Real Business Cycles in Emerging Countries?

by

Javier García-Cicco

Roberto Pancrazi

and

Martín Uribe

Modeling Emerging Countries

(1) **Non RBC Approach:** Emerging countries are buffeted by shocks that cannot be reasonably approximated by a shock to total factor productivity. In addition, these countries face distortions and market failures that render the neoclassical model invalid for understanding the transmission of aggregate disturbances.

(2) **Strong RBC Approach:** The neoclassical model driven by productivity shocks explains the bulk of business-cycle fluctuations in emerging countries.

(3) **Weak RBC Approach:** Shocks impinging upon emerging countries are numerous and of different natures, but can be interpreted as an aggregate shock to total factor productivity. In addition, the neoclassical model is a good framework for understanding the transmission of such shocks.

Main Contribution of this Paper

Evaluate the empirical plausibility of the strong and weak RBC approaches to modelling business cycles in emerging countries.

A Difficulty

- A common feature of papers advocating the ability of the RBC framework to explain aggregate fluctuations in emerging countries is the use of short data samples for model estimation.

- This is particularly problematic if nonstationary shocks are believed to play a significant role in shaping business cycles.

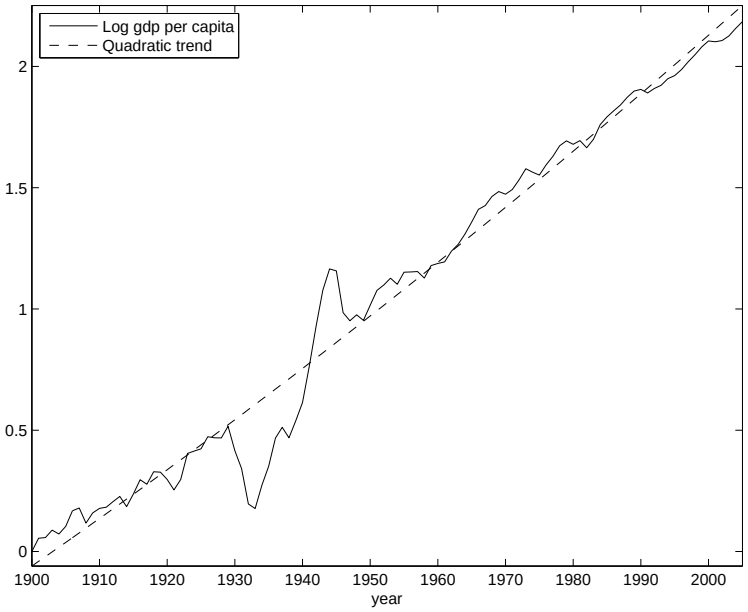
How this Paper Addresses This Problem

- Use of a long data set for model estimation—particularly, for the estimation of the underlying driving forces.

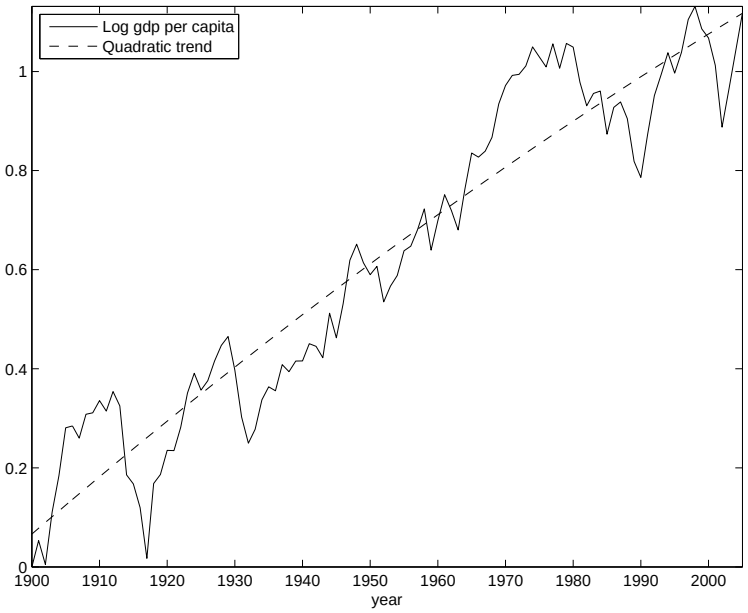
- Data: Argentina, 1900-2005.

Output Per Capita: 1900-2005

(a) United States



(b) Argentina

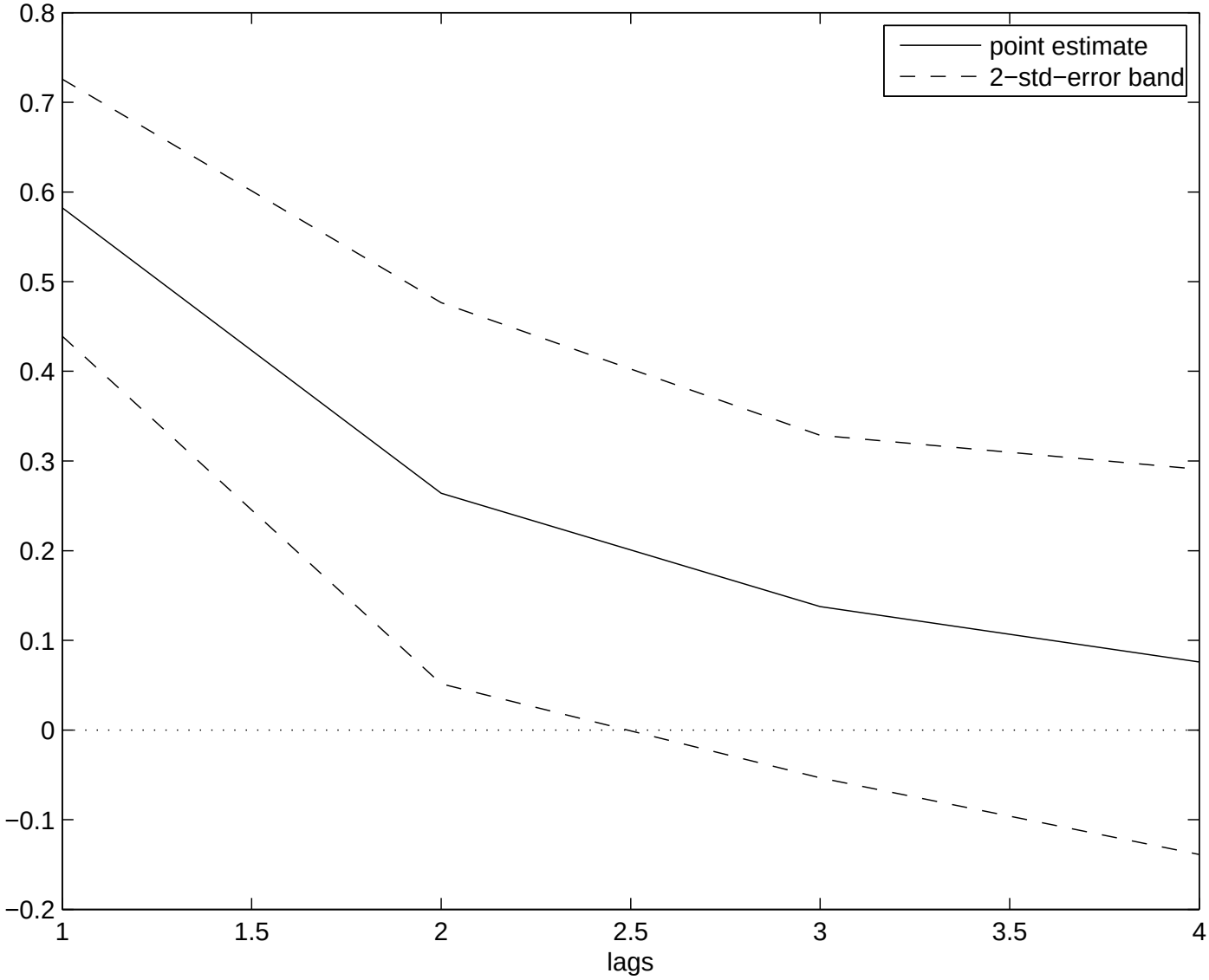


Standard Deviation of Per-Capita Output Growth

Period	Argentina	United States
1900-2005	5.4	4.9
1900-1945	5.7	6.4
1946-2005	5.2	3.4

Note: In percentage points.

Autocorrelation Function of the Trade Share



Argentina 1900-2005: Summary Statistics

Statistic	g^Y	g^C	g^I	tby
Standard Deviation	5.3	7.5	20.0	5.2
	(0.4)	(0.6)	(1.8)	(0.5)
Correlation with g^Y	—	0.72	0.67	-0.03
	—	(0.07)	(0.09)	(0.09)
Correlation with tby	—	-0.27	-0.19	—
	—	(0.07)	(0.08)	—
Serial Correlation	0.11	0.00	0.32	0.58
	(0.09)	(0.08)	(0.10)	(0.07)

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

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

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

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

Driving Forces

$$g_t \equiv X_t / X_{t-1}$$

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

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

Closing the Model

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

Calibrated Parameters

Parameter	Value
γ	2
δ	0.1255
α	0.32
ψ	0.001
ω	1.6
θ	2.24
β	0.9224
$\bar{d}$	0.03

GMM Estimation

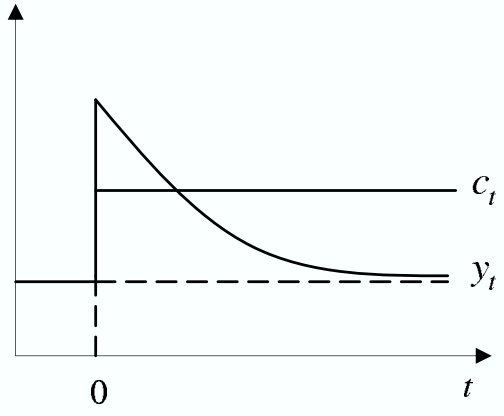
- 6 Estimated Parameters: g, σ_g, ρ_g, σ_a, ρ_a, ϕ.

- 16 Moment Conditions:
  - Standard Deviations of g^Y, g^C, g^I, and tb/y
  - Correlations of g^C, g^I, and tb/y with g^Y
  - First- and second-order autocorrelations of g^Y, g^C, g^I, and tb/y.
  - Mean of g^Y

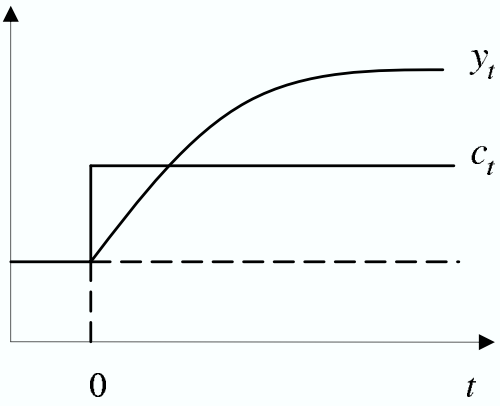
Estimated Structural Parameters

Parameter	Point Estimate	Standard Error
g	1.001	0.005
σ_g	0.030	0.004
ρ_g	0.399	0.048
σ_a	0.020	0.002
ρ_a	0.006	0.076
ϕ	0.580	0.161
Overidentifying Restrictions Test	p value	0.069

Transitory Vs. Permanent Shocks

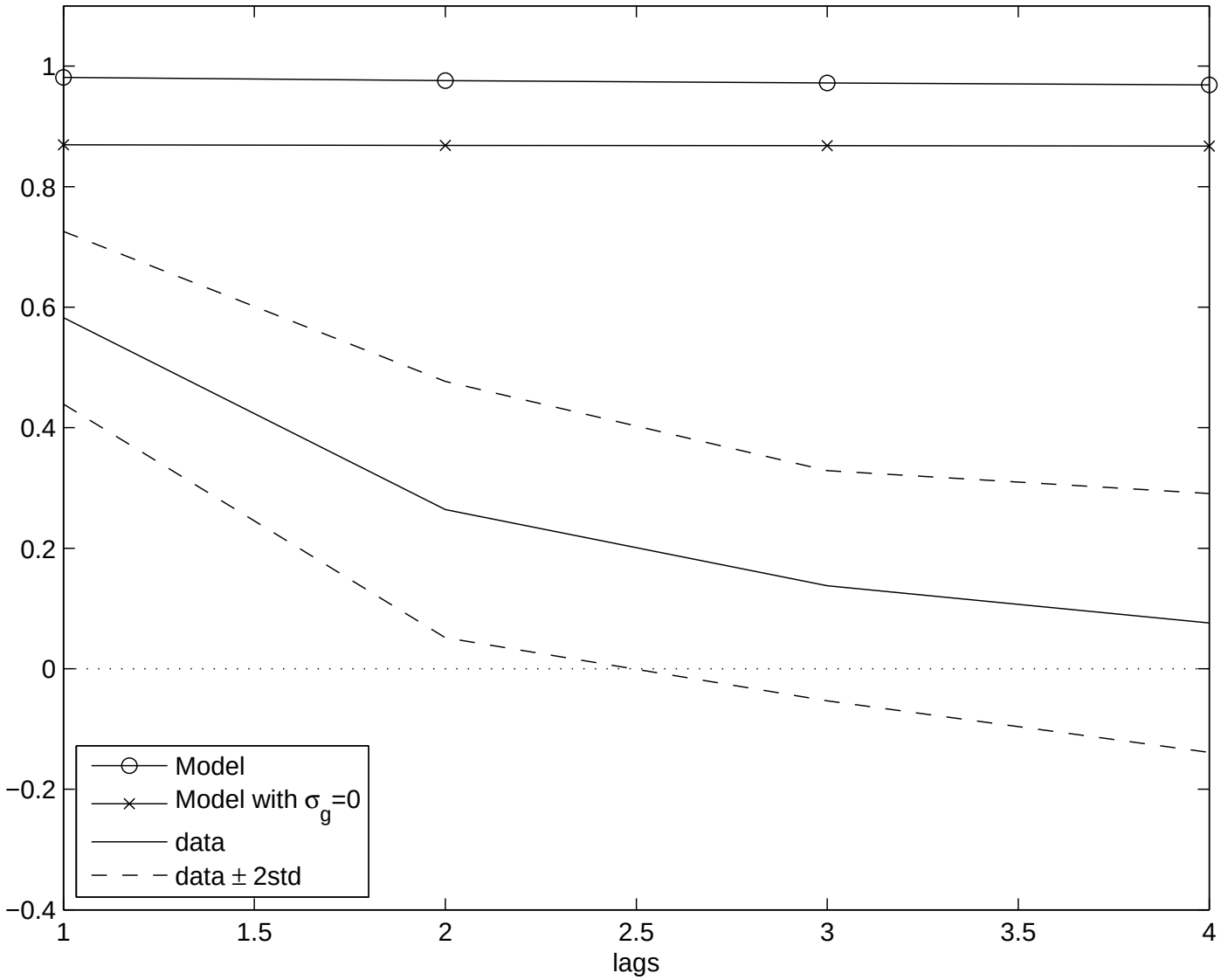


Stationary Shock



Non-Stationary Shock

Comparing Model Predictions and Data
Autocorrelation Function of the Trade Share



Comparing Model Predictions and Data

Standard Deviations

	g^Y	g^C	g^I	tby
Model	6.1	4.5	13.5	17.6
Data	5.3	7.5	20.4	5.2
	(0.4)	(0.6)	(1.8)	(0.6)
	**	***	***	***

One, two, or three asterisks indicate whether the hypothesis that an individual theoretical moment equals its empirical counterpart is rejected at the 10, 5, or 1 percent confidence level, respectively, using the test proposed by Tauchen (1985)

Comparing Model Predictions and Data Correlations With Output Growth

	g^Y	g^C	g^I	tby
Model		0.96	0.54	0.003
Data		0.72	0.67	-0.04
		(0.07)	(0.09)	(0.09)
			**	

One, two, or three asterisks indicate whether the hypothesis that an individual theoretical moment equals its empirical counterpart is rejected at the 10, 5, or 1 percent confidence level, respectively, using the test proposed by Tauchen (1985)

Comparing Model Predictions and Data Correlations With the Trade-Balance Share

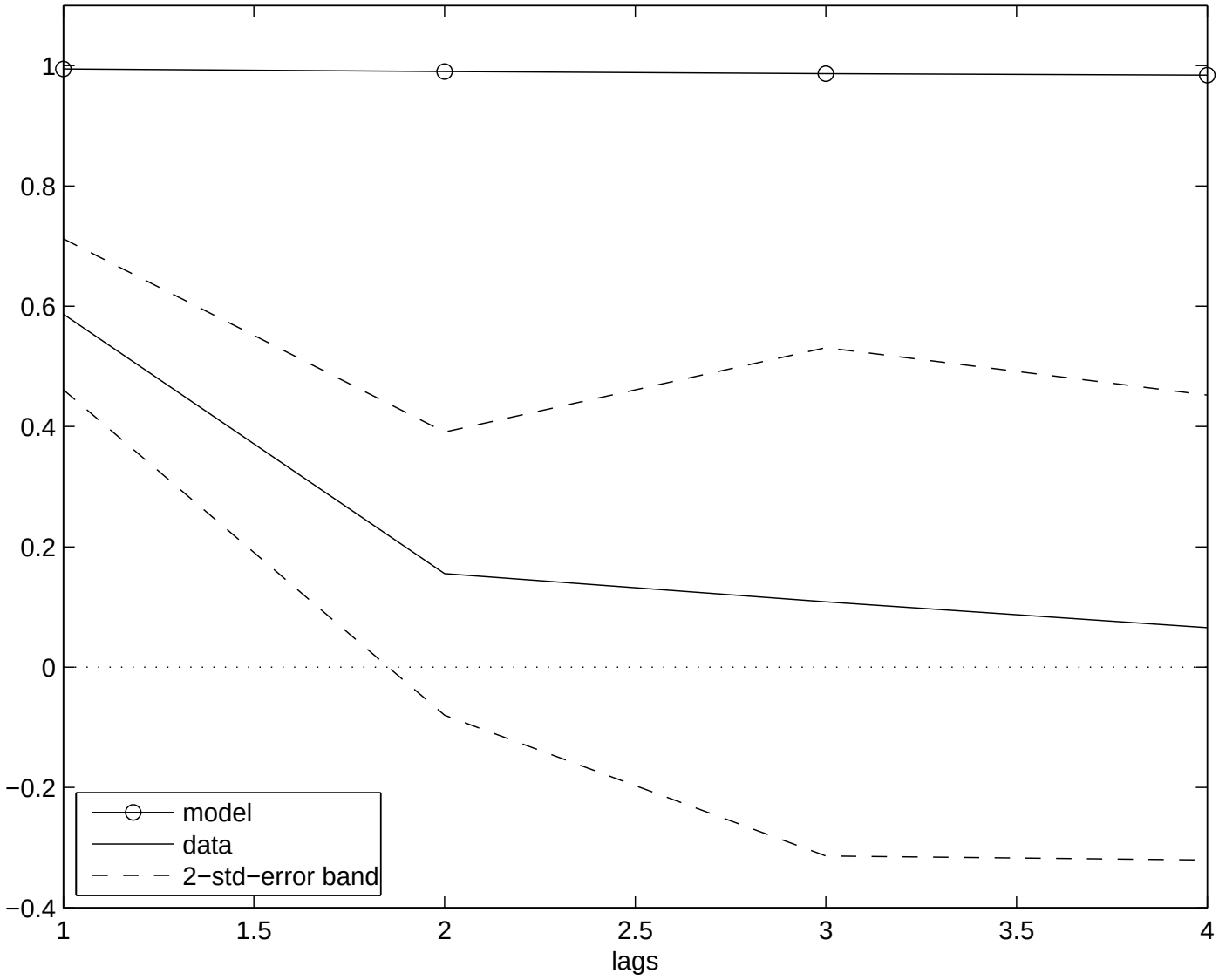
	g^Y	g^C	g^I	tby
Model		-0.03	-0.08	
Data		-0.27	-0.19	
		(0.07)	(0.08)	
		**		

One, two, or three asterisks indicate whether the hypothesis that an individual theoretical moment equals its empirical counterpart is rejected at the 10, 5, or 1 percent confidence level, respectively, using the test proposed by Tauchen (1985)

Comparing Model Predictions and Data Serial Correlations

	g^Y	g^C	g^I	tby
Model	-0.31	-0.17	-0.17	0.98
Data	0.11	-0.005	0.32	0.58
	(0.09)	(0.08)	(0.10)	(0.07)
	***		***	***

Robustness
The Postwar Autocorrelation Function of TB/Y



Robustness

- Varying the sample size:
  - 1946-2005
  - 1900-2005 (baseline)
  - 1865-2005
- Cobb-Douglas preferences
- AR(2) specification for permanent and transitory productivity shocks.

Robustness Continued

- 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%

Robustness (continued)

- Higher capital share ($\alpha = 0.4$)
- Higher and lower country premium ($\beta = 0.89$ and $\beta = 0.96$).
- Lower depreciation rate ($\delta = 0.1$)
- Low intertemporal elasticity of substitution ($\gamma = 5$)

Conclusion

- The RBC model does a poor job at explaining Argentine business cycles. Particularly problematic predictions are:
  - The predicted autocorrelation function of the trade balance is flat and close to unity.
  - The model predicts insufficient volatility in consumption and investment, but excessive volatility in the trade balance.
  - The model misses the sign of the ACF of output up to fourth order.
- This paper represents a joint test of the model structure (the neoclassical model) and the underlying driving forces (permanent and transitory productivity shocks). Therefore, future research should explore modifications along these two dimensions.

EXTRAS

Argentina: Volatility Over Subsamples

Standard Deviation	1900-2005	1946-2005
g^Y	5.3	5.1
g^C	7.5	6.4
g^I	20.4	16.7
tby	5.2	3

Observations: In the Post WWII Subsample:

- Volatility Ranking ($g^I > g^C > g^Y > tby$) preserved.
- Volatility of g^Y roughly unchanged.
- Volatilities of g^C and g^I fall somewhat.
- Volatility of tby falls significntly.