Real Business Cycles in Emerging Countries?

Javier García - Cicco
Duke University

Robertó Pancrazi
Duke University

Martín Uribe
Duke University and NBER

Objective
Evaluate the ability of a small, open, neoclassical model driven by permanent and transitory productivity shocks (the RBC model) to explain business cycle fluctuations in emerging countries.

Motivation
• Papers advocating the ability of the RBC model to explain aggregate fluctuations in EC use short data samples to estimate the underlying driving processes.
• This is problematic if non-stationary shocks are to play a significant role.

Our Contribution
• Use of a long data set for the estimation of the parameters defining the stochastic processes of permanent and temporary productivity shocks.
• Data: Argentina 1913-2005

Main Results

Table 1: Estimated Structural Parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Point Estimate</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\gamma$</td>
<td>1.0013</td>
<td>0.0480</td>
</tr>
<tr>
<td>$\sigma_y^2$</td>
<td>0.263</td>
<td>0.0146</td>
</tr>
<tr>
<td>$\sigma_y$</td>
<td>0.4165</td>
<td>0.0537</td>
</tr>
<tr>
<td>$\phi_t$</td>
<td>0.0119</td>
<td>0.0052</td>
</tr>
<tr>
<td>$\rho_0$</td>
<td>0.2122</td>
<td>0.3299</td>
</tr>
<tr>
<td>$\phi$</td>
<td>0.9036</td>
<td>0.2995</td>
</tr>
</tbody>
</table>

Test of model fit: $p$ value = 0.13

The Model

$\max E_0 \sum_{t=0}^{\infty} \beta^t \left[ C_t - \theta d^{-1} X_t - \beta X_t \right]^{1-\gamma} - 1,$

Subject to

$D_{t+1} \delta + D_t - Y_t + C_t + I_t - \frac{\phi^2}{2} \left( \frac{K_{t+1}}{K_t} - \gamma \right)^2 K_t = 0,$

$K_{t+1} = \left( 1 - \delta \right) K_t + I_t,$

$Y_t = a_t K_t^\alpha (X_t h_t)^{1-\alpha},$

$
\ln(a_t) = \ln(a_t) + \epsilon_{t+1}^A.$

Driving Forces

$g_t = \frac{X_t}{X_{t-1}},$

$\ln(g_{t+1}/g_t) = \ln(g_{t+1}/g_t) + \epsilon_{t+1}^A.$

Closing the model

$r_t = r^* + \psi \left( \beta_{t+1} X_{t-1} - d - 1 \right).$

Estimation

• The parameters ($g, \rho_2, \sigma_y, \phi_1, \phi_2$) are estimated by GMM.
• In particular, the estimator seeks to match the following 16 moments:
  – The standard deviations of $g, r, g^2, g^3,$ and $\theta g.$
  – The first and second-order autocorrelations of $g, g^2, g^3,$ and $\theta g.$
  – The correlations of $g^2, g^3,$ and $\theta g$ with $g^1.$
  – The unconditional mean of $g^1.$

Conclusions:

• The RBC model does a poor job at explaining Argentine business cycles. In particular:
  • Consumption is less volatile than output
  • Investment is half as volatile as in the data.
  • The trade balance is many times as volatile as observed in the data.
  • The model misses the sign of the ACF of output up to fourth order.
  • The model predicts an ACF of the trade balance close to unity and significantly away from its empirical counterpart.

Robustness

• AR(2) specification for permanent and transitory productivity shocks.
• Exclude second-order autocorrelations from GMM estimation.
• Estimate the model using the shares of $C$ and $I$ instead of their growth rates.
• No persistence in the stationary shock ($\rho_0 = 0$)
• Set $g$ consistent with the observed average growth rate of output of 1.25.
• Higher and lower country premium ($\beta = 0.89$ and $\beta = 0.96$).
• Lower depreciation rate ($\delta = 0.1$).
• Low intertemporal elasticity of substitution ($\gamma = 5$).