ECON4330 – International Macroeconomics

Postponed Exam

Total: 100 points

Instructions

- The exam consists of three parts. Answer all questions.
- Explain your reasoning clearly. Unsupported one-line answers may receive limited credit.
- You may answer graphically where appropriate.
- Unless otherwise stated, treat all prices and interest rates as real variables.

1. Current accounts, investment and the world interest rate [50 points]

Consider a two-period small open economy. The representative household chooses C_1, C_2, investment K_2, and foreign assets B_2 to maximize

$$U = \log C_1 + \beta \log C_2.$$

Initial foreign assets are zero and there is no government. Period-1 output is exogenous and equal to Y_1. Investment at date 1 is $I_1 = K_2$ and costs one unit of the good per unit of capital. At date 2, the economy receives exogenous income Y_2, produces $AK_2^{1/2}$, and can also consume the undepreciated capital stock K_2 before the economy ends. The country can borrow or lend internationally at the world interest rate r.

The budget constraints are

$$C_1 + K_2 + B_2 = Y_1,$$
$$C_2 = Y_2 + AK_2^{1/2} + K_2 + (1+r)B_2.$$

The date-1 current account is

$$\mathrm{CA}_1 = B_2 = Y_1 - C_1 - K_2.$$

Assume an interior solution with $K_2 > 0$.

(a) Derive the intertemporal budget constraint by substituting out B_2. Explain how investment affects lifetime resources. **[8 points]**

(b) Derive the Euler equation for consumption and the first-order condition for investment. Explain the separation result: why is K_2 pinned down by technology and the world interest rate rather than by preferences? How does a higher r affect K_2? **[12 points]**

(c) Now set $\beta = 1$, $r = 0.20$, $Y_1 = 100$, $Y_2 = 115$, and $A = 2$. Compute the optimal K_2, C_1, C_2, B_2, and CA_1. Is the current-account deficit financing consumption, investment, or both? **[12 points]**

(d) Starting from the numerical economy in part (c), keep A, r, and β unchanged. First suppose Y_1 rises by 12. Then consider instead a rise in Y_2 of 14.4, so that the present value of the income shock is also 12. In each case, keep K_2 at its optimal value from part (c), compute the change in C_1 and CA_1, and interpret the difference. **[8 points]**

(e) Return to the baseline values in part (c), but now suppose productivity rises from $A = 2$ to $A = 2.4$. Compute the new optimal K_2, C_1, C_2, and CA_1. Explain why a positive future-productivity shock can lower the current account today. **[10 points]**

2. Short questions [20 points]

Answer briefly and precisely.

(a) In the permanent-income model with quadratic utility and AR(1) net output deviations, suppose

$$\widetilde{z}_t = \rho \widetilde{z}_{t-1} + \varepsilon_t, \qquad \mathrm{CA}_t = \frac{1-\rho}{1+r-\rho}\widetilde{z}_t.$$

Explain how the persistence parameter ρ affects the current-account response to a positive output shock. How would the model interpret an anticipated future oil boom before current output has risen? **[7 points]**

(b) Explain the debt-overhang mechanism in sovereign borrowing. In your answer, use the idea that inherited debt can act like an implicit tax on new investment. Why can debt forgiveness sometimes make both the debtor country and creditors better off? **[7 points]**

(c) In a moral-hazard model of international lending, a project pays Z with probability $\pi(I)$ and zero otherwise, with $\pi' > 0$ and $\pi'' < 0$. Compare the first-best condition

$$\pi'(\bar{I})Z = 1 + r$$

with the borrower's hidden-action condition

$$\pi'(I)\{Z - [P(Z) - P(0)]\} = 1 + r.$$

Explain why moral hazard causes under-investment and how this helps explain the Lucas paradox. **[6 points]**

3. Exchange rates, intervention and monetary control [30 points]

Consider the short-run portfolio-balance block

$$r_k = i - i^* - e^e(E), \qquad F_g = S(E, r_k), \qquad S_{r_k} > 0,$$

where E is the domestic-currency price of foreign currency, i is the domestic nominal interest rate, i^* is the foreign nominal interest rate, $e^e(E)$ is expected depreciation, r_k is the risk premium on domestic-currency assets, F_g is central-bank foreign reserves, and S is the public's net supply of foreign currency to the central bank. The central-bank balance sheet is

$$M = EF_g + (\overline{B} - B),$$

where M is money and $(\overline{B} - B)$ is the central bank's holdings of domestic bonds. Money-market equilibrium is

$$\frac{M}{P} = m(i, Y), \qquad m_i < 0, \quad m_Y > 0.$$

Assume prices are fixed in the short run. Under a peg, $E = \bar{E}$ and F_g adjusts. Under a float, F_g is fixed and E adjusts.

(a) Define the risk premium r_k. Holding E and i fixed, what happens to r_k and to the public supply of foreign currency when the foreign interest rate i^* increases? **[6 points]**

(b) Suppose the economy maintains a fixed exchange rate and the central bank does *not* sterilize reserve flows, so $\Delta(\overline{B} - B) = 0$. Trace the effects of an increase in i^* on reserves F_g, money M, and the domestic interest rate i. **[8 points]**

(c) Now suppose the exchange rate is fixed but the central bank sterilizes fully, so $\Delta M = 0$. What domestic bond operation is required after the increase in i^*? What happens to i on impact, and why is this policy limited by reserves? **[8 points]**

(d) Finally, suppose the exchange rate floats. Trace the effects of the same increase in i^* on E, F_g, M, and i. Compare the three regimes in terms of monetary-policy autonomy. **[8 points]**