

Model-Based Estimation of Output Gap in Poland

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Output Gap Estimation

- Univariate & Multivariate HP
- Production Function
- SVAR
- Univariate & Multivariate UC

Why UC?

- HP is just a special case of UC, but its parameters not estimated.
- Multivariate UC specifies a simplified structural model useful on its own.
- Multivariate UC efficiently uses available information.

The Model

- Phillips curve

$$\pi_t = b_\pi \pi_{t-1} + b_y y_{t-1} + b_{\Delta q} \Delta q_{t-1} + b_{\pi^{food}} \pi_t^{food} + b_{\pi^{oil}} \pi_{t-1}^{oil} + \varepsilon_t^\pi$$

- Aggregate demand

$$y_t = a_y y_{t-1} + a_r (i_{t-1} - \bar{\pi}_{t-1}) + a_q q_{t-1} + a_{y^*} y_{t-1}^* + \varepsilon_t^y$$

- Potential output

$$Y_t = y_t + t_t$$

$$t_t = t_{t-1} + \beta_{t-1} + \varepsilon_t^t$$

$$\beta_t = \beta_{t-1} + \varepsilon_t^\beta$$

Estimation 1

- Classical methods inadequate. Time series for transition countries are short and subject to large shocks
- Bayesian methods blend theory with the data. Estimation of the output gap consistent with models developed for stable economies.

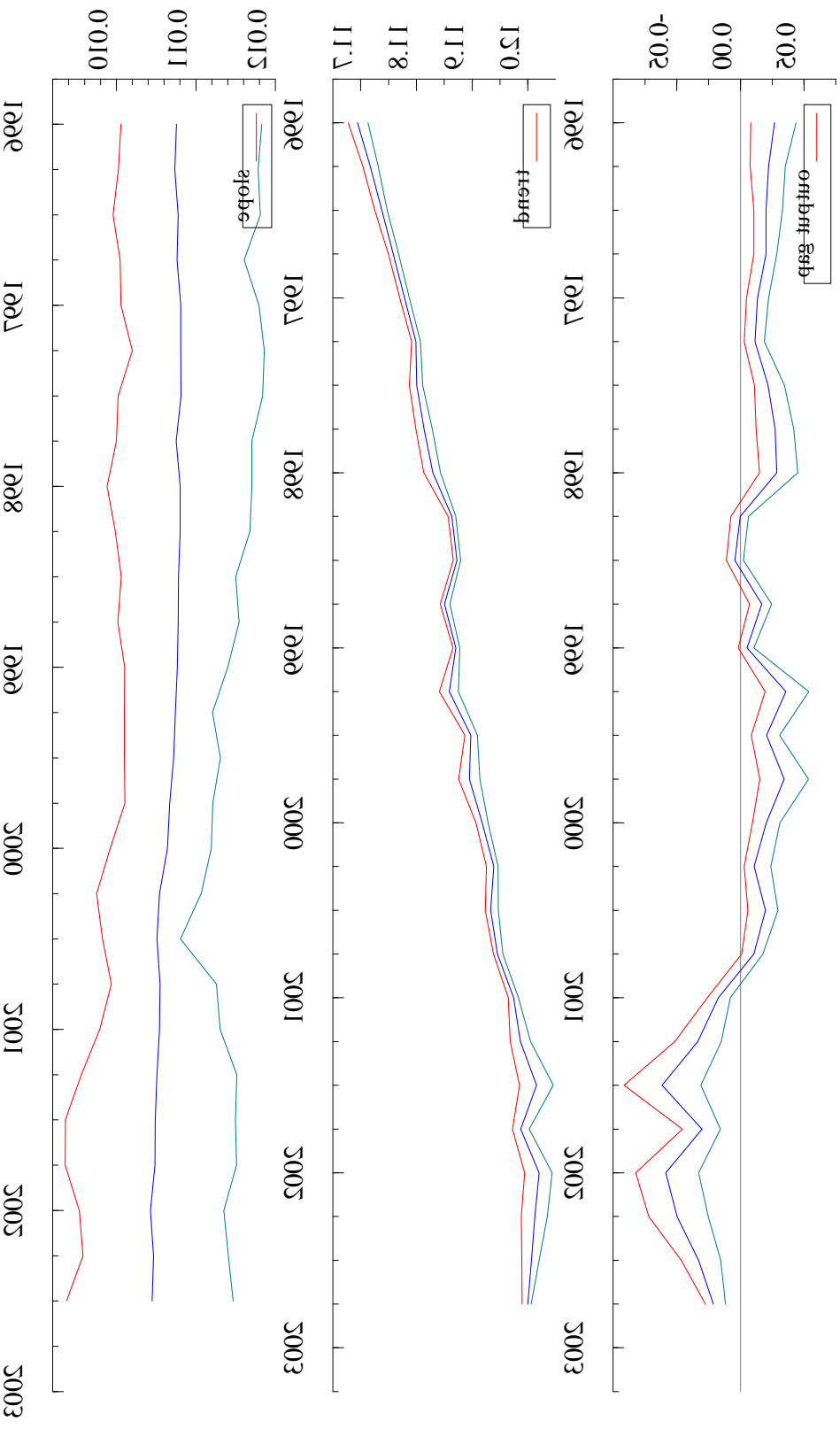
Estimation 2

- Numerical methods needed for estimation of the model: Markov Chain Monte Carlo.
- Start from arbitrary number and generate draws from conditional densities until convergence.

Results

	Prior		Posterior	
	Mean	Std. Error	Mean	Std. Error
b_{π}	0.8	0.8	0.530	0.146
b_{γ}	0.15	0.15	0.119	0.076
b_{dq}	0.2	0.2	0.057	0.037
$b_{\pi\text{food}}$	0.2	0.2	0.177	0.108
$b_{\pi\text{oil}}$	0.03	0.03	0.008	0.005
a_{γ}	0.9	0.9	0.757	0.122
a_r	-0.05	-0.05	-0.201	0.148
a_q	0.1	0.1	0.699	0.249
a_{γ^*}	0.1	0.1	0.252	0.167

Estimated state variables



Extensions

- Robustness.
- Combine UC with production function approach.
- Optimal monetary policy.

Conclusions

- Estimated output gap significantly different from HP methods.
- The model generates not only point estimates, but also uncertainty.
- The model may be useful for policy analysis.
- Several extensions possible.