Micro2 CH17

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For simplicity, all calculations assume to be only 2 periods, similar results as the infinite horizon model.

Q1

6. Suppose that apartments in San Francisco typically sell for $300,000 and rent for $1,500 a month. The market interest rate is 10%. **True or False:** The market must be anticipating a rise in apartment rentals at some time in the future.

TRUE/FALSE. One invests 300,000 dollars in the rental market can earn $1500 \times 12 = 18,000$ a year, whereas saves those money into the financial market can earn $300,000 \times 10\% = 30,000$ a year. Hence, the apartment rentals must rise in the future. (Or, there is another possibility that the market anticipates a fall in the interest rate.)

Q2

15. **True or False:** If a monopolist owned an exhaustible resource, he would control its availability so that the price rose faster than the rate of interest.

FALSE. Consider the two period model. The monopolist who faced a linear demand $q = a - bp$, aims at

$$\max_{p_1,p_2} p_1(a - bp_1)(1 + r) + p_2(a - bp_2).$$

subject to the resource constraint $a - bp_1 + a - bp_2 = S$. Solving the optimization problem, we have

$$p_1 = \frac{4a + ar - 2S}{2br + 4b}$$
$$p_2 = \frac{4a + 3ar - 2S - 2Sr}{2br + 4b}.$$

The price rises at the rate

$$\pi = \frac{p_2 - p_1}{p_1} = \frac{2r(a - S)}{4a + ar - 2S} < \frac{2r(a - S)}{2a - 2S} = r.$$

Intuitively, the monopolist wants his marginal revenue to grow at the rate of interest. Because the marginal revenue curve is steeper than the demand curve, a given rise in marginal revenue corresponds to a smaller rise in price.

Q3

20. Suppose that the interest rate is 12% and that the representative agent's tastes are such that the interest rate would have to rise to 20% to get him to voluntarily cut current consumption by $1,000. Suppose now that there is a war that destroys $1,000 worth of consumption goods for every agent in the economy. **True or False:** The interest rate must rise to 20% to restore equilibrium.

FALSE. The representative agent is poorer now, and has a lower demand curve for current consumption. If his current consumption quantity is Q, then $Q - 1000$ corresponds to 20% on the old demand curve. It must correspond to something less than 20% on the new demand curve.

Q4

4. In Ch'ing dynasty Taiwan, a tenant usually paid his landlord a fixed amount of rental (定額租) every year. Suppose the rental for a given piece of land is R for a year. It's now the beginning of a year, and a landlord will receive the rental only at the end of year. The annual market interest rate is i, $i > 0$. What is the equilibrium market price for this piece of land?

Suppose a piece of land costs M dollars. A person possesses such wealth can invest either in the rental market or the financial market. In equilibrium, both market should have the same return, that is,

$$R = Mi \Rightarrow M = \frac{R}{i}.$$

Q5

5. It's interesting to note that not all pieces of land were sold unconditionally (絕賣) in Ch'ing dynasty Taiwan. Quite often, a seller of a piece of land had an option of repurchasing (or redeeming) it at the same price in the future. The custom was named Dian (典賣). Researchers find that subjecting a parcel of land to Dian reduced its market value to 60 to 80 percent of its value without Dian. Suppose a landlord wishes to raise \$K. There are 3 options: (1) To Dian his land at a price of \$K with the option that he could purchase it back 10 years later at the same price. (2) To sell the same piece of land at a full price of \$5K/4. (3) To borrow \$K for 10 years and the market interest rate is i, $i > 0$. We assume the market is perfect and one could always sell/buy anything he wishes at the market price. Which option is the most appealing financially?

Here I assume only two periods. Compare the future values:

(1) $K(1+i) - K = Ki$.

(2) $\frac{5}{4}K(1+i) - \frac{5}{4}K = \frac{5}{4}Ki$

(3) By Q4, the revenue for owning a house in the next period is the rental $R = \frac{5}{4}Ki$.

Hence, (2) = (3) > (1).

Q6

6. X 獨居荒島兩期, 島上有果樹1株, 第一期結果8個, 第二期結果6個。X 可以將第一期的果子收藏起來, 第二期再享用。令 c_1、c_2 表第一、二期 X 的消費數量, X 之跨期效用函數爲:

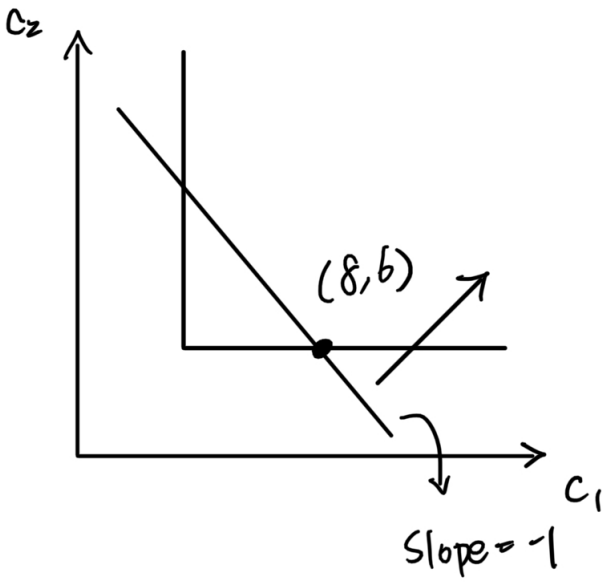
$$u = \min\{c_1, c_2\}$$

(a) 請在 $c_1 - c_2$ 平面上繪出 X 的無異曲線。(可先嘗試比較 (c_1, c_2) 爲 (3,2)、(2,3)、(2,2) 的效用。)

(b) 請在 $c_1 - c_2$ 平面上繪出 X 的預算線, 並標明斜率。

(c) X 第一期會吃幾個果子?

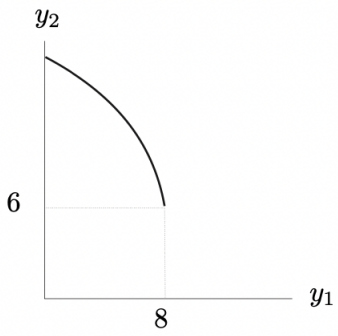
(a)(b)



(c) 7

Q7

7. 承前題, 除了將果子存於儲藏室外, X 發現若第一期的果子不消費而埋在地下, 第二期地下的果子會長出新果子。令 y_1 爲第一期吃掉的果子, 埋了 $8-y_1$ 的果子, 第二期的總收穫 (包括原先自然生長的6個) 量爲 y_2。$y_2(y_1)$ 如下圖粗線所示:



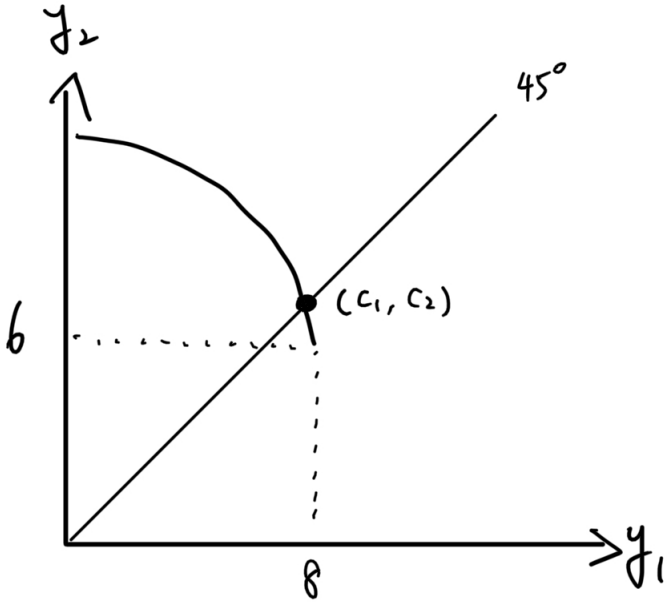
已知

$$\frac{dy_2}{dy_1}|_{y_1=8}=-2,\quad \frac{dy_2}{dy_1}|_{y_1=0}=-1.1$$

(a) 請繪圖說明 X 第一期的消費 c_1 爲何。

(b) 若耕種以外, X 尚有借貸機會, 跨期利率爲20%。請繪圖決定X 第一期的消費 c_1。

(a)



(b)