Forecasting with VARs with Time-Variation in the Mean

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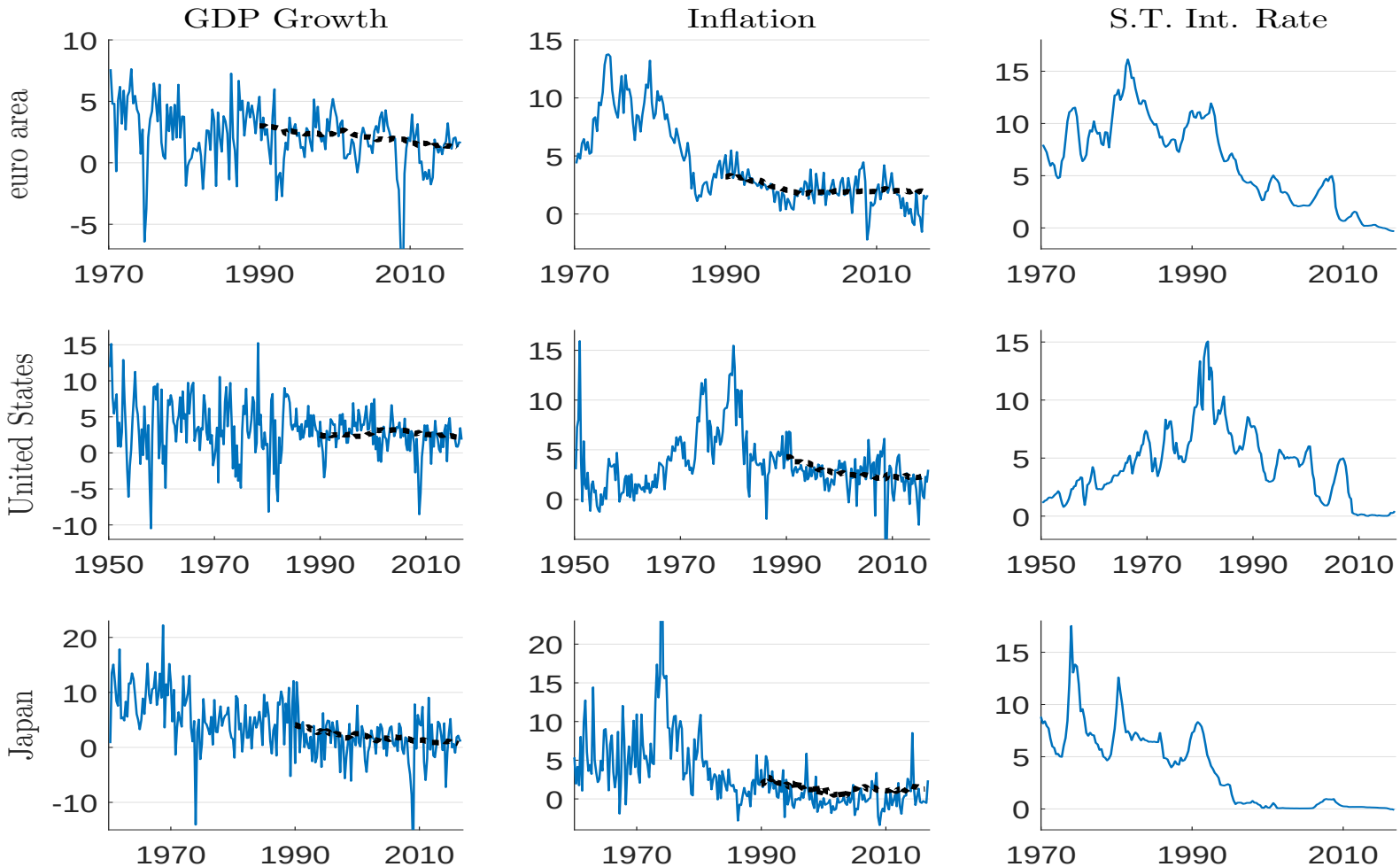
Motivation: changes in the mean over time



Blue lines: GDP growth, inflation, and the short-term interest rate; dotted lines: the long-term forecasts from Consensus Economics

Motivation

- Surveys found to provide useful information for forecasting and trend "estimation"

  Ang, Bekaert, and Wei (2007), Faust and Wright (2013), Wright (2013), Clark and Doh (2014), Kozicki and Tinsley (2012), Mertens (2016), Chan, Clark, and Koop (2015)

- Problems with standard TVP VARs (Cogley and Sargent, 2005; Primiceri, 2005)
  - Computational burden
  - Potential over-parameterisation issues

  Some solutions: Koop and Korobilis (2013), Eisenstat, Chan, and Strachan (2016), de Wind and Gambetti (2014)

Model

- VAR with a local mean

$$y_t - \psi_t = \sum_{k=1}^{p} B_k \left(y_{t-k} - \psi_{t-k} \right) + \varepsilon_t, \quad \varepsilon_t \sim N\left(0, H_t\right),$$

- modelled as random walk

$$\psi_t = \psi_{t-1} + \eta_t, \quad \eta_t \sim N(0, V_t),$$

- and linked to long-term survey forecasts (Consensus)

$$z_t = P_\psi \psi_t + g_t, \quad g_t \sim N\left(0, G_t\right),$$

P_ψ: selection matrix.

Stochastic volatility in all equations. Inference with Gibbs sampler.

- Label: Survey Local Mean (SLM) model.

Similar models: Garnier, Mertens, and Nelson (2015), Andrle and Bruha (2017)

Forecast evaluation

For euro area, US and Japan over 2000-2016

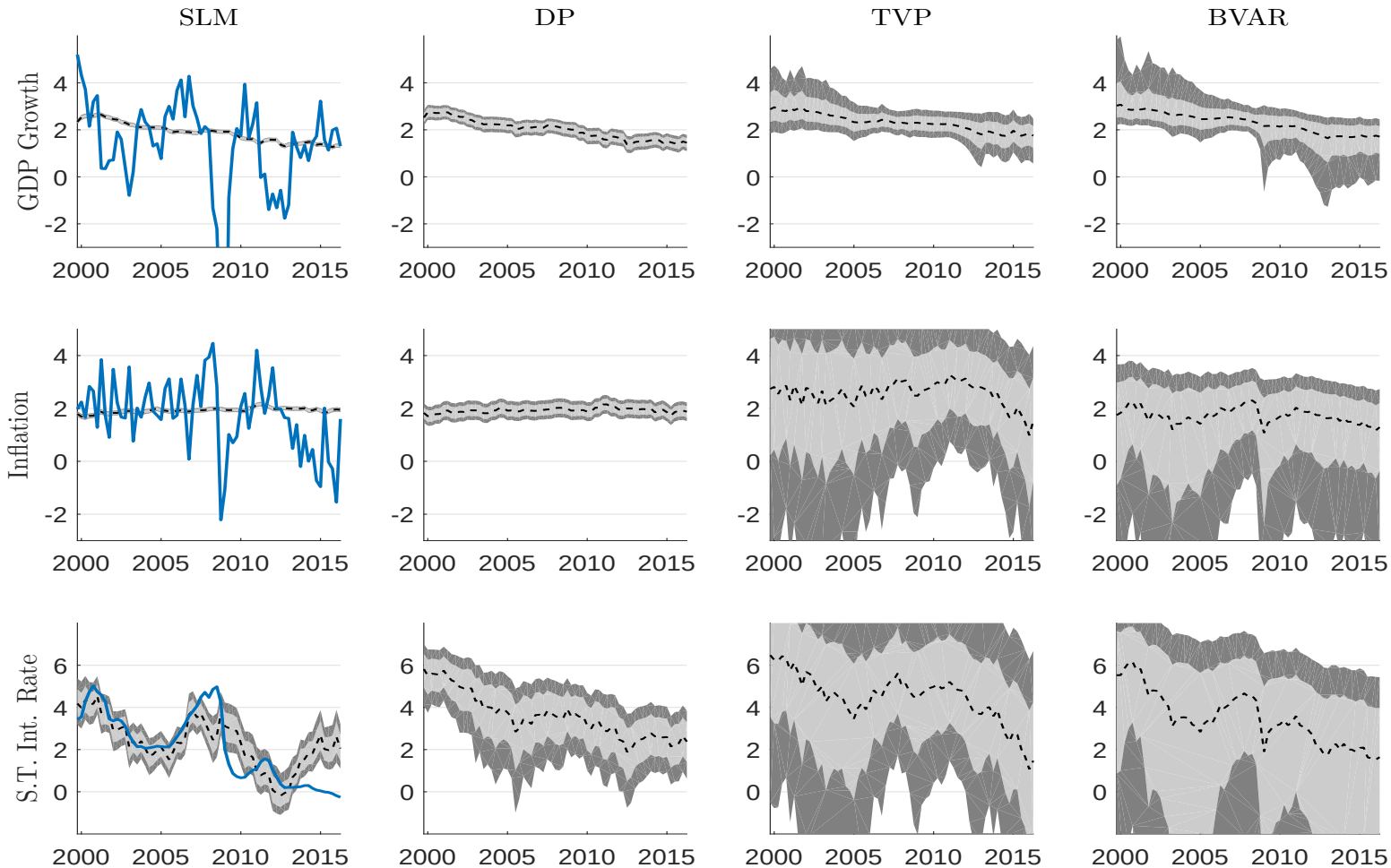
Main results for standard 3-variable version (GDP, inflation, ST interest rate) but also for 5- and 15-variable systems.

Comparison with the following models:

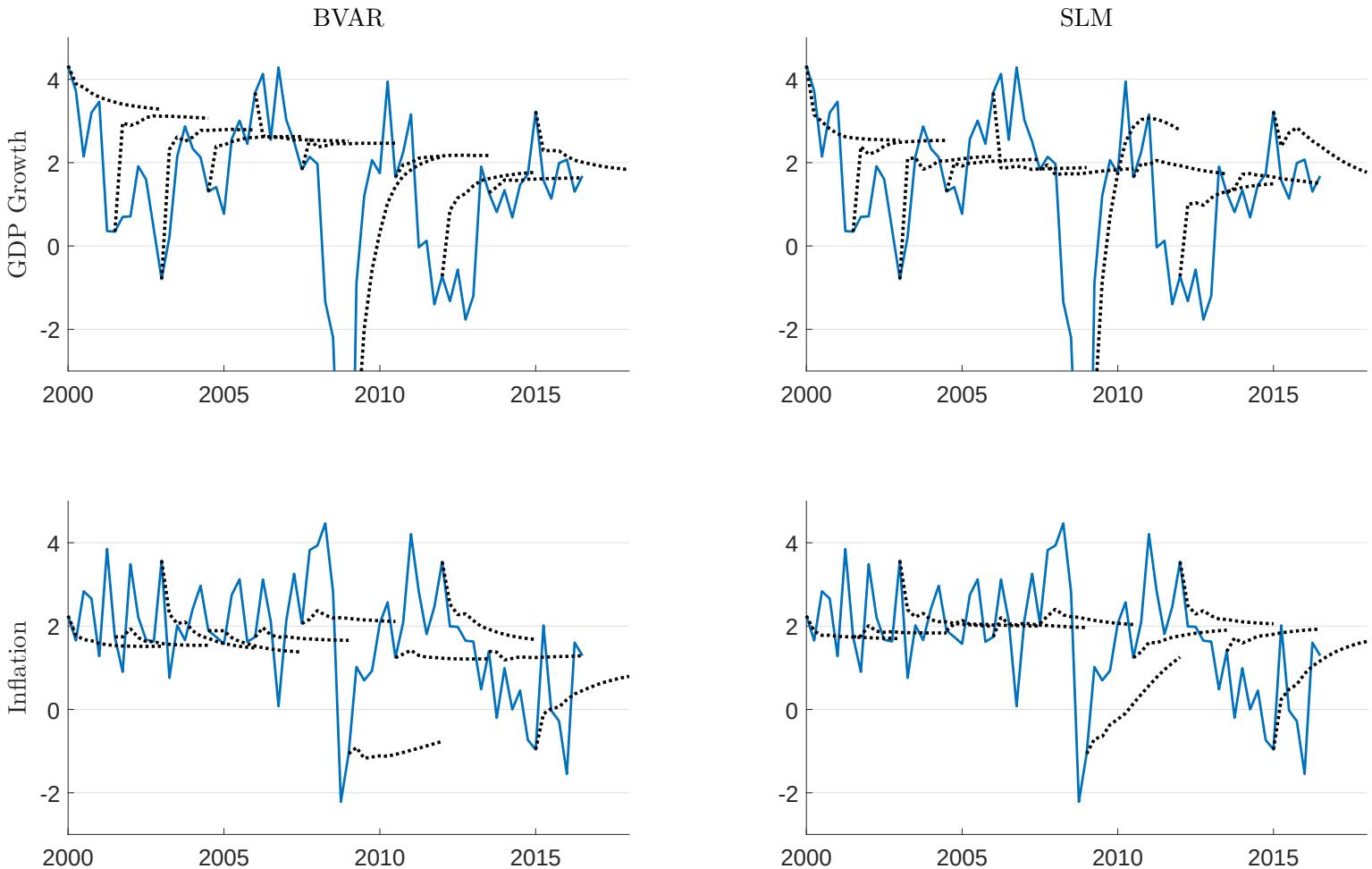
- Standard constant parameter VARs with Minnesota priors
- Constant parameter VARs with democratic priors as in Wright (2012) following Villani (2005)
- Standard TVP VARs
- UCSV of Stock and Watson (2007)
- VAR with local mean but without the link to the survey forecasts

in terms of RMSFE and log predictive scores

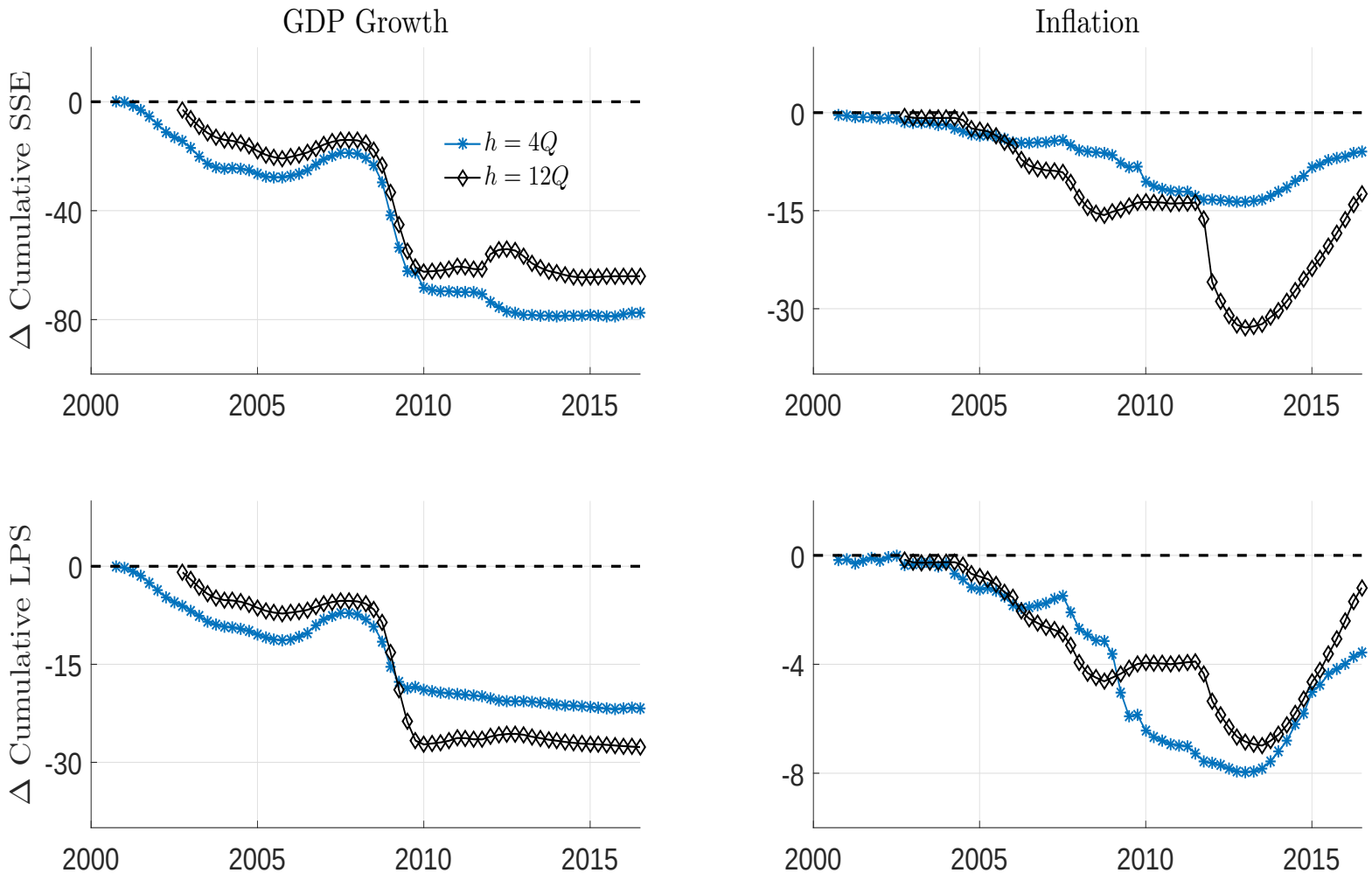
End-of-sample unconditional means



Out-of-sample forecasts



Cumulative differences in forecast accuracy



Cumulative sums of the difference in squared forecast errors and LPS over time. The difference is taken with respect to the BVAR model, negative values indicate a better performance of the SLM model.

Conclusions

- Paper contributes to the literature on how best to allow for time variation in macro time series models in a forecasting context

  See also e.g. Barnett, Mumtaz, and Theodoridis (2014), Aastveit, Carriero, Clark, and Marcellino (2017), Dijk, Koopman, Wel, and Wright (2014), Antolin-Diaz, Drechsel, and Petrella (2017), Stock and Watson (2010,2012)

- The model compares well to popular benchmarks in terms of forecast accuracy in particular for longer horizons

- Survey long-term forecasts provide a useful way to "anchor" the time-varying mean, but not always ...

  not for Japan and recently not for euro area inflation.