

Discussion

**Forecasting Economic and Financial
Variables with Global VARs**

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Modelling international linkages

Collect main macroeconomic indicators

$$x_{it} = (y_{it}, \pi_{it}, q_{it}, \rho_{it}^S, \rho_{it}^L, e_{it})'$$

for 26 countries/regions ($\approx 90\%$ of world GDP)

\Rightarrow Large panel of 134 variables: $X_t = (x'_{1t}, \dots, x'_{nt}, p_t^o)'$

A general linear model:

$$\Phi_{ii}(L)x_{it} = h_{i0} + h_{i1}t + \sum_{j \neq i} \Phi_{ij}(L)x_{jt} + v_{it}$$

cannot be estimated since there are too many parameters
(curse of dimensionality)

Solutions to the curse of dimensionality

$$\Phi_{ij}(L)x_{it} = h_{i0} + h_{i1}t + \sum_{j=1}^n \Phi_{ij}(L)x_{jt} + v_{it}$$

Assume $\Phi_{ij}(L) = w_{ij}\Phi_i^*(L)$ where w_{ij} is a set of weights.

$$\implies \Phi_{ij}(L)x_{it} = h_{i0} + h_{i1}t + \Phi_i^*(L)x_{it}^* + v_{it}$$

where

$$x_{it}^* = \sum_{i=1}^n w_{ij}x_{jt}$$

Under which conditions this parsimonious approximation describes well the data?

- international fluctuations are driven by few pervasive factors F_t while country specific dynamics is weakly correlated

$$x_{it} = \Lambda_i F_t + e_{it}$$

- the set of weights can kill country specific fluctuations:

$$\sum_{j \neq i} w_{ij}^2 \rightarrow 0 \text{ as } n \rightarrow \infty$$

$\implies x_{it}^* \rightarrow F_t$ as $n \rightarrow \infty$: law of large numbers

Forni and Reichlin (1998) REStud

Chudik and Pesaran (2007)

Global VAR

- Construct $x_{it}^* = \sum_{i=1}^n w_{ij} x_{jt}$ where w_{ij} are trade weights
- Write the model

$$\Phi_{ii}(L)x_{it} = h_{i0} + h_{i1}t + \Phi_i^*(L)x_{it}^* + v_{it}$$

in error correction form

$$A_i(L)\Delta x_{it} = c_{i0} + \alpha_j r_{it} + A_i^*(L)\Delta x_{it}^* + v_{it}$$

where r_{it} is an error correction term

Common trends are taken into account!

This is an important distinctive feature of the model!

Forecasting with Global VAR

Evaluate the forecasting performances using simulated out-of-sample exercise for the period 2004q1-2005q5.

The dominant strategy

Average the forecasts obtained by estimate the model over different estimation windows and for different model specification.

Does the model work?

GDP growth for industrialized countries plus China

- RMSFE for 1 quarter ahead
Best GVAR: 0.514; Constant growth: .573
- RMSFE for GDP growth 1 year ahead
Best GVAR: 0.206; Constant growth: .209

Forecasting performances are quite disappointing for such a rich model!

Similar results for the other variables

Alternative strategy

Many steps in GVAR modelling:

- How many common trends?

- Estimate the cointegration relationships

- How many lags?

- Are aggregated variables weakly exogenous?

- Estimate the parameters country by country.

These steps introduce uncertainty that might undermine forecasting accuracy...

Averaging across model specification is a possible route to overcome this problem!

Alternative: Bayesian Shrinkage

Bayesian VAR for Large Panels

Some recent results:

- empirics: accurate forecast for the US economy
- theory: consistency if there are few global forces

De Mol, Giannone and Reichlin, 2007

Banbura, Giannone and Reichlin, 2007

Bayesian VARs for Large panel is a viable alternative to GVAR:

- 1) flexible tool to take into account common trends
- 2) prior instead of exact restrictions

GVAR versus BVAR

Work in progress:

preliminary results...

Relative mean square forecast error GVAR/BVAR



