Discussion of

Real-time Prediction with UK Monetary Aggregates in the Presence of Model Uncertainty by Garrat, Koop, Mise, Vahey

Marek Jarociński

European Central Bank, DG-Research

Workshop on Forecasting Short-Term Economic Developments, Ottawa October 25th 2007

Overview of the paper

Popular knowledge:

UK abandoned monetary targeting because weak predictive relationship between M and Y,P became apparent in the 1980.

→ **This paper:** study predictive content of M for Y,P

Finding: mixed/unstable evidence on M's predictive content, especially when properly taking into account real time data

Out of sample: M systematically biases forecasts ← underexploited in the paper!

Methodology

VAR/VECM
Granger causality tests
+ out-of-sample forecast comparison with/without M
$\longrightarrow$ Amato and Swanson (2001)

New, realistic feature: model uncertainty (Bayesian Model Averaging)
+ Bayesian look at forecast comparison

Computing probabilities on average over models

- 40 VAR/VECM *specifications* (differences: number lags, number of cointegrating vectors)
- each *specification* in two varieties: with M, and without M (coefficients restricted to 0)
- $\Rightarrow$ total model space: 80 VAR/VECM's
- approximate Bayesian result: posterior probability $\propto$ exp(BIC)
- What is the posterior probability that M is out? *average over specifications:* = what is the posterior weight of all models without M as a share of all model space:

Example

Suppose total model space is 4: specifications 1 and 2, R(estricted) and U(nrestricted)
examples of probabilities:

$$P(R|1) = \frac{eBIC_1^R}{eBIC_1^R + eBIC_1^U}$$

$$P(U1|U) = \frac{eBIC_1^U}{eBIC_1^U + eBIC_2^U}$$

$$P(1) = P(1|all) = \frac{eBIC_1^U + eBIC_1^R}{eBIC_1^U + eBIC_1^R + eBIC_2^U + eBIC_2^R}$$

Posterior probability of R on average across models:

$$P(R|1) \times P(U1|U) + P(R|2) \times P(U2|U) = ? \quad (1)$$

$$P(R|1) \times P(R1|R) + P(R|2) \times P(R2|R) = ? \quad (2)$$

correct:

$$P(R|1) \times P(1|all) + P(R|2) \times P(2|all) = P(R|all) = P(R) \quad (3)$$

Numerical example

eBIC1r	8
eBIC1u	4
eBIC2r	1
eBIC2u	4

	$P(R\|1)$	$P(1)$	$P(R\|2)$	$P(2)$	$P(R)$
by U	0.67	0.50	0.20	0.50	0.43
by R	0.67	0.89	0.20	0.11	0.61
correct	0.67	0.71	0.20	0.29	0.53

Comment on the instability

Instability of model weights: typical finding

model probability $\propto$ **exp**(logL - K/2 lnT)

$\approx SSE^{-T/2} \times T^{-K/2}$

$\rightarrow p(M|Data) \propto p(Data|M) \times p(M)$ - value of T-dim density, badly behaved

in the context of growth regressions:
Ciccone, Jarocinski (2007), Determinants of Economic Growth: Will Data Tell?
potential remedies: shrinkage priors, explicit modeling of measurement errors, Zellner's quality adjusted likelihood

Model space

results are conditional on the space of models:
VAR/VECM's with

- 1 to 8 lags
- 0 to 4 cointegrating vectors

Is the model space interesting? Are these VARs good forecasting models?

no evidence on forecasting performance compared to other models (e.g. univariate)

- most probability on low number of lags
$\Rightarrow$**unrestricted VARs are heavily overparametrized!**
- 'we do not attempt an economic interpretation of the number of cointegrating relationships' - so why bother distinguishing these cases?

Missing important alternative model

encompassing model: VAR in levels + shrinkage prior (Minnesota prior)

- much better for forecasting
- nests models with shorter lags, nests reduced rank - cointegrating relationships
- if included in the BMA, it will dominate other models! ”Lindley’s paradox”: flat prior = negligible model weight
- its results will fluctuate less across subsamples!

Shrinking vs BMA: see Jarocinski (2007) Shrinking growth regressions

Out of sample exercise:

- forecasting models are for h steps ahead regressions
- model weights are for one step ahead regressions

- predictive density should weigh h-steps ahead models by their own weights

Summary

- interesting new evidence on the predictive content of money in the UK
- real time issues taken into account

- model space - crucial; room for improvement?
- previous literature: focus on statistical significance; still unexploited: economic significance; fig. 5-6!