

SGPE Summer School. Tutorial 4.

Q1. According to the theory presented here, there are four main factors that determine private consumption. For each factor, explain why it affects consumption and the magnitude of the effect.

Q2. Analyse how the following shocks will affect the natural rate of interest:

- (a) Firms become more pessimistic about future demand for their products.
- (b) A temporary reduction in production due to a bad harvest.
- (c) A hurricane destroys a substantial share of the capital stock but miraculously no one dies.

Q3. Assume that the natural real interest rate is 3 percent, inflation is 2 percent, and the central bank sets the nominal interest rate at 3 percent. Will production be above or below the natural level? Is this a sustainable situation?

Q4. A consumer lives for two periods. He has incomes Y_1 and Y_2 in the two different periods, and he can borrow or lend at an interest rate r . He maximises the lifetime utility function

$$U = u(C_1) + \frac{u(C_2)}{1 + \rho}$$

Write down the consumer's budget constraint and substitute this into the lifetime utility function in order to find the first-order condition for consumption.

Q5. A consumer lives for two periods. She maximises the lifetime utility function subject to a budget constraint (note: A_1 is initial wealth)

$$U = \ln(C_1) + \frac{\ln(C_2)}{1 + \rho}$$

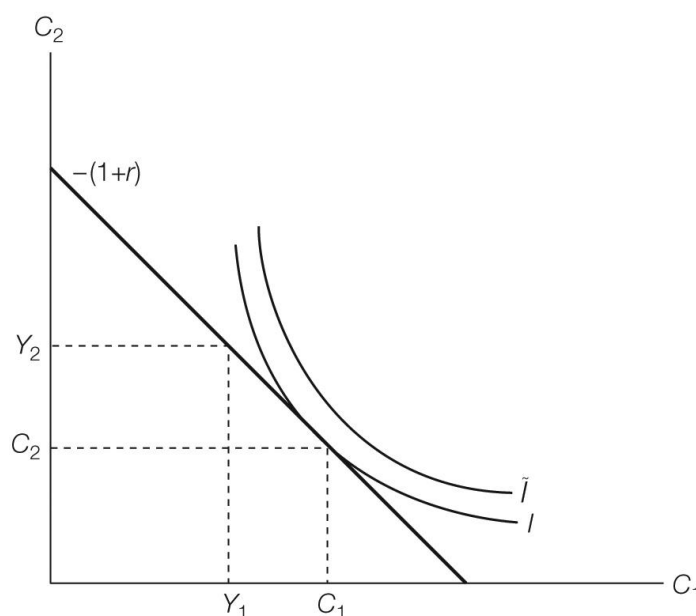
$$C_1 + \frac{C_2}{1 + r} = A_1 + Y_1 + \frac{Y_2}{1 + r}$$

- (a) What is the first-order condition for consumption in this case?
- (b) Use the first-order condition to substitute for C_2 in the budget constraint, and solve for C_1 .
- (c) Set $\rho = 0$ and investigate how Y_1^l , A_1 , Y_2^l , and r affect C_1 . Interpret the results.
- (d) Suppose that $A_1 = Y_1^l = Y_2^l = 100$ and $\rho = r = 0$. What is consumption in period 1?
- (e) Suppose that $A_1 = Y_1^l = Y_2^l = 100$ and $r = 0$, and $\rho = 0.10$. What is consumption in period 1? Explain the difference compared with the previous case.

Q6. The first order condition for consumption says that if the real interest rate is higher than the subjective rate of discount the consumer will plan consumption to increase over time. Explain why this is so.

Q7. Anna lives for two periods, 1 and 2. Her consumption in the two periods is determined by the tangency point between the indifference curve (I) and the budget line in Figure 4.10 (reproduced below).

Fig. 4.10 *The real interest rate on consumption with negative saving*



- Is Anna saving or borrowing in period 1?
- Suppose the real interest rate falls. Draw the new budget line so that it is tangent to the indifference curve \tilde{I} . How is Anna's consumption in period 1 affected by the decrease in the interest rate?
- What happens to savings/borrowings in period 1?
- How is Anna's consumption in period 2 affected by the decrease in the interest rate?
- Explain the results in terms of income and substitution effects.

Q8. Consider an economy where production grows exogenously at the rate of 1 percent. There is no capital stock and no investment so consumption equals production in each period. The subjective discount rate is 3 percent, the utility function is $u(C_t) = \ln(C_t)$, and inflation is 5 percent.

- What is the real interest rate in this economy? (Hint: Use the first order condition for consumption.)
- What is the nominal interest rate in this economy?

Q9. Assume that the real interest rate and the subjective rate of discount are both zero. A consumer expects to live for another 20 years. The first 5 years he will earn 40,000 euros per year. The last 15 years he will be retired and earn 20,000 euros. To simplify, we assume that the consumer acts as if future incomes and the length of life were known with certainty. What is his optimal level of consumption and how much does he save?

Q10. A consumer lives for two periods. His subjective discount rate and the real interest rate are both 5 percent.

- (a) What is the relation between consumption in the two periods?**
- (b) Use the lifetime budget constraint to calculate consumption as a function of incomes in the two periods.**
- (c) What will consumption be if incomes in both periods are 500?**
- (d) How much will consumption increase if income in the first period increases by 100? Explain the result.**
- (e) How much will consumption increase if income in the second period increases by 100? Explain the result.**