

1. (20%) Consider an industry that is characterized by a network effect, under which the value of a product to each user increases with the number of users.

(i) First consider a monopoly case. A monopolist firm has to decide the quantities of two potential products (henceforth product 1 and product 2), denoted by q_1 and q_2 . Suppose that the variable costs of product 1 and product 2 equal c_1 and c_2 , respectively, where $c_1 \leq c_2 < 1$. Furthermore, all other costs are assumed to be zero. The market price p of the two products is determined by the function $p = 1 - \gamma(q_1 + q_2)$, where $0 < \gamma < 1$ and a smaller γ represents a stronger network effect. Suppose that the firm can choose to produce one or two products to maximize its profits. Derive the optimal quantities of the two products for the monopoly firm. Explain the result. In particular, how would the value of γ influence its quantity decisions.

(ii) Now consider that two firms, firm 1 and firm 2, compete in the quantities of their products, denoted by q_1 and q_2 . Each firm produces only one product. The variable costs of the two products are the same and equal to c . Firm 1 and firm 2 simultaneously choose q_1 and q_2 , respectively, to maximize the profits from their own products. The market price, as a function of q_1 and q_2 remains the same (i.e., $p = 1 - \gamma(q_1 + q_2)$). Derive the equilibrium quantities of the two firms and the industry output $q_1 + q_2$ for this competition case. Compare them with those in (i) by assuming the variable costs in (i) are also the same (i.e., $c_1 = c_2 = c < 1$). Explain the output difference by giving some intuition and managerial implications.

2. (30%) 某甲有 10 元現金，可用以購買 A、B、C 三種貨品，或繼續保有現金。每單位現金的持有，會為甲帶來兩單位效用。消費第 n 單位的 A 貨品，會為甲帶來 $(7-3n)$ 單位的邊際效用。消費第 m 單位的 B 貨品，會為甲帶來 $(11-4m)$ 單位的邊際效用。單獨消費第 k 單位的 C 貨品，會為甲帶來 $(9-2k)$ 單位的邊際效用，但若甲以一單位的 C 貨品搭配一單位的 A 貨品來進行消費，則獲得 A 搭配的 C 貨品，其第 k 單位 C 貨品的邊際效用變成 $(9-k)$ ，若 $k \leq 3$ ；但第四單位以後的 C 貨品，其邊際效用則不因 A 貨品的搭配與否而有不同。例如甲購買了兩單位的 A 三單位的 C，則除了消費 A 的總效用為 5 之外，消費第一單位 C、第二單位 C、與第三單位 C 之邊際效用分別為 8、7 與 3。注意以上出現的 n, m, k 等皆為自然數，而且我們假設過度消費某一產品，邊際效用可能出現負值。假設目前 A、B、C 三種貨品的售價皆為 1 元。

(1) 試問甲應購買 A、B、C 三種貨品各多少單位，並持有多少現金，以便極大化其總效用。

(2) 現假設在甲完成購買 A、B、C 三種貨品之後，此三個貨品市場隨即關閉。但甲在一開始購買 A、B、C 三種貨品之時，就理性地預期到某乙即將在三個貨品市場關閉之後出現，並在甲尚未消費 A、B、C 三種貨品之前，向甲請求轉售甲手中的 B 貨品。甲也正確地預期到某乙將願以每單位 3 元，買盡甲願意出售的 B 貨品之最大數量。試求在此新的情境下，甲應購買 A、B、C 三種貨品各多少單位，並持有多少現金，以便極大化其總效用。

3. (25%) Please explain why firms are hard to coordinate on a focal equilibrium in their pricing decision for a more competitive industry and identify the factors about how market structure affects the sustainability of cooperative pricing?

4. (25%) 廠商的生產成本會隨著產量增加而下降，此一成本降低可能是規模擴大造成的，也可能是學習經驗(員工技術更熟練)所影響的。

請問：

- 如何分辨兩者的差別(請以成本曲線圖標示)?
- 如果想進行實證研究，如何分辨兩者個別對成本的影響?

試題請隨卷繳回