Micro2 CH14

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Q1

1. 請考慮共有物水族館的例子。週末市民可選擇去戶外野餐, 或是參觀水族館。一位水族館訪客所獲得的參訪價值 AV 與水族館內的人數 n 有關: $AV^a(n) = 120 - n$。戶外野餐的價值因人而異, 所有市民若按野餐價值由低至高排序, 第 n 位的價值爲 $MV^p(n) = n$。請考慮人數爲連續變數來做答。

    (a) 若水族館不收門票, 均衡時會有多少人在館內參觀?

    (b) 若要達到效率性, 應安排那些市民參觀水族館? 參觀人數爲何?

    (c) 若要透過收取門票, 使水族館的參訪人數具效率性, 水族館票價格應爲何?

    (d) 令 p 爲水族館門票價格, 水族館參訪的需求函數 $n(p)$ 爲何? 極大化收入的門票價格爲何?

(a) Assume there are N people in the aquarium at equilibrium. These N people in the aquarium must be the lowest N ones in the picnic value ranking. The Nth person should think that going to the aquarium is better than picnic, while the $N + dN$th person should think that picnic is better. That is,

$$
\begin{cases}
120 - N \geq N \\
120 - (N + dN) \leq N + dN
\end{cases}
\Rightarrow 60 - dN \leq N \leq 60
$$

Since dN can be arbitrarily small, $N = 60$.

(b) To reach efficiency, the marginal surplus to go to the aquarium should equal to

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the marginal surplus to go on a picnic. That is,

$$\frac{d}{dn}n(120 - n) = 120 - 2n = n \Rightarrow n = 40.$$

The first forty citizens should be scheduled to visit the aquarium so that the arrangement is efficient.

(c) In order to drive out the extra 20 people, the aquarium should charge 40 dollars.

(d) $120 - n(p) - p = n(p) \Rightarrow n(p) = 60 - \frac{1}{2}p$. To maximize $pn(p) = 60p - \frac{1}{2}p^2$, $p = 60$.

Q2

13. Suppose that you want to sell your car to one of several people and that you decide to auction it off. You are curious to know the highest price that each of the potential buyers would be willing to pay for the car. You ask each to submit a sealed bid, announcing that the car will go to the highest bidder, but that he will be charged the amount of the second-highest bid. Will the submitted bids be truthful? Why or why not?

Yes, see CH12 Q3.

Q3

3. A、B 兩人消費木材與香蕉, 前者爲公共財, 後者爲私有財。令 W_i、B_i 表 i 所消費木材與香蕉的數量, 兩人的偏好相同, i 的效用函數 $U_i = W_i * B_i$。A、B 每天皆要出外撿拾木材與香蕉。A 一天採集木材數量 W 與香蕉數量 B 的關係是:
$$W = 100 - B。$$
B 的生產可能曲線與 A 相同。

(a) 若 B 一根木材都不撿, A 每天會採幾根木材?

(b) 令 W^i 爲 i 所撿木材數量, 請導出反應函數 $W^A(W^B)$。

(c) Nash 均衡中, 兩人共採多少木材?

(d) 具有 Pareto 效率性的木材總量爲何?

(a) $U_A = (100 - B_A)B_A \Rightarrow B_A = 50, W_A = 50.$

(b) $U_A = (W^A + W^B)(100 - W^A) \Rightarrow (100 - W^A) - (W^A + W^B) = 0 \Rightarrow W^A = 50 - \frac{W^B}{2}.$
Similarly, $W^B = 50 - \frac{W^A}{2}.$

(c) $W^A = W^B = \frac{100}{3}.$

(d) By Samuelson condition: $MRS_a + MRS_b = MRT = 1$

$$MRS_a + MRS_b = \frac{B_a}{W} + \frac{B_b}{W} = 1 \Rightarrow (100 - W_a) + (100 - W_b) = W \Rightarrow W = 100$$

, the efficient amount is 100.