Problemset 9

International Macroeconomics (Master)

Prof. Dr. Hoffmann
Chair of International Trade and Finance
University of Zurich

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Exercise 1: Intertemporal optimality in the TnT model

Consider an open economy that exists for two periods, period $t = 1$ and period $t = 2$. Lifetime utility of the representative household is given by

$$U(C_1, C_2) = u(C_1) + \beta u(C_2)$$

with

$$u(C_t) = \frac{C_t^{1-\frac{1}{\sigma}}}{1-\frac{1}{\sigma}}$$

In each period, the household draws utility out of consumption of a traded and a non-traded good C^T and C^N. In both periods, this consumption bundle is given by

$$C_t = \left[\gamma^{\frac{1}{\theta}} \left(C_t^N\right)^{\frac{\theta-1}{\theta}} + (1-\gamma)^{\frac{1}{\theta}} \left(C_t^T\right)^{\frac{\theta-1}{\theta}}\right]^{\frac{\theta}{\theta-1}}$$

The household faces the following budget constraints:

$$\begin{aligned} C_1^T + \frac{P_1^N}{P_1^T} C_1^N &= Y_1^T + \frac{P_1^N}{P_1^T} Y_1^N + rB_0 - CA_1 \\ C_2^T + \frac{P_2^N}{P_2^T} C_2^N &= Y_2^T + \frac{P_2^N}{P_2^T} Y_2^N + (1+r)(B_0 + CA_1) \end{aligned}$$

a) Show that a price index P_t exists such that

$$P_t C_t = P_t^T C_t^T + P_t^N C_t^N$$

b) Repetition: interpret two parameters σ and θ.
c) Normalize $P_1^T = P_2^T = 1$ and set $B_0 = 0$. Solve the household's optimization problem to derive the following equation for the current account

$$CA_1 = Y_1^T - \frac{Y_1^T + \frac{Y_2^T}{1+r}}{1 + \beta^\sigma (1+r)^{\sigma-1} \left(\frac{P_1}{P_2}\right)^{\sigma-\theta}}$$

d) Suppose $\sigma > \theta$. Suppose that P^T is constant over time and consider $P_2 > P_1$. What does this imply for the current account CA_1?