Problemset 3

International Macroeconomics (Master)

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

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Exercise 1: Logarithmic Case of Two–Country Endowment Economy

Consider an open economy endowment model with $S_1 + S_1^\star = 0$. Lifetime utility in the home country is given by

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

and the intertemporal budget constraint is

$$C_1 + \frac{C_2}{1+r} = Y_1 + \frac{Y_2}{1+r}.$$

Analogously, foreign utility is defined as

$$U^\star = \log(C_1^\star) + \beta^\star \log(C_2^\star),$$

and the intertemporal budget constraint is

$$C_1^\star + \frac{C_2^\star}{1+r} = Y_1^\star + \frac{Y_2^\star}{1+r}.$$

In Exercise 1 of Problemset 2 we have shown that the solution to the intertemporal optimisation problem at hand yields

$$C_1 = \frac{1}{1+\beta}\left[Y_1 + \frac{Y_2}{1+r}\right]$$
$$C_2 = \frac{\beta}{1+\beta}(1+r)\left[Y_1 + \frac{Y_2}{1+r}\right].$$

(a) Calculate the savings schedule S_1 as a function of r. Show that the savings function is upward sloping in r. Explain why!

(b) Compute the equilibrium world interest rate r.

(c) Show that the world interest rate r lies between the autarky rates r^A and $r^{A\star}$.

(d) Confirm that a country with an autarky interest rate below r will run a (primary) current account surplus at date 1, while an autarky rate above r implies a (primary) current account deficit. Give an economic intuition for this result. Use a (C_2, C_1)–graph to demonstrate the case of a creditor country!

(e) How does an increase in the foreign rate of output growth affect the home welfare?

(i) Show that a rise in the ratio $Y_2^\star / Y_1^\star$ raises the equilibrium world interest rate r.

(ii) Show that the derivative of U with respect to r is

$$\frac{\mathrm{d}U}{\mathrm{d}r} = \frac{\beta}{1+r}\left[\frac{r - r^A}{(1+r) + \beta\,(1+r^A)}\right].$$

(iii) Under which circumstances is higher foreign output growth beneficial for the home country? Explain carefully!