Trends and Cycles in SOE: Making the Case for a General Equilibrium Approach.

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Old Question: Is there a "Common" international business cycle in the data?

Answer: Yes, there evidence of sizable "world" factor in cross-country analysis.


This "world" factor is particularly important to explain fluctuations in developed (stable) economies.
Multi-country business cycle analysis is painful: Capturing interactions across countries is infeasible (Guerron-Quintana, 2012)

Practical Solution: "Partial" equilibrium in which we take the rest of the world as a given.
Two key contributions for SOE models:

1. They incorporate this "world" factor in a **tractable way** in a structural RBC.

2. In doing so, they force us to **drastically rethink** how we interpret some business cycle facts.
A "General-Equilibrium" RBC for a SOE

- Take the standard one-good, two-country, RBC model (Baxter and Crucini, 1995)

- The two countries are **asymmetric** in size

  1. Small-Open Economy (SOE)
  2. The Rest of the World
**TFP Shock Processes**

**Rest of the world** $(0)$

\[
\ln A_{0t} = \ln A_{0t}^P + \ln A_{0t}^T, 
\]

*Random walk component* $\iff \ln A_{0t}^P = \ln A_{0t-1}^P + \ln \varepsilon_{0t}^P$

*Stationary component* $\iff \ln A_{0t}^T = \rho_0 \ln A_{0t-1}^T + \ln \varepsilon_{0t}^T$, where $\rho_0 < 1$

**Small open economy** $(j)$

\[
\ln A_{jt} = \ln A_{jt}^P + \ln A_{jt}^T + \omega_j^P \ln A_{0t}^P + \omega_j^T \ln A_{0t}^T
\]

"Spillovers" from the rest of the world
"General" vs "Partial" Equilibrium in SOE

In General-Equilibrium,

The market clearing condition is:

$$\pi_0 (Y_{0t} - C_{0t} - I_{0t}) + \pi_j (Y_{jt} - C_{jt} - I_t) = 0,$$

where $\pi_j$ is the share of world GDP produced by the small country $j$.

In Partial-Equilibrium:

Replace the equation above with an exogenous AR(1) process for the interest (discount) rate for international borrowing.
Large country $\mapsto$ Weighted average of the G-8 (G7+Australia).

Small country $\mapsto$ Each of the 68 small economies in the panel rotates in this role (Average moments are considered).
Model Calibration

1. **First-Stage:** Simulate a **Closed Economy** version of the model.
   - Pick parameters in the TFP process for (0) to match observed moments of key G-8 macro variables.

2. **Second-Stage:** Simulate **Complete model**. Choose TFP parameters for each \( (j) \) (including ROW spillovers, \( \varpi_j \)) to match:
   - Std. Dev. of Output \( (\sigma_Y) \)
   - Std. Dev. of Consumption \( (\sigma_C) \)
   - Cross-country Output correlation \( (j \text{ with the G-8 aggregate}) \)
   - Cross-country Consumption correlation \( (j \text{ with the G-8 aggregate}) \)
Two-Group of Countries:
Developing: \( \frac{\sigma_C}{\sigma_Y} > 0 \)  
Developed: \( \frac{\sigma_C}{\sigma_Y} < 0 \).

- With Financial Integration, agents can easily smooth \( C \) when facing transitory income shocks \( \rightarrow \sigma_C < \sigma_Y \).

- However, if income shocks are permanent consumption jumps on anticipation of higher income \( \rightarrow \sigma_C > \sigma_Y \).

- Aguiar-Gopinath: Permanent (transitory) TFP shocks drive the cycle in Developing (Developed) countries.
Main Result: With this new GE approach, Permanent TFP shocks also the main driver of the cycle in developed countries.

In particular, the world permanent shock ($A_{0t}^P$) is Key (consistent with the empirical cross-country evidence).
(My) intuition behind the results.

- Calibrated TFP shocks are set to match $\sigma_{C_j}$ and $\sigma_{Y_j}$, but also the $\text{corr}(Y_j, Y_0)$ and $\text{corr}(C_j, C_0)$.

- Data for Developed Countries:
  $\text{corr}(Y_j, Y_0) = 0.49 > \text{corr}(C_j, C_0) = 0.37$.

- Not possible to match these moments without Permanent Shocks.
Why Permanent Shocks are important also in Developed Countries?

Permanent shocks are key

- **If only transitory shocks (either domestic or worldwide) matter:**
  - International borrowing should allow for risk-sharing across countries $\rightarrow \text{corr}(C_j, C_0) \approx 1$
  - Contrarian to evidence: $\text{corr}(C_j, C_0)$ is **quite low**.

- **Permanent Shocks will fundamentally improve the model fit,**
Permanent Shocks in Developed Countries.

- If we add permanent domestic shocks are sizable: \( \text{corr}(C_j, C_0) \neq 1 \) (As in the data)
  - Risk-sharing is more difficult with permanent idiosyncratic income shocks.
  - But...if this is the case: \( \text{corr}(Y_j, Y_0) \approx 0 \) in the model... while quite high in the data.

- If we also add permanent world shocks with strong spillovers: \( \text{corr}(Y_j, Y_0) > 0 \).
Some Possible Extensions

To Further Validate the Model.

- Use the Solow residuals to estimate these TFP shocks.

- Use Bayesian methods estimate other model parameters and use likelihood principle to rank models.

- Extend the model to a two-good framework (i.e. BKK) Insights on Exch. Rate (Address Backus-Smith Puzzle?)

- This framework is flexible enough to add another block of nations (E.g. BRICS). This can enrich the analysis greatly....
Some Possible Extensions

Garcia-Cicco, Pancrazi and Uribe (2010)

- RBC for SOE predicts a near random walk for consumption → \( \frac{\text{Trade Balance}}{\text{Output}} \) also a ransom walk.

- However \( \frac{\text{Trade Balance}}{\text{Output}} \) closer to AR(1) process quickly converging to zero → Rejecting RBC.

- Their Solution: Add one financial friction: \( r^*_t = f'(B^*_t), f'(.) > 0 \).

- Country runs sustained deficits → borrowing ↑ (i.e. ↑ \( B^*_t \)) → ↑ \( r^*_t \) → \( \frac{\text{Trade Balance}}{\text{Output}} \) must decline, thus converging to zero.
Some Possible Extensions

Garcia-Cicco, Pancrazi and Uribe (2010)

- This new General Equilibrium approach might revalidate the RBC.

- **Spillovers:** Robust growth in Major Emerging Markets $\rightarrow \uparrow r_t^*$ (endogenously) $\rightarrow$ Forcing our SOE to rebalance.
Some Issues

- Emerging and Advanced economies may display diverging growth paths that can lead to explosive dynamics.

- To warrant a balanced-growth path, imposing a VECM to the TFP process may help when taking this model to the data.
Conclusions

- Very interesting paper.
- Tractable model that can be easily extended to address many issues.
- It will force us to reconsider many "established" facts from the literature.