Two-sector model with currency mismatch

Anton Cheremukhin

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Description of the model

Consumption:

(1) $\phi c_{Nt}^{T} p_t = (1-\phi) c_{Tt}^{T}$

(2) $\phi c_{Nt}^{N} p_t = (1-\phi) c_{Tt}^{N}$

Euler equations:

(3) $\beta \frac{c_{Tt}^{T}}{c_{Tt+1}^{T}} \left(\alpha \theta_{t+1} k_{Tt+1}^{\alpha-1} + 1 - \delta + \Phi (k_{Tt+2} - k_{Tt+1}) - m_0 \right) = 1 + \Phi (k_{Tt+1} - k_{Tt}) - \frac{m_0}{1+r+\varepsilon_{Tt}}$

(4) $\beta \frac{c_{Tt}^{N}}{c_{Tt+1}^{N}} \left(\eta u_{t+1}^{\eta} k_{t+1}^{\eta-1} + 1 - \delta_{t+1} + \Phi (k_{Nt+2} - k_{Nt+1}) - n_t \right) = \frac{p_t}{p_{t+1}} (1 + \Phi (k_{Nt+1} - k_{Nt})) - \frac{n_t}{1+r+\varepsilon_{Nt}}$

Borrowing constraints:

(5) $(1 + r + \varepsilon_{Tt+1}) b_{Tt+1} = m_0 k_{Tt+1}$

(6) $(1 + r + \varepsilon_{Nt+1}) b_{Nt+1} = n_t p_{t+1} k_{Nt+1}$

Budget constraints on the sectors:

(7) $c_{Tt}^{T} + p_t c_{Nt}^{T} + k_{Tt+1} - (1-\delta) k_{Tt} + \frac{\Phi}{2} (k_{Tt+1} - k_{Tt})^2 = \theta_t k_{Tt}^{\alpha} + b_{Tt+1} - b_{Tt} (1 + r + \varepsilon_{Tt+1})$

(8) $c_{Tt}^{N} + p_t c_{Nt}^{N} + p_t k_{Nt+1} - (1-\delta) p_t k_{Nt} + p_t \frac{\Phi}{2} (k_{Nt+1} - k_{Nt})^2 = p_t (u_t k_{Nt})^{\eta} + b_{Nt+1} - b_{Nt} (1 + r + \varepsilon_{Nt+1})$

Resource constraint:

(9) $c_{Nt}^{T} + c_{Nt}^{N} + k_{Nt+1} - (1-\delta) k_{Nt} + \frac{\Phi}{2} (k_{Nt+1} - k_{Nt})^2 = (u_t k_{Nt})^{\eta}$

Capital utilization and depreciation:

(10) $u_t = u_0 \left(\frac{n_t}{n_0} \right)^{a}$

(11) $\delta_t = \delta + b \left(u_t^{\psi} - u_0^{\psi} \right)$

Shocks Processes:

(12) $n_t = n_0^{1-\rho_n} n_{t-1}^{\rho_n} \exp (\sigma_n \varepsilon_{nt})$

(13) $\theta_t = \theta_0^{1-\rho_\theta} \theta_{t-1}^{\rho_\theta} \exp (\sigma_\theta \varepsilon_{\theta t})$

Borrowing risk premia:

(14) $\varepsilon_{Tt} = \varepsilon (\exp (b_{Tt} - b_{T0}) - 1)$

(15) $\varepsilon_{Nt} = \varepsilon (\exp (b_{Nt} - b_{N0}) - 1)$

State: $\left\{ c_{Tt}^{T}, c_{Nt}^{T}, c_{Tt}^{N}, c_{Nt}^{N}, k_{Tt}, k_{Nt}, b_{Tt}, b_{Nt}, p_t, \theta_t, u_t, \delta_t, n_t, \varepsilon_{Tt}, \varepsilon_{Nt} \right\}$

Also define:

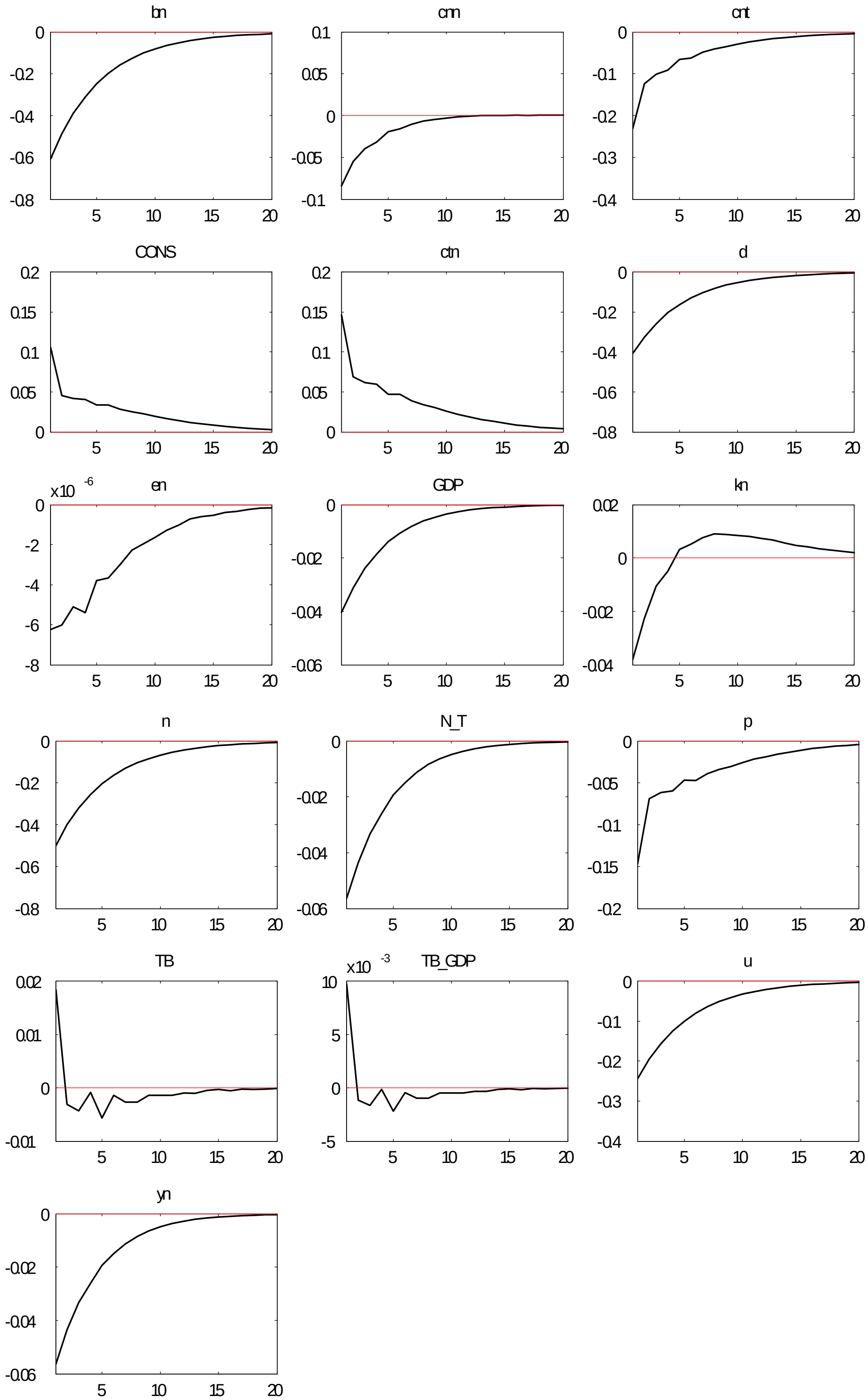
$y_{Tt} = k_t^{\alpha}$ $\quad y_{Nt} = (u_t k_{Nt})^{\eta}$ $\quad GDP_t = y_{Tt} + p_0 y_{Nt}$ $\quad CONS_t = c_{Tt}^{T} + c_{Tt}^{N} + p_0 c_{Nt}^{T} + p_0 c_{Nt}^{N}$

$TB_t = b_{Tt} (1+r) - b_{Tt+1} + b_{Nt} (1+r) - b_{Nt+1}$ $\quad TB/GDP = TB_t / GDP_t$ $\quad N/T = y_{Nt} / y_{Tt}$

Calibration:

α	η	ϕ	Φ	β	δ	r	m_0	n_0	ε	u_0	a	b	ψ	ρ_N	ρ_θ	θ_0
0.4	0.2	0.29	0.3	0.9	0.1	0.04	0.23	0.13	.0006	0.2	0.96	1.195	1.31	0.8	0.9	1.24

Impulse responses to a 50% negative shock to the borrowing constraint on the N sector:



Impulse responses to a 10% positive terms-of-trade shock: