

An Estimated Two-Country DSGE Model for the Euro Area and the US Economy

Discussion

Monday June 5, 2006.

Practical Issues in DSGE Modelling at Central Banks

Stephen Murchison

Presentation Outline

1. Paper Highlights
2. Model Highlights
3. A Few 'Practical Issues'

1 Paper Highlights

- Medium-sized 2-country symmetrical model of the U.S. and Euro Area (with a ROW attached)
- Estimated using Bayesian techniques as in Smets and Wouters (2003 a,b) using data on 22 series and 22 shocks
- Model is used
 - to investigate the relative contributions of different shocks to business-cycle fluctuations in output, trade and real exchange rate
 - compute impulse responses to several shocks

1.1 Some conclusions

1. Spillover effects to output in both countries are very small ($>90\%$)
2. Model can explain relative-consumption/real exchange rate correlation (low sub. version)
3. Uncovered Interest Rate Parity is not supported by the data, the exchange rate is explained by UIRP shocks
4. Model has difficulty explaining international synchronization of business cycles (cons., inv., output)

5. The elasticity of substitution between domestic and foreign goods, while important for the behaviour of the model, is not well identified in the data
6. Output is explained by domestic demand shocks (68% at one year hor. for U.S., 14% for monetary policy)
7. Price inflation is explained largely by markup shocks (price and wage)
8. Trade balance is explained by open-economy shocks (UIRP and trade shocks)

2 Model Highlights

- Sticky domestic, import prices and wages (Calvo) with partial dynamic indexation
- Non-additively separable utility function in consumption and leisure, with habits
 - marginal utility of consumption depends on employment
- Replaced Dixit-Stiglitz aggregator with Eichenbaum and Fisher (2004) application of Kimball (1995)
- Oil, non-oil imports, capital and labour as inputs to production

- Consumer-owned capital services (capital rental market), $mc_i \neq f(y_i)$
- Adjustment costs on CAPU, changes to investment, changes to imports share
- Shocks may be AR(1) or ARMA(1,1)
- Version with UIRP and exogenous exchange rate

2.1 Structure of production

Domestic Output $\left(y_{i,t} = g \left(z \left(K_{it}, L_{it} \right), O_{it}^p, M_{it}^p \right) \right)$

⇓

Aggregator (EF 2004) $\int G \left(\frac{y_{i,t}}{D_t} \right) = 1$

⇓

Distribution sector $M_t^d = \min \left\{ \delta D_t^d; (1 - \delta) M_t^f \right\}$

⇓

Final good sector $F_t = f \left(\Omega_t M_t^d, D_t^f, O_t^p \right) = \text{Lots of flexibility!}$

3 Outstanding Issues

1. Limiting exchange-rate pass-through to prices

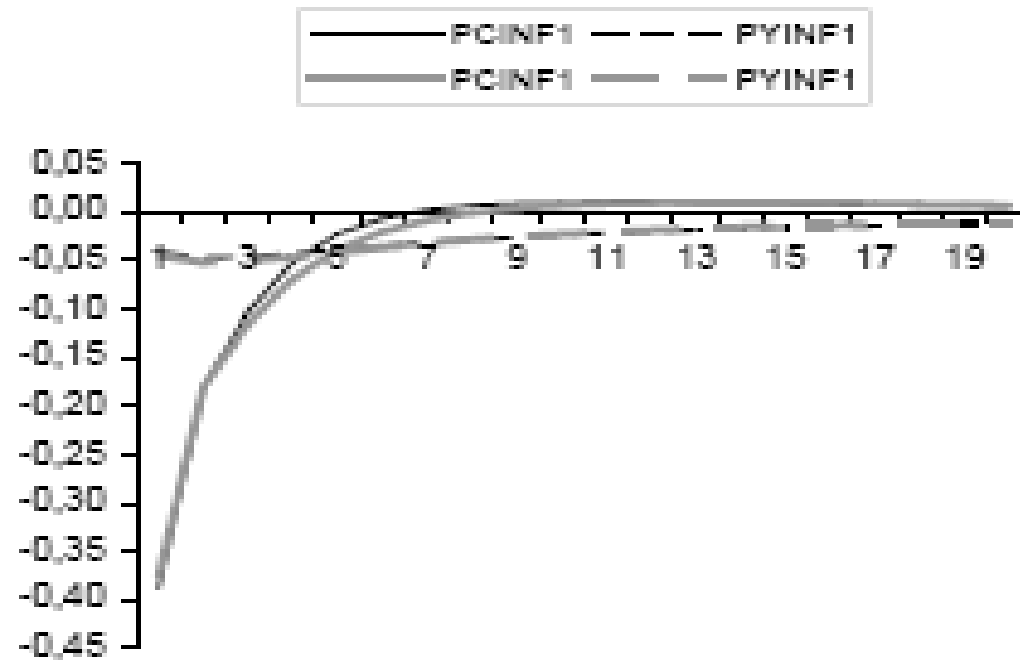
Little mention of model-generated pass-through in paper

- Sticky import prices (domestic output and distribution sectors)
- Sticky domestic output prices
- Aggregator (EF 2004) $\int G\left(\frac{y_{i,t}}{D_t}\right) = 1$.

- Coefficient on mc_t scaled by $\xi = \frac{1}{1+\epsilon\lambda_p} \approx 0.75$ (for $\epsilon = 33, \lambda_p = 0.1$).
- ToTEM with firm-specific capital services yields $\xi = 0.2$.

Is this sufficient reproduce the magnitude and timing of pass-through? More discussion is needed. How do I measure ϵ ?

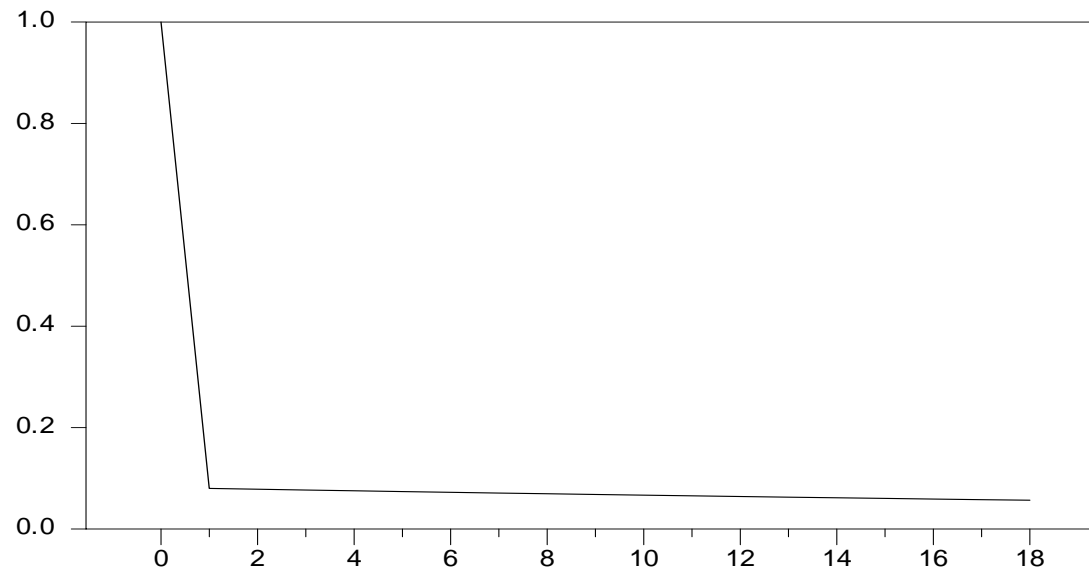
Figure 1: Consumer Price Inflation Response to Exchange Rate Shock



2. ARMA shocks

$$\lambda_{p,t} = \lambda_p + \rho\lambda_{p,t-1} - \phi\eta_{p,t-1} + \eta_{p,t} \quad \eta_{p,t} \sim NIID(0, \sigma_\eta)$$

If $\rho = \phi$ then $\lambda_{p,t} = \lambda_p + \eta_{p,t}$. If $\rho \gtrsim \phi$ then



- Used to explain low frequency trends (inflation), no inflation objective shock.
- Cool trick, how do I interpret the structural shocks?.

3. Estimation

- What non-data information is being used to form priors?
- How much better is the fit relative to calibrating your prior?

4. Moments - Spillover effects and synchronization of business cycles

- Imports from (Exports to) Euro Area (% of U.S. GDP): **3% (2.4%)**
- Imports from (Exports to) U.S. (% of Euro Area GDP): **6% (7%)**

Cross-country Correlation	Data	High sub.	Low sub.
GDP	0.42	0.05	0.00
Consumption	0.33	-0.04	-0.08
Investment	0.34	-0.08	-0.12

The models get the trade links correct.

Do we need greater international integration in financial markets/risk sharing?

Are we happy with common shocks?

Figure 2: Cross-correlations ToTEM

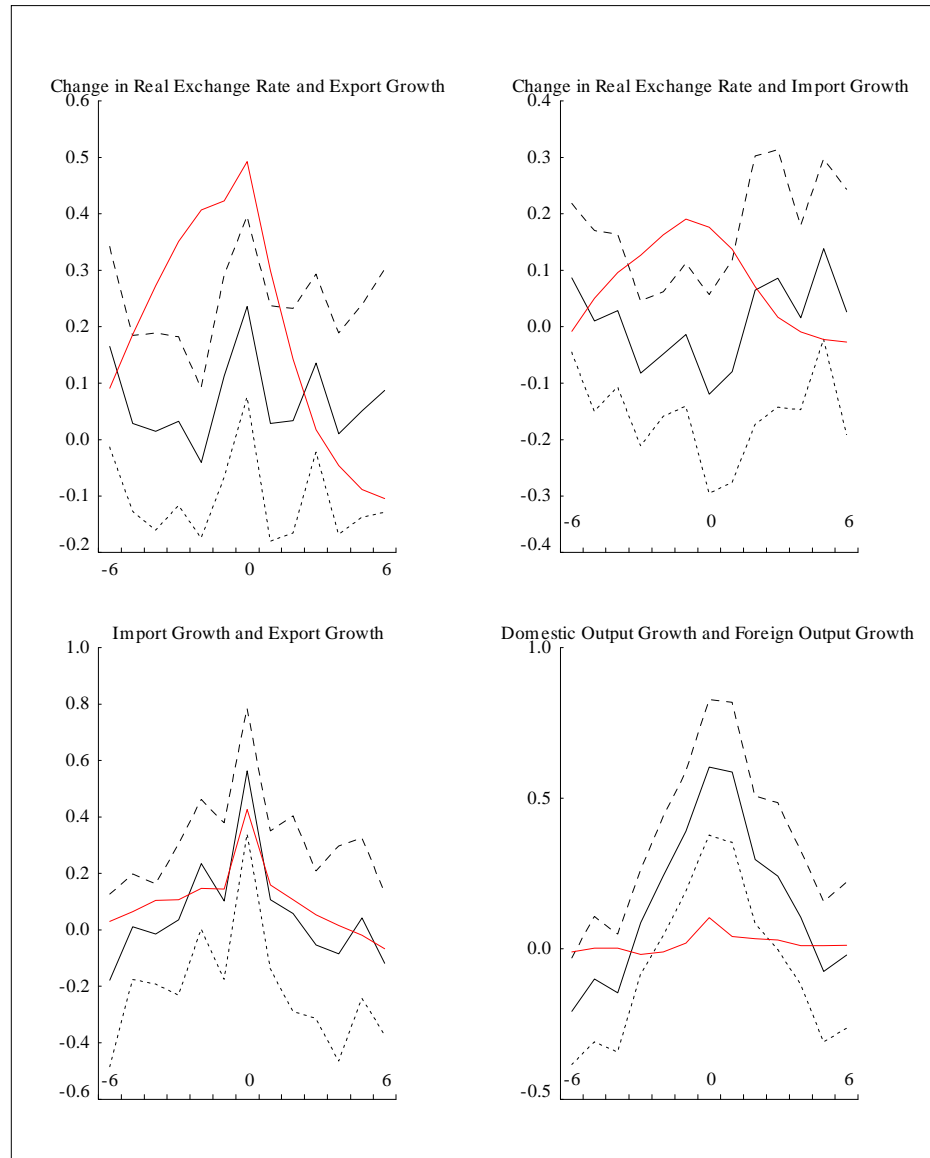


Figure 3: Home Country Response to ROW demand shock

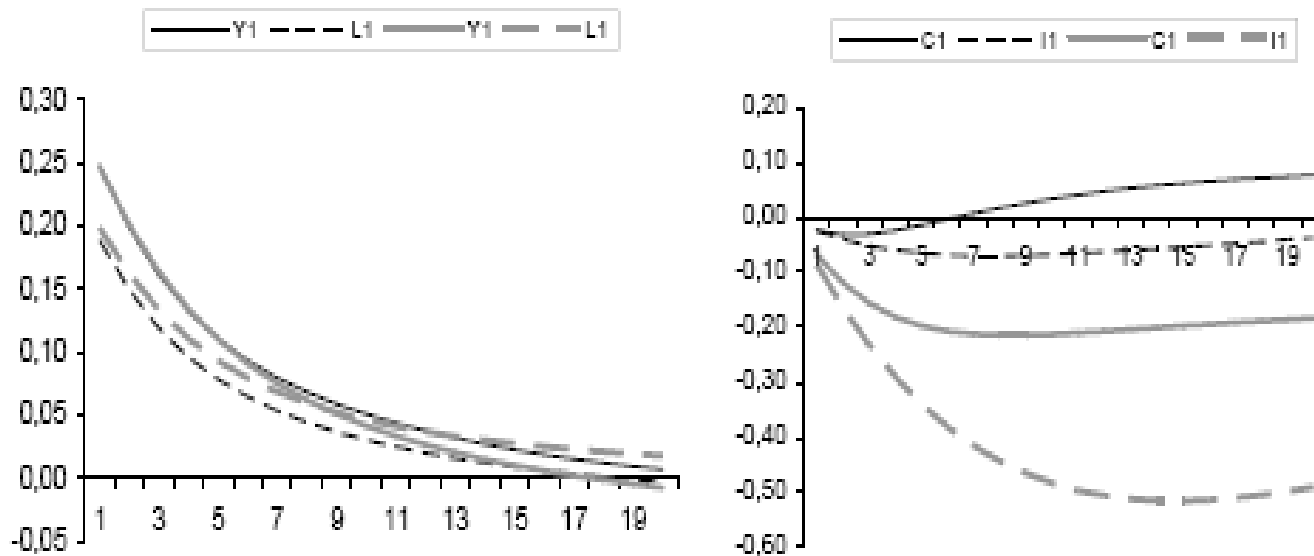
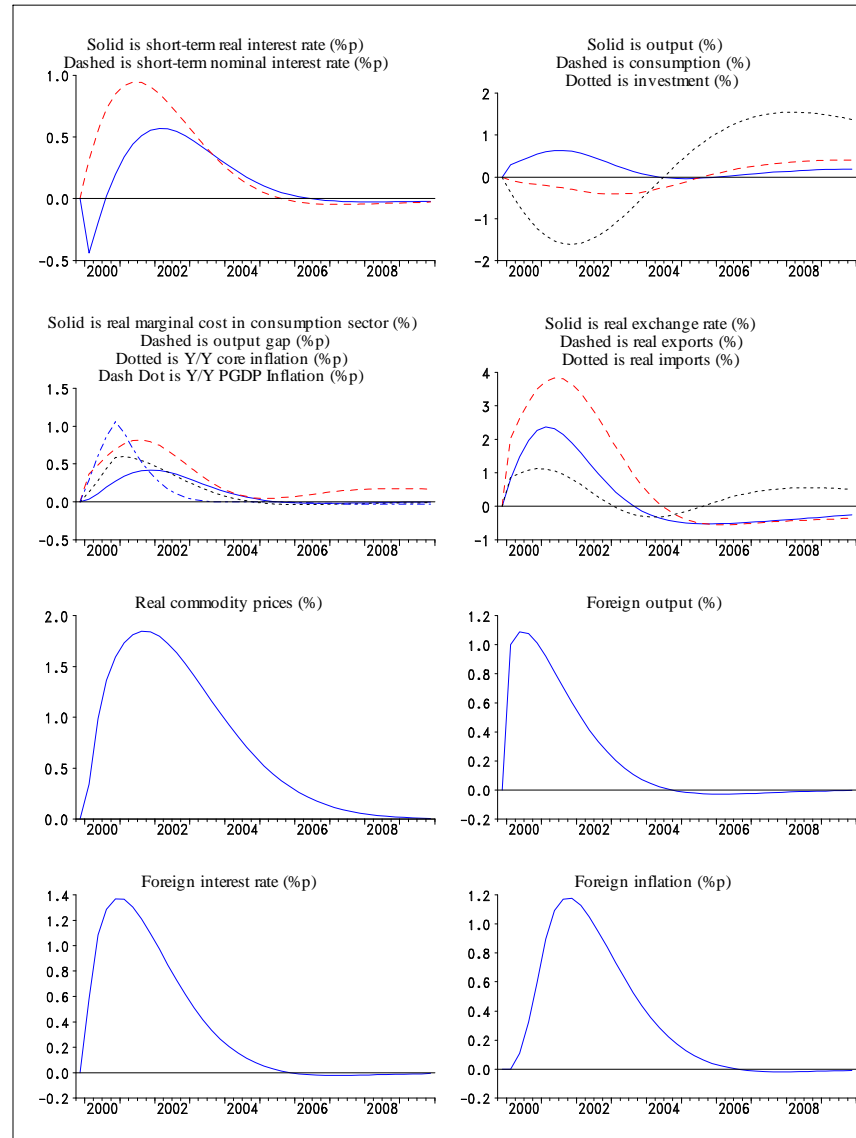


Figure 4: ROW demand shock in ToTEM



4. Moments con't - variances

- ToTEM and this model overstate variance of key series, often by a factor of two or more.
- ToTEM is calibrated :-)

5. Do we have to abandon UIRP?

- Hybrid specification used in ToTEM

$$\ln e_t = \varpi \ln e_{t-1} + (1 - \varpi) \mathbf{E}_t \ln (e_{t+1}(1 + R_t^*) / (1 + R_t))$$

4 Overall Impression

1. Authors are to be applauded for this effort (two-country, 22 shock estimated model)
2. Most of the impulses would be regarded as reasonable
3. The historical (variance) decompositions tell mostly believable stories
4. Some model weaknesses are also present with ToTEM