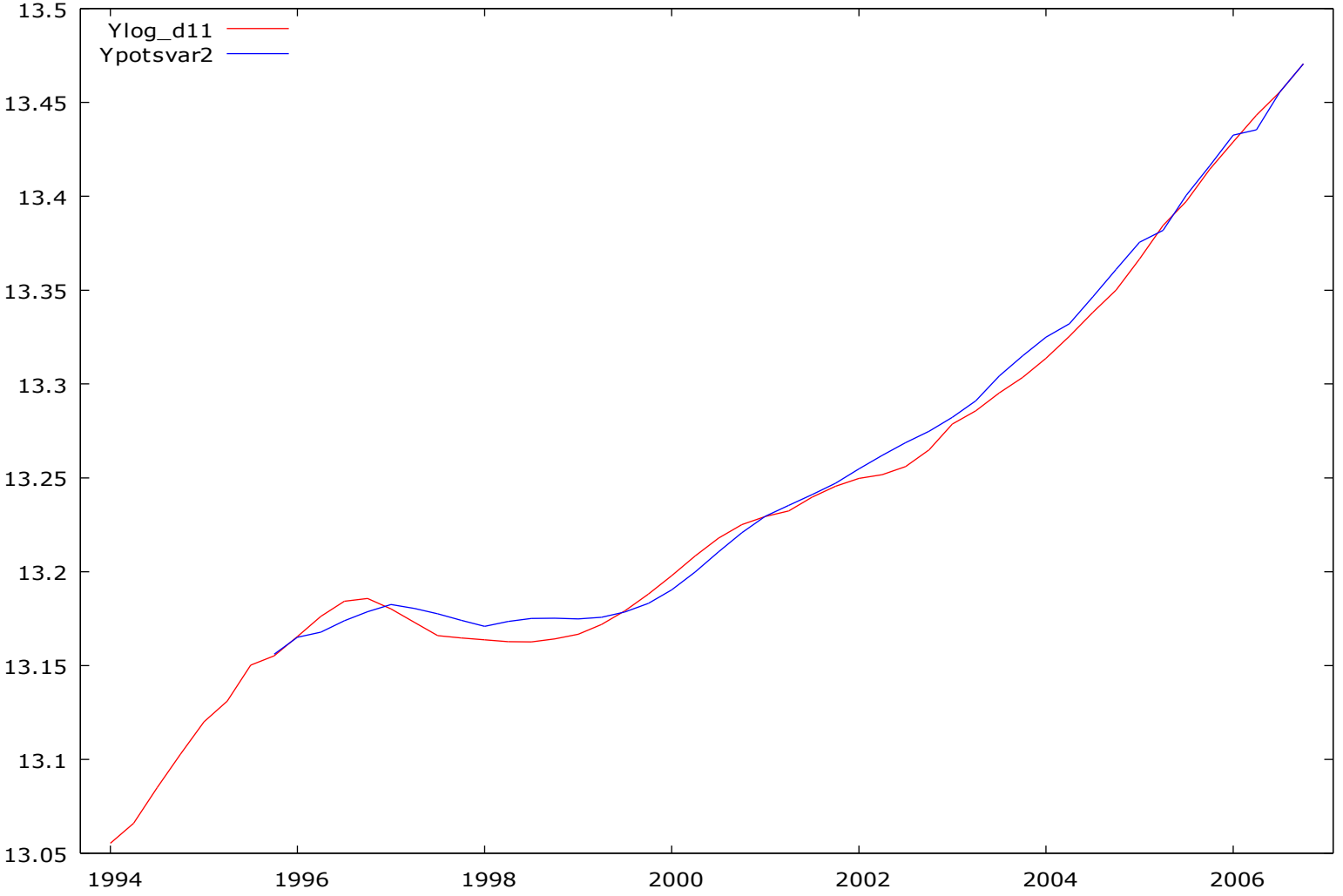
SVAR results

- Blanchard-Quah: gdp and U



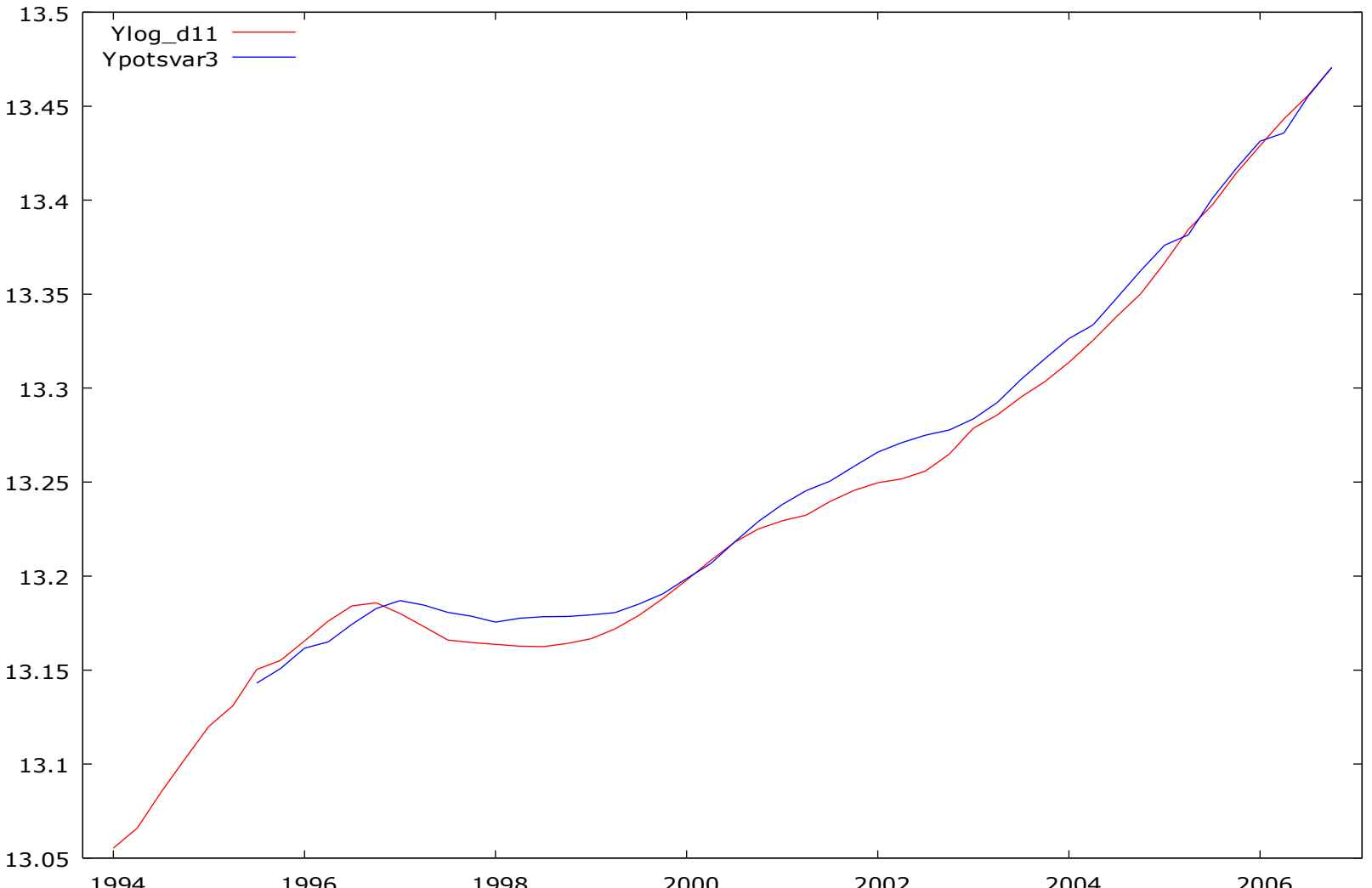
SVAR results

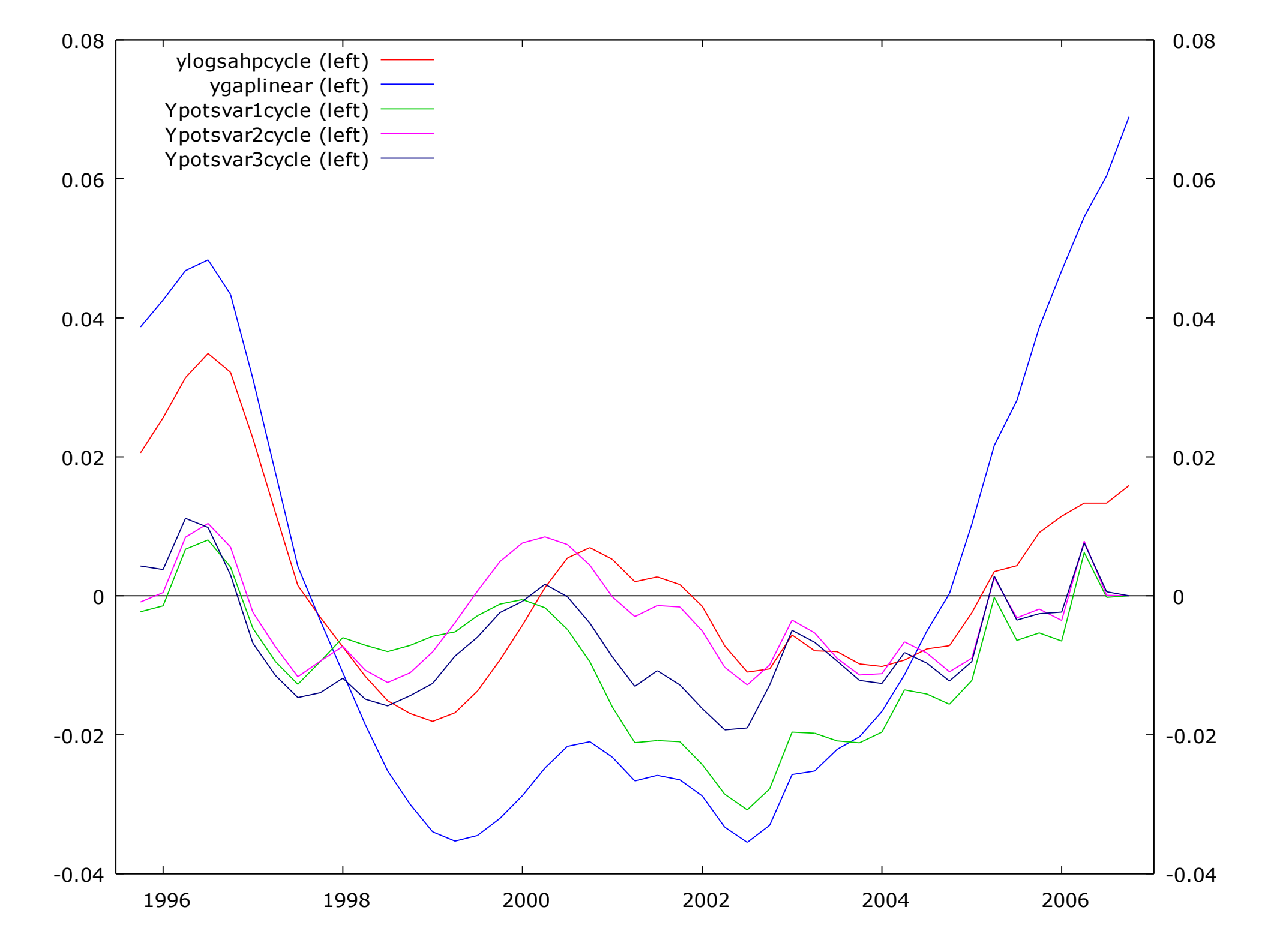
- gdp and cui



SVAR results

- three-variables model




ylogsahpcycle (left)
ygaplinear (left)
Ypotsvar1cycle (left)
Ypotsvar2cycle (left)
Ypotsvar3cycle (left)
0.08
0.06
0.04
0.02
0
-0.02
-0.04
1996
1998
2000
2002
2004
2006

Comparing Output Gaps

- Linear: seems to be rudiculous due to non-linearity of original time-series
- HP filter as a benchmark: recessions since 1997:4 to 1999:4 and 2002:1 - 2004:4
- Differences in timing of recessions: the Blanchard-Quah model suggests there was lower than trend growth almost in the whole sample.
- Size of fluctuations also differs: the three-variables model has the lowest fluctuations.

Comparing Output Gaps

- Evaluation through applications: which gap explains most of shifts in unemployment?
- gdp/cpi (but only about 16% of variance)
- And of CPIcore changes?
- all are bad (less than 1% of variance): perhaps due to continuous decrease of CoreCPI in the Czech Republic during last ten years.
- Other issue: stationarity.

Conclusion

Not very reliable...

(God save the rules of thumb!!!)