Real Business Cycles in Emerging Countries?

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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

The Model

$$\max E_0 \sum_{t=0}^{\infty} \beta^t \frac{\left[C_t - \theta \omega^{-1} X_{t-1} h_t^{\omega}\right]^{1-\gamma} - 1}{1-\gamma},$$

Subject to

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

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

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

Driving Forces

$$\ln a_{t+1} = \rho_a \ln a_t + \epsilon_{t+1}^a,$$

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

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

Closing the model

$$r_t = r^* + \psi\left(e^{\tilde{D}_{t+1}/X_t - \bar{d}} - 1\right).$$

Estimation

- The parameters $(g, \rho_g, \sigma_g, \rho_a, \sigma_a, \phi)$ are estimated by GMM.
- In particular, the estimator seeks to match the following 16 moments:
  - The standard deviations of g^Y, g^C, g^I, and tby.
  - The first and second-order autocorrelations of g^Y, g^C, g^I, and tby.
  - The correlations of g^C, g^I, and tby with g^Y.
  - The unconditional mean of g^Y.

Main Results

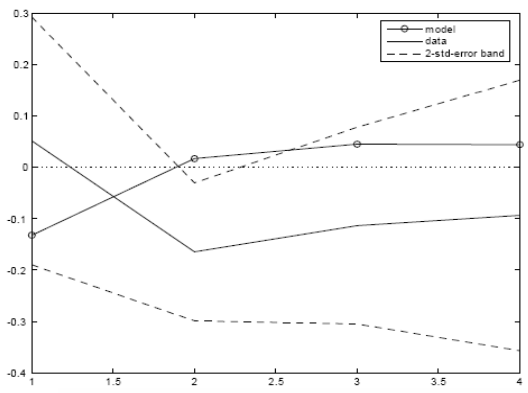
Table 1: Estimated Structural Parameters

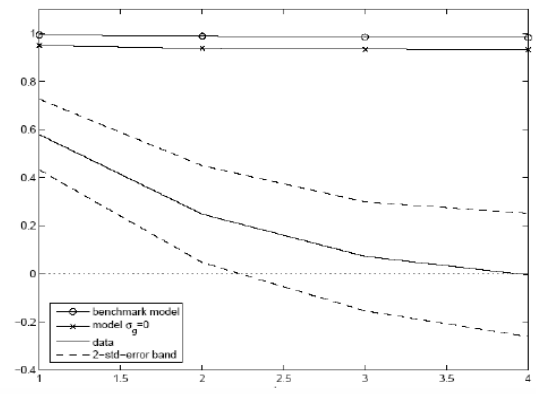
Parameter	Point Estimate	Standard Error
g	1.0013	0.0040
σ_g	0.0283	0.0046
ρ_g	0.4165	0.0537
σ_a	0.0119	0.0052
ρ_a	0.2122	0.3299
ϕ	0.9036	0.2995
Test of model fit	p value	0.13

Table 2: Comparing Model and Data: Summary Statistics

Statistic	g^Y	g^C	g^I	tby
Standard Deviation				
– Model	4.3	3.8	10.0	16.0
– Data	5.1	7.3	19.0	4.9
	(0.4)	(0.7)	(1.8)	(0.7)
Correlation with g^Y				
– Model	1.00	0.97	0.80	-0.05
– Data	1.00	0.77	0.66	-0.08
	(0.00)	(0.07)	(0.12)	(0.09)
Correlation with tby				
– Model	-0.05	-0.06	-0.06	1.00
– Data	-0.08	-0.30	-0.21	1.00
	(0.09)	(0.06)	(0.09)	(0.00)
Serial Correlation				
– Model	-0.13	-0.06	-0.13	0.99
– Data	0.05	0.04	0.21	0.58
	(0.12)	(0.09)	(0.10)	(0.07)

Comparing Model and Data: Autocorrelation Functions





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 ($\rho_a = 0$)
- 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 ($\gamma = 5$).
- Longer data sample: Argentina 1865-2004.

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.
- This paper is a joint test of the model structure (the neoclassical model) and the underlying driving forces (permanent and transitory productivity shocks). Future research should explore modifications along these two dimensions.