公 共 財

1. Pure consumptive public goods (PG)

- Pure public goods:
  - Non-rival (非耗竭性):
    - MC = 0 for more consumers to enjoy[1]
  - Non-excludable (非排他性): everyone can enjoy
    - Exclusion is technologically infeasible
    - Exclusion is too costly

  E Defence, lighthouse, fire works, TV/radio, weather forecast

- Also called "collective good" or "social good"

- Taxonomy:

	Rival	Non-rival
Excludable	Private Goods	Club Goods
Non-excludable	Impure PG	Pure PG

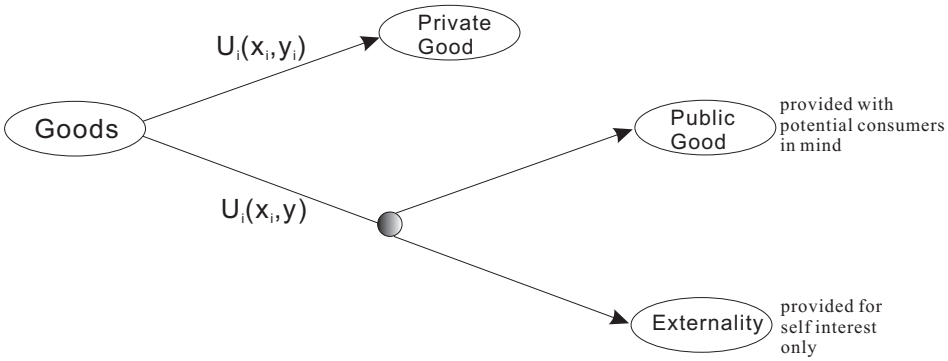
  - Impure/congestible PG: Internet, park, beach, highway, ...
  - Club/excludable goods: fitness club, swimming/golf club, ...

[1] Not MC= 0 of production!

- Math Def: goods affecting many people's utility

$$U_1(x_1, y),\ U_2(x_2, y)$$

  ▷ Consistent with non-rivalry and non-excludability



- Impure/congestible public goods:

$$U_i \ = \ U_i(x_i,\ \frac{y}{N^\alpha}), \quad \alpha \in (0,1)$$

- Public bad (公害): smoking, pollution, child birth
- Local public good: limited in geographical scope
- Productive public good: infrastructure, bureaucracy
- Other examples:
  - Political/spiritual leaders
  - Altruism:
    - Romeo/Juliet:

$$U_R(x_R, x_J),\ U_J(x_J, x_R)$$

    * Parent/kid:

$$U_P(x_P, x_K),\ U_K(x_K)$$

- Income distribution
- Externalities:[2]
    * Vaccination
    * Elementary/graduate education: U-shape
    * Beautiful v. ugly faces

[2]Also called "quasi-public good".

2. Single-Market Comparison: Private v. Public Goods

- Market equilibrium: market demand equals market supply

$$\text{MD} = \text{MS}$$

- Allocation efficiency: marginal social benefits equals marginal social costs

$$\text{MSB} = \text{MSC}$$

3. Private-good market: equilibrium and optimality

- Excludability: buy your own, or consume nothing
- At any price p, consumers have same MB_i, but different demand q_i
- Market demand:

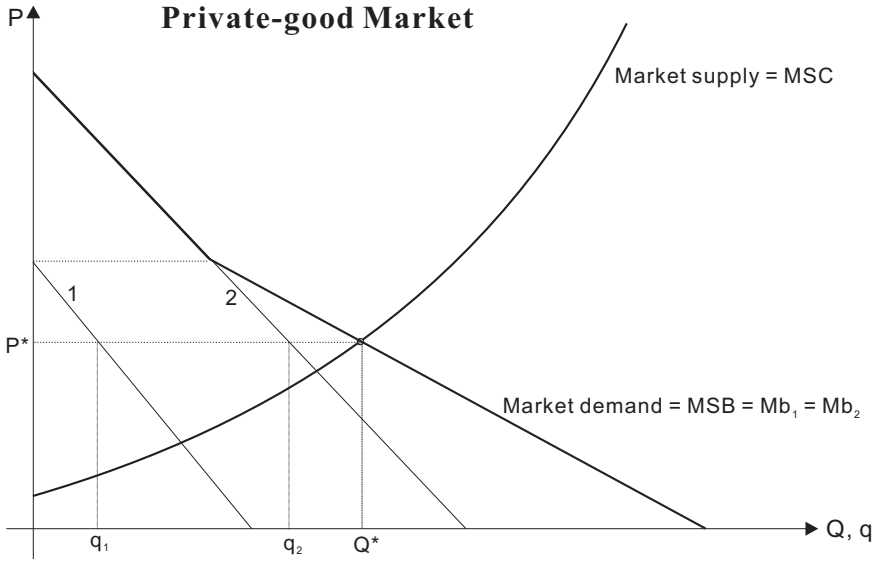
$$Q(p) \;=\; \sum_i q_i(p)$$

  - *Horizontal summation* of individual demand (along Q-axis)
  - Individual demand $q_i(p)$:

$$p(q_i) \;\equiv\; \text{MB}_i(q_i)$$

  - Market demand $Q(p)$:

$$p(Q) \;=\; \text{MSB}(Q) \;=\; \text{MB}_i(q_i),\ \forall\, i$$



- CE condition:

$$\text{Market demand} = \text{Market supply}$$

- Efficiency condition:

$$\text{MSB} = \text{MSC}$$

$\triangleright$ CE is efficient!

4. Public-good optimality

- Efficiency condition:

$$\text{MSB}(\text{Q}^*) \;=\; \text{MSC}(Q^*)$$

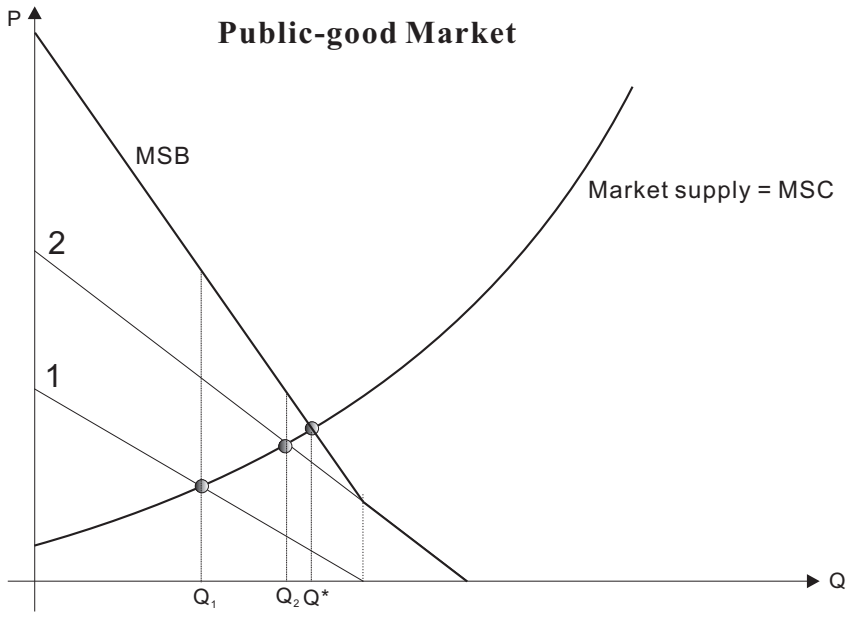
- Non-rivalry: consumers enjoy same Q, but have different MB_i
- Individual demand:

$$p_i(Q) \;=\; \text{MB}_i(Q)$$

  $\triangleright$ Height of individual demand curve (at level G)

- *Vertical summation* of individual demand (along p-axis)

$$\text{MSB}(Q) \;=\; \sum_i \text{MB}_i(Q) \;=\; \sum_i p_i(Q)$$



- Efficiency condition: Samuelson FOC

$$\text{MSB}(Q) \;=\; \sum_i p_i(Q) \;=\; \text{MSC}(Q)$$

- Private-provision equilibrium $\hat{Q}$:

  ▷ Individual utility-max:

$$\text{MB}_i(\hat{Q}) \;=\; p_i(\hat{Q}) \;\leq\; \text{MC}_i(\hat{Q})$$

  – Under-provision of public goods:

$$\hat{Q} \;\leq\; Q^*$$

  – Over-provision of public bads:

$$\hat{Q} \;\geq\; Q^*$$

- Free riding incentive: due to non-excludability of PG

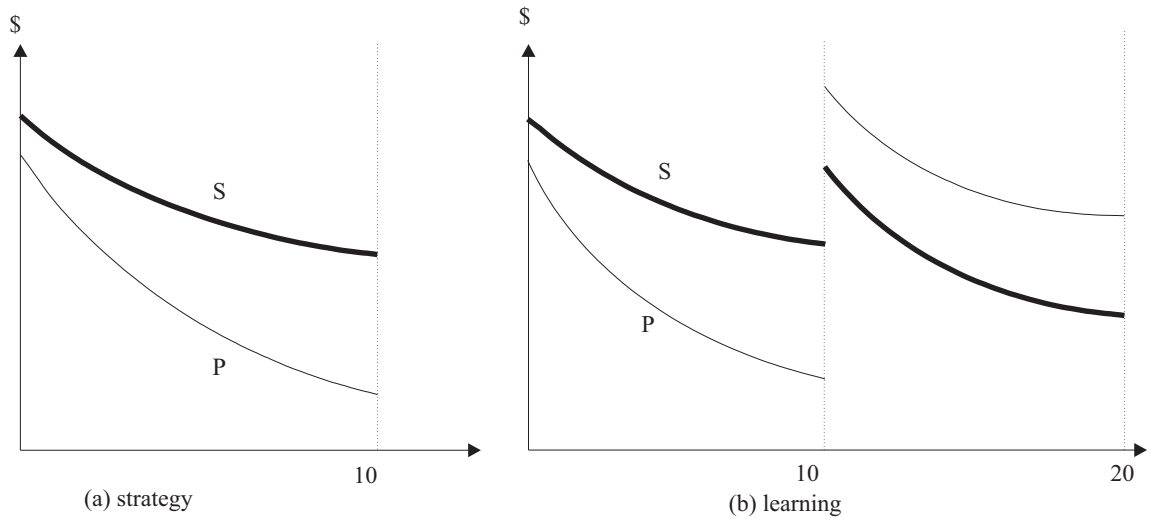
- Market failure remedy:

  – Govt provision/intervention

  – Govt needs perfect information about preferences

5. Free-riding (搭便車)

- An economic decision, no moral judgement
- Definition: *micro* v. *systemic* levels
- Everyone likes to enjoy (WTP>0), but no one wants to pay
- Lab experiment (實驗設計):
  - Stylized facts
  - Marwell/Ames (JPuE 1981): 1-time game, 40–60% contribution
  - Andreoni (JPuE 1988, 37:291–304): *learning* v. *strategy*
  - Effect of learning economics: free-ride more?
  - Nationality/culture (Burlando-Hey 1997): British free-ride more!
- Read: 《超爆蘋果橘子經濟學》, 第三章 (頁 149–192), 2010, 時報出版[3]



[3]S.D. Levitt and S.J. Dubner, *Superfreakonomics*, 2009.

6. Lindahl Equilibrium: Individualized Prices

- An example: roommates sharing rent C&J, 2e, pp.55–57

- Bargaining process:
  - Low transaction costs: few parties involved
  - Individualized prices: p_i

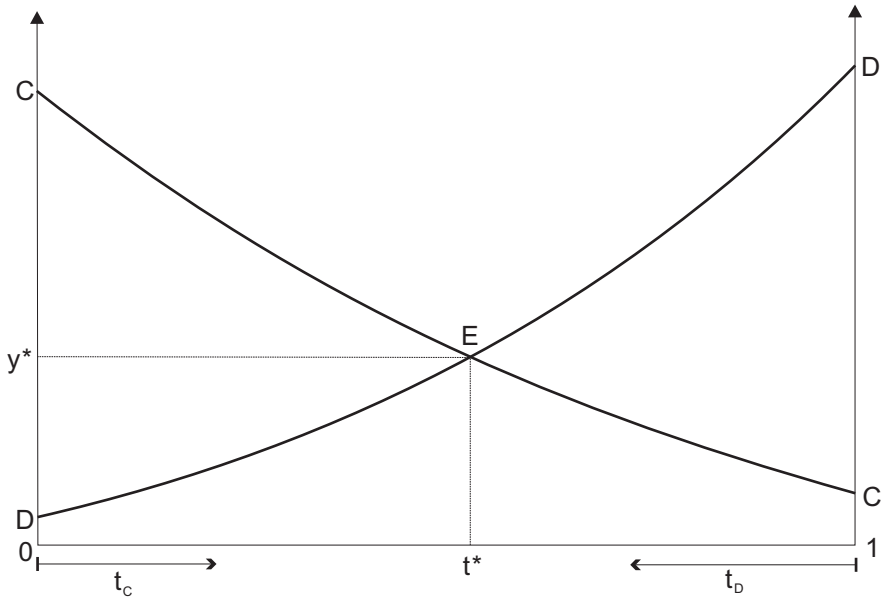
- Bargaining Lindahl equilibrium:
  - Demand side: consumers util-max

$$y_i \;=\; y(p_i \,|\, I_i)$$

  - Supply side:

$$\sum_i \; p_i = P$$

  - Equilibrium: identical demand y_i for PG



- At Lindahl equilibrium y^*:

$$\mathrm{MB}_i(y^*) \;=\; p_i$$

$$\sum_i \mathrm{MB}_i(y^*) \;=\; \sum_i p_i \;=\; P$$

  $\triangleright$ Samuelson FOC is satisfied.

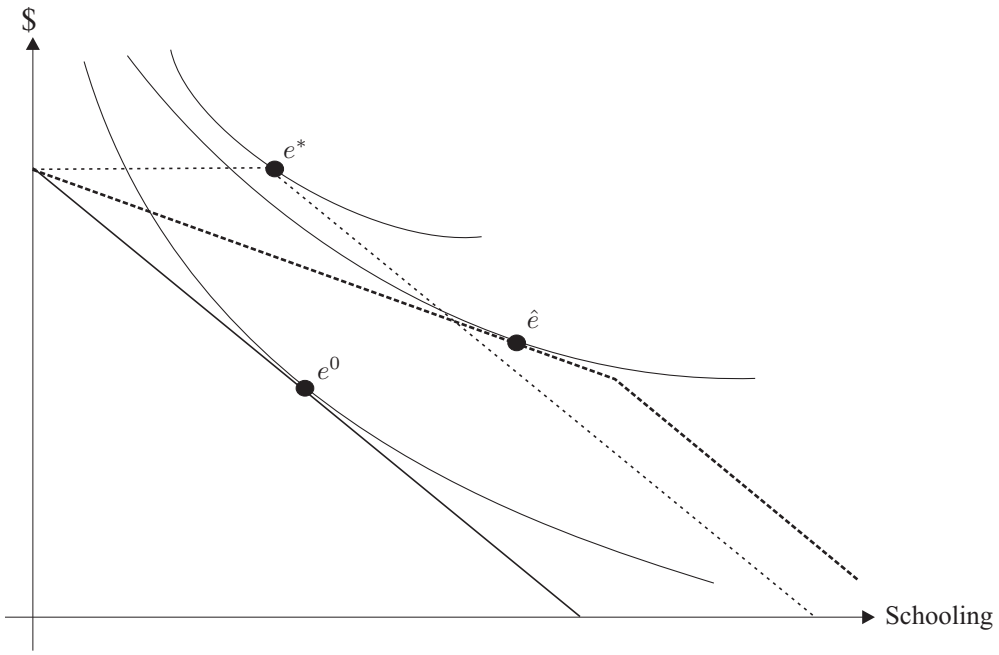
7. Private vs. Public Provision

- Private provision of public goods:
  - Police v. security
  - Court v. arbitration (仲裁, 調解)
  - Public v. private schools/parks
- Govt provision of private goods: due to
  - *Adverse selection* (逆選擇): health insurance
  - *Economy of scale* (規模經濟): public utilities, garbage collection
  - *Commodity egalitarianism* (商品均等化): public housing
- Considerations:
  - Property: Rival? Excludable?
  - Production cost: economy of scale
  - Administrative cost
  - Fair/even distributn
- Private Production of Public Goods: Private sector more efficient?
  - Performance hinges on existence of competition
  - Output of public sector hard to measure
  - Privatization of public enterprizes

8. Case Study 1: Free Education

- Rationale for public provision/production:
  - Efficiency: externality
  - Equity: access to education available to all

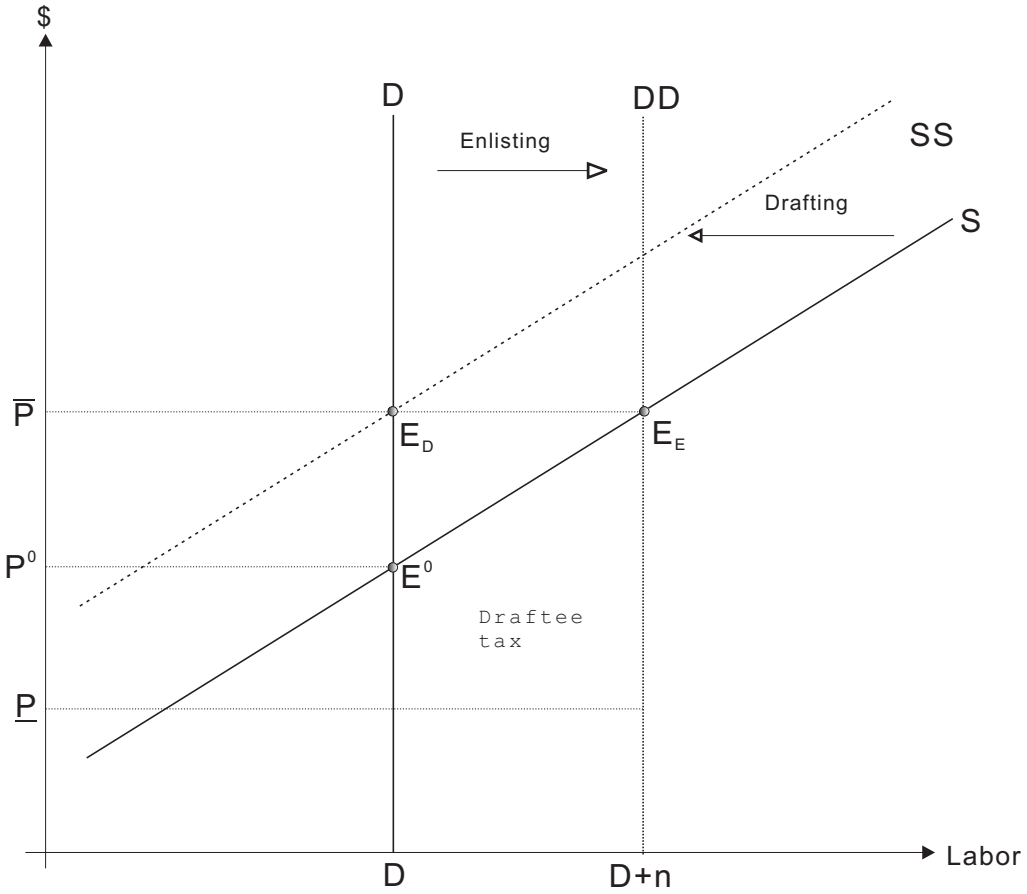
- Quantity subsidy (免費義務教育) v. price subsidy with ceilings (學費補貼)
  - $e^* < e^0$: inferior goods, more likely[4]
  - $\hat{e} < e^0$: Giffen goods, less likely



[4] E.g., instant coffee.

9. Case Study 2: National defence labor acquisition

- Initial labor market equilibrium: $(E^0,\ P^0)$
  - Fixed labor demand: $D(p) = D$
  - Elastic labor supply: $S(p)$



- 兵制: n soldiers required by govt, with wage paid only $\underline{P}$
  - Enlisting (募兵制): labor demand raised (shifts right) by n
  - Drafting (徵兵制): labor supply reduced (shifts left) by n

- Draftee tax: draftee wage loss is

$$\bar{P} - \underline{P}$$