

- 本試題共 5 大題, 合計 100 分。
- 請依題號依序作答。
- 請詳述理由或計算推導過程, 否則不予計分。

1. (50 points) Consider a 2-period representative agent small open economy endowment model, in which the representative household maximizes:

$$\max_{(C_1, C_2)} U(C_1) + \beta E[U(C_2)],$$

where

$$0 < \beta < 1,$$

$$U(C) = C - \frac{\alpha}{2}(C)^2,$$

and $E[\cdot]$ refers to the expected value. Assume the parameter α is sufficiently small that marginal utility is always positive in both periods.

The endowment in period 1 is given by Y_1 . In period 2, there are two possible states, and the endowment is

$$Y_2 = WY_2^H + (1 - W)Y_2^L,$$

where

$$Y_2^H > Y_1, \quad Y_2^L = 2Y_1 - Y_2^H,$$

and W is a random variable:

$$W \sim \text{Bernoulli}(0.5).$$

That is, $W = 1$ for state H (boom), and $W = 0$ for state L (recession). Clearly, C_2 is also a random variable, and its realizations are denoted as C_2^H for state H and C_2^L for state L , respectively.

In addition, households are assumed to be endowed with B_0 units of a foreign bond. In period 1, these bond holdings generate interest income in the amount of rB_0 , where r denotes the interest rate on bonds held between periods 0 and 1. At period 1, the household can allocate its income to two alternative uses: purchases of consumption goods, which we denote by C_1 , and purchases of foreign bonds, $B_1 - B_0$, where B_1 denotes foreign bond holdings at the end of period 1. The interest rate r is determined on world markets and exogenous for the economy.

- (1) According to the utility function, is the representative agent risk-loving, risk-averse or risk-neutral? Why?
- (2) Write down the budget constraint for the household in periods 1 and 2. Note that the budget constraint in period 2 is state-dependent.
- (3) What is the no-Ponzi-game constraint in this model?
- (4) Write down the lifetime budget constraint of the household. Be explicit on which equilibrium condition you have imposed. Note that the lifetime budget constraint is also state-dependent.
- (5) Write the first-order condition for the optimal choice of C_1 and C_2 , which implies that the household does not expect to be better off by consuming one fewer unit this period, lending at the prevailing interest rate r through bonds, and consuming the proceeds next period.

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Assume $\beta(1+r) = 1$ and $B_0 = 0$ for Questions (6)–(10).

- (6) Solve out for the optimal choices of C_1 , C_2^H and C_2^L in terms of r , Y_1 , Y_2^H and Y_2^L .
- (7) Derive the expression for this country's current account in period 1. Does this country have a current account surplus or deficit?
- (8) Now solve the same problem as above, but assume that

$W \sim \text{Bernoulli}(1)$.

That is, the probability of Y_2^H has increased from 0.5 to 1. Solve for the optimal choices of C_1 and C_2 in terms of r , Y_1 , Y_2^H and Y_2^L .

- (9) Derive the expression for this country's current account in period 1. Does this country have a current account surplus or deficit?
- (10) Provide an economic intuition to explain why the results in Questions (7) and (9) are different.

2. (16 points) Suppose we estimate the following reaction function of a central bank:

$$R_t = \alpha_0 + \alpha_1(\pi_t - \pi^*) + \alpha_2(y_t - y^*) + \alpha_3 z_t, \quad (1)$$

where R_t is the short-term interest rate, π_t and y_t are respectively date t inflation rate and output growth rate, and z_t is date t equity returns.

- (a) Explain the rationale why we estimate a reaction function of central bank such as equation (1). What is the difference with the conventional Taylor rule?
- (b) Suppose the estimation results are $\alpha_1 = 1.6$ and $\alpha_3 = 0$ for country A and $\alpha_1 = 0.8$ and $\alpha_3 = 0.2$ for country B. Explain the differences between these two estimated reaction functions.
3. (16 points) Let the natural rate of growth $y^* = 4\%$ and the natural rate of unemployment $u^* = 5\%$. Suppose the current expected inflation rate $\pi^e = 3\%$.
- (a) Given the expected inflation rate, we observe that the current unemployment rate $u = 4\%$ and inflation rate is $\pi = 5\%$. Find the (linear) equation of the Phillips curve.
- (b) Do you expect this situation $(u, \pi) = (4\%, 5\%)$ to persist? Explain why.
4. (9 points) Explain briefly the main differences and the impacts between quantitative easing (QE) and conventional open market operation (OMO).
5. (9 points) During the Great Depression 1930-33, nearly 9000 banks failed. The data shows that monetary base (MB) increased by 20%, but the money stock (M1) in U.S. declined by 25%. Explain this observation.