

# Public Economics

## Lec 3: Public goods

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School of Economics and Management

- **Kruse & Ståhlberg: Welfare economics**  
Theory, empirical results and the Swedish experience  
Studentlitteratur
- Lecture 12 (Fiscal federalism) & lecture 13 (Debt & ageing) switched
- Practical info about **exam**
- Applying welfare economics

# Today's reading list

- **Rosen & Gayer** ch. 4
- **Recommended readings**
  - Coase (1974)
  - Samuelson (1954)
- **Optional readings**
  - Bundling (Frackenkohl & Pönitzsch, 2013)
  - Buchanan's clubs (Sandler, 2013)

# Definition of a public good

- ① Consumption of the good is **nonrival**
  - Resource cost of additional consumption = 0
  - An additional unit of consumption does not deteriorate the consumption opportunities available to others
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- Buffet
- Museum
- Fairytale
- Public illumination
- Radio broadcasting
- National defense
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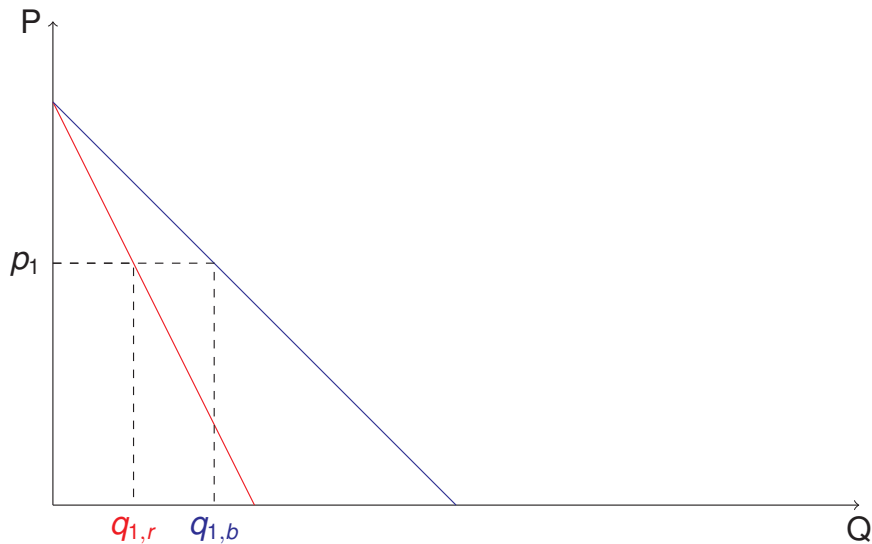
## Examples

- Bar of chocolate X
- Buffet X
- Museum X
- Fairytale ✓
- Public illumination ✓
- Radio broadcasting ✓
- National defense ✓
- Public roads ...

# Distinctions

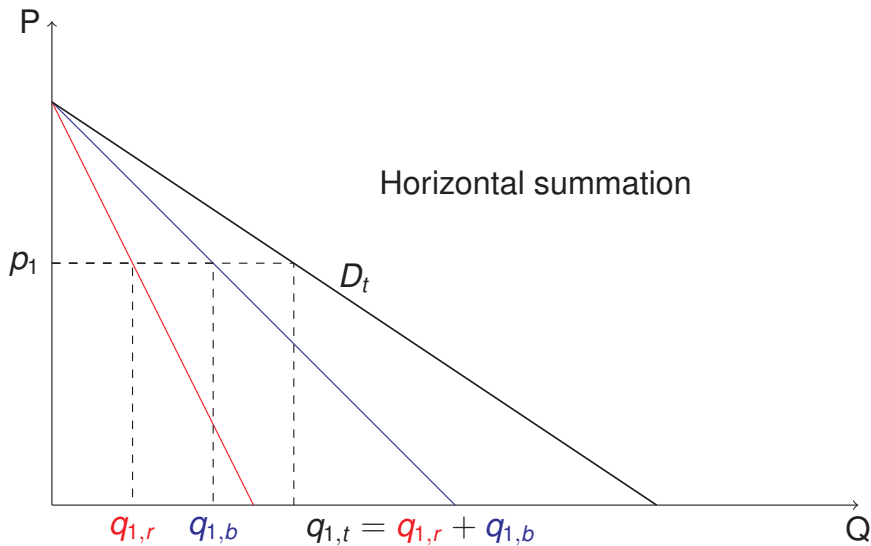
- **Some goods may satisfy one condition but not the other**
  - **Impure** public good
  - Buchanan's **theory of clubs**
- **Public goods not necessarily produced by state**
  - **Examples:** mercenaries, radio stations, lighthouse
- **Type of a good might not be stable over time**
  - Technology can change the status of a good (patent)

# Demand for **private** good (recall)

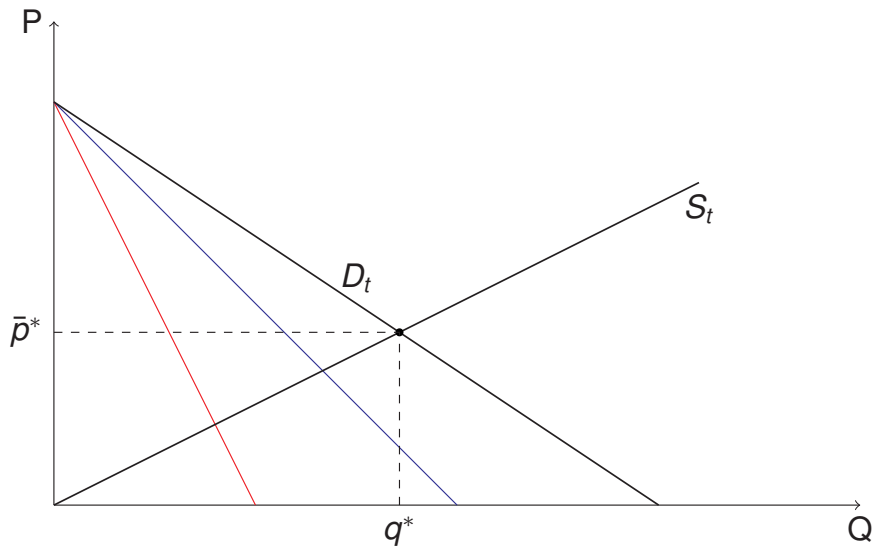




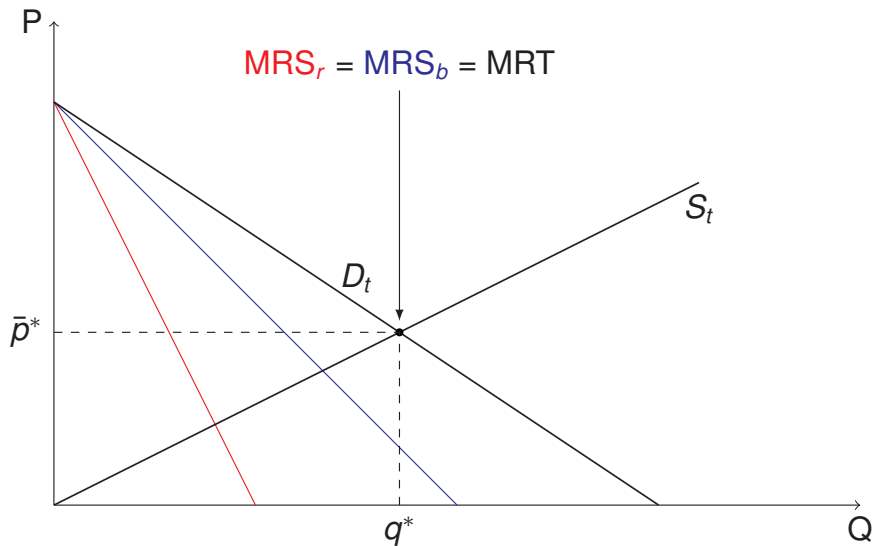
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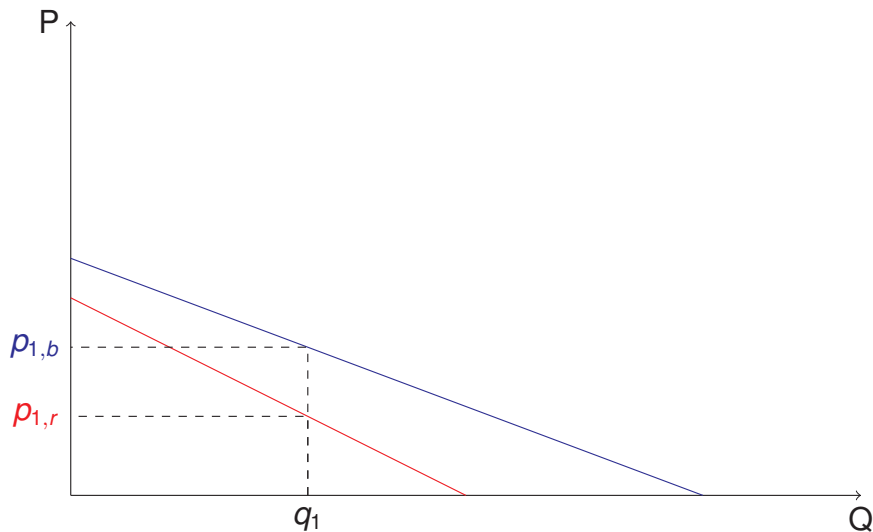
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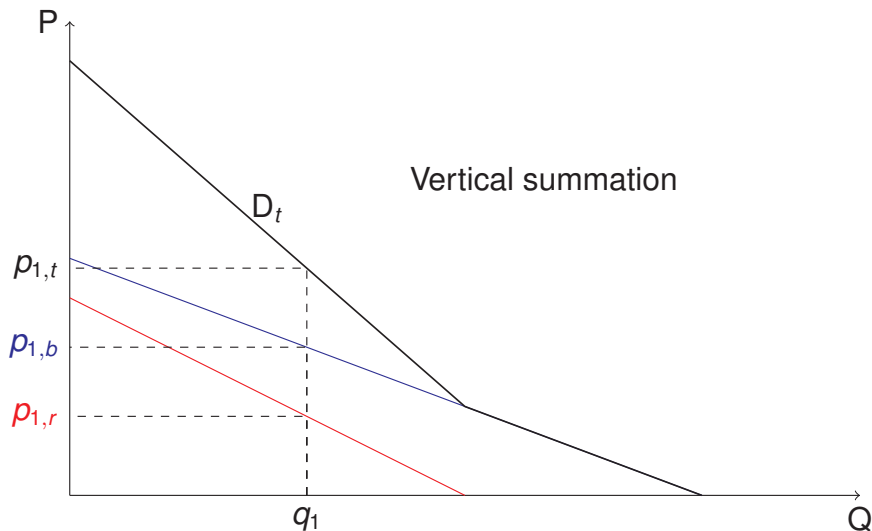
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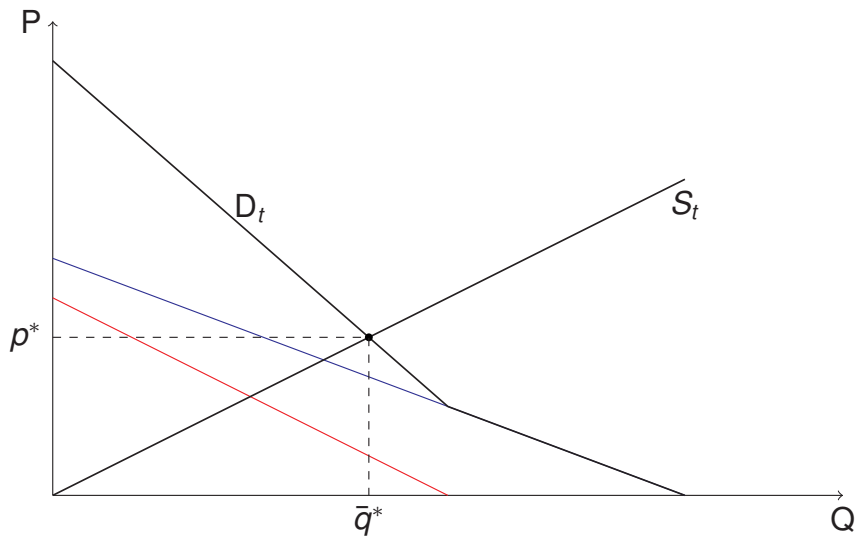
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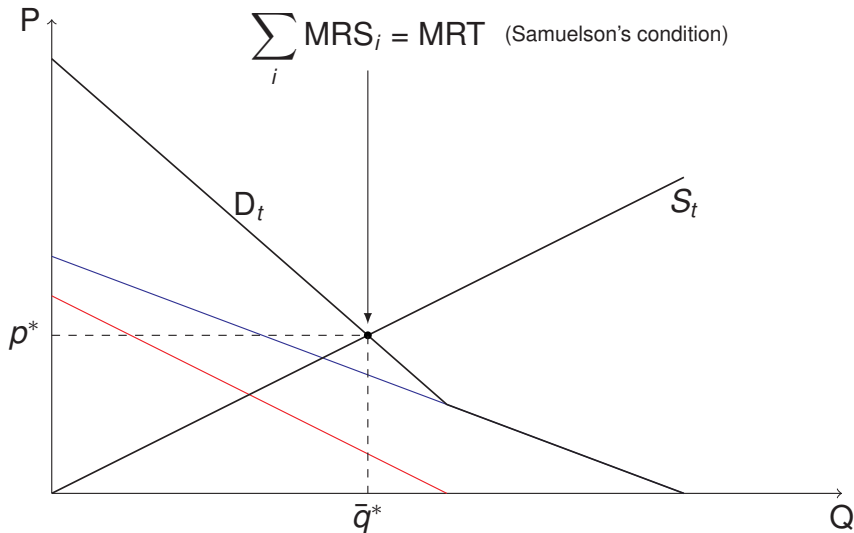
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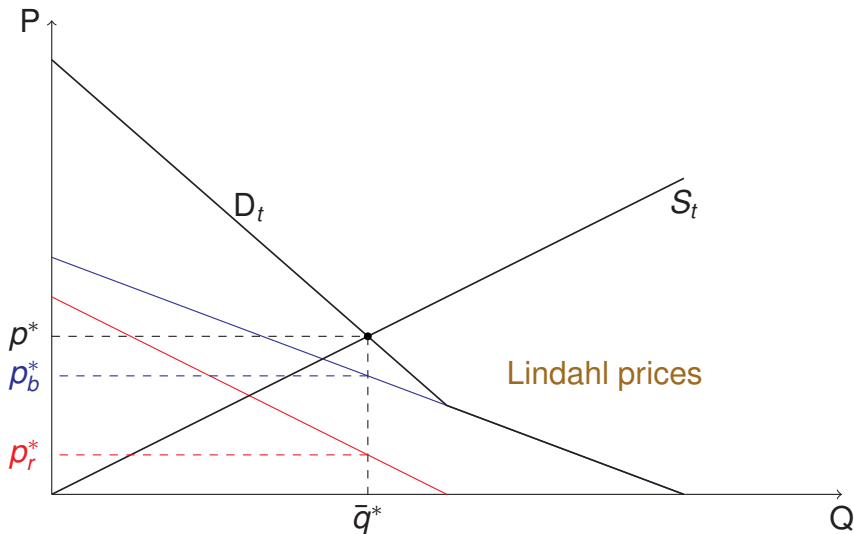
# Demand for **public** good



# Demand for **public** good



# Demand for **public** good





# Samuelson's theory of public expenditure

## Making sense of formulas (Samuelson, 1954)

one always wants to maximize and (2) inputs or factors which everyone always wants to minimize, we are free to change the algebraic signs of the latter category and from then on to work only with "goods," knowing that the case of factor inputs is covered as well. Hence by this convention we are sure that  $u^i_j > 0$  always.

narrow it to the class that any one of its indexes can be written  $U = U(u^1, \dots, u^s)$  with  $U_j > 0$ .

2. *Optimal Conditions.* In terms of these norms, there is a "best state of the world" which is defined mathematically in simple regular cases by the marginal conditions

$$\frac{u^i_j}{u^i_r} = \frac{F_j}{F_r} \quad (i = 1, 2, \dots, s; r, j = 1, \dots, n) \text{ or} \quad (1)$$

$$(i = 1, 2, \dots, s; r = 1; j = 2, \dots, n)$$

$$\sum_{i=1}^s \frac{u^i_{n+j}}{u^i_r} = \frac{F_{n+j}}{F_r} \quad (j = 1, \dots, m; r = 1, \dots, n) \text{ or} \quad (2)$$

$$(j = 1, \dots, m; r = 1)$$

$$\frac{U_i u^i_k}{U_q u^q_k} = 1 \quad (i, q = 1, \dots, s; k = 1, \dots, n) \text{ or} \quad (3)$$

$$(q = 1; i = 2, \dots, s; k = 1).$$

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# Problems with public goods

- ① **Marginal willingness to pay is unobservable**
  - Hard to determine efficient provision (macro)
  - Lindahl prices unapplicable (micro)
- Same price for everybody  $\implies$  **Redistribution issues**
- + **Taxes distortionary**

## ② Public good is nonexcludable

- Why contribute?
- Cleaning shared kitchen, fill the printer, empty the dishwasher
- **Free-riding**

# Free-riding: small class experiment

- Groups of 4 people, each of you has 100 ducats
- Decide how many to keep for yourself and how many to put in a common investment fund with people in your group
- **Do not talk or peak at what other people are doing**
- All ducats invested in the fund will grow by 50%, then split equally among all members
- The person earning more money gets chocolate
- Identify yourself with last 4 digits of your mobile number

## Group X, 8144

Myself  
40

Pool  
60

# Free-riding: idea

- **Efficient provision:** everybody contributes 100
  - **Public pool:**  $400 \implies 600$
  - **Size of the pie:** 600
  - **Individual payoffs:**  $\frac{600}{4} = 150$
- **Defection:** one person does not contribute
  - **Public pool:**  $300 \implies 450$
  - **Size of the pie:**  $450 + 100 = 550$
  - **Contributor's payoffs:**  $\frac{450}{4} = 112.5$
  - **Defector's payoffs:**  $\frac{450}{4} + 100 = 212.5$

# Free-riding: consequences

## Incentive to free-ride

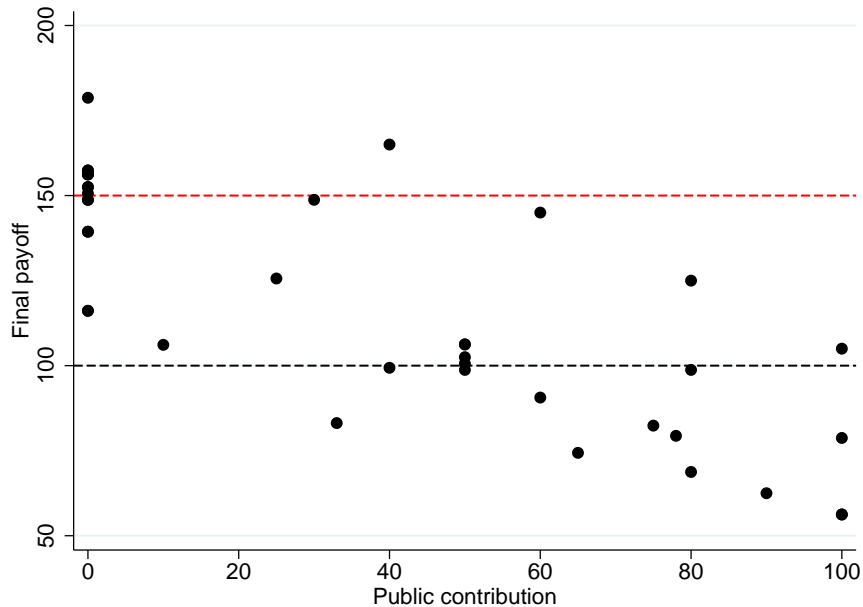
- Tax evasion, bus tickets, cigarettes on the streets
- Group essays, group presentations. . .

⇒ **underprovision of public good**

## Your behavior

- Average contribution: 37.4%
- 16/40 people contributed 0
- 13/40 people contributed  $> 50\%$
- Average pie size: 472.5 (max 600)

# Free-riding: experiment results



# Alternative pay mechanism

- **Sale of by-products**: commercials in TV
- **Bundling**: “organic” food
- **Technological change**: satellite encryption
  - Private contracts

## **Clubs**: (Buchanan, 1960's)

- Impure public good: **excludable**
  - Excludability used to finance impure public good
- Choose both optimal provision and membership
  - Optimal provision depends on member quantity & MRS



# How to provide for public good?

## Criteria

- How much to **produce**
- How to **finance** it

## Private or public provision?

- **Private:** inefficient (under-)provision
  - Successful examples: lighthouse (Coase, 1974), crowdfunding
- **Public:** inefficient financing
- **Efficiency vs equity:** distributional considerations

**Think:** education, culture, public illumination

# Crowdfunding

