Lecture 6: Public Goods

Petros Varthalitis

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Public Goods

- Optimal Provision of Public Goods
- Private Provision of Public Goods
- Public Provision of Public Goods

Public Goods: Trash Collection in Beirut, Lebanon

Why don't people pay to have their neighbor's trash collected?

- No one wants to pay, but everyone wants someone else to pay.
- Private trash collection, financed by a voluntary fee paid by neighborhood residents, faces the classic ***free rider problem***.
- Goods that suffer from this free rider problem are known in economics as ***public goods***.

Public Goods: A taxonomy

- **Pure public goods**: Goods that are perfectly non-rival in consumption and are non-excludable.
  - **Non-rival in consumption**: One individual's consumption of a good does not affect another's opportunity to consume the good.
  - **Non-excludable**: Individuals cannot deny each other the opportunity to consume a good.
- **Impure public goods**: Goods that satisfy the two public good conditions (non-rival in consumption and non-excludable) to some extent but not fully.

Defining Pure and Impure Public Goods

		Is the Good Rival in Consumption?: (Yes)	**Is the Good Rival in Consumption?:** (No)
Is the Good Excludable?	(Yes)	Private good (ice cream)	Impure public good (TV streaming)
Is the Good Excludable?	(No)	Impure public good (crowded city sidewalk)	Pure public good (national defense)

Optimal Provision of Public Goods: Introduction

- How much of the public good should society provide?
- Markets will not provide the correct amount.
- To answer this question, start by reconsidering the market for a **private good** like ice cream cones.
- Ben and Jerry have different tastes for ice cream (*ic*) relative to the other good (*c*). How does the market aggregate their preferences?
- *Quick hint*: To make the model easier to use, assume that the other good is a **numeraire good**, a good for which the price is set at $1. This makes the absolute and relative price of the ice cream equal.

Optimal Provision of Private Goods

- Ben and Jerry demand different quantities of the good at each price.

- The *optimality* condition for the consumption of private goods is written as:

$$\frac{MU_{ic}^{B}}{MU_{c}^{B}} = MRS_{ic,c}^{B} = MRS_{ic,c}^{J} \quad = \frac{P_{ic}}{P_{c}}$$

Optimal Provision of Private Goods

- Equilibrium on the supply side requires

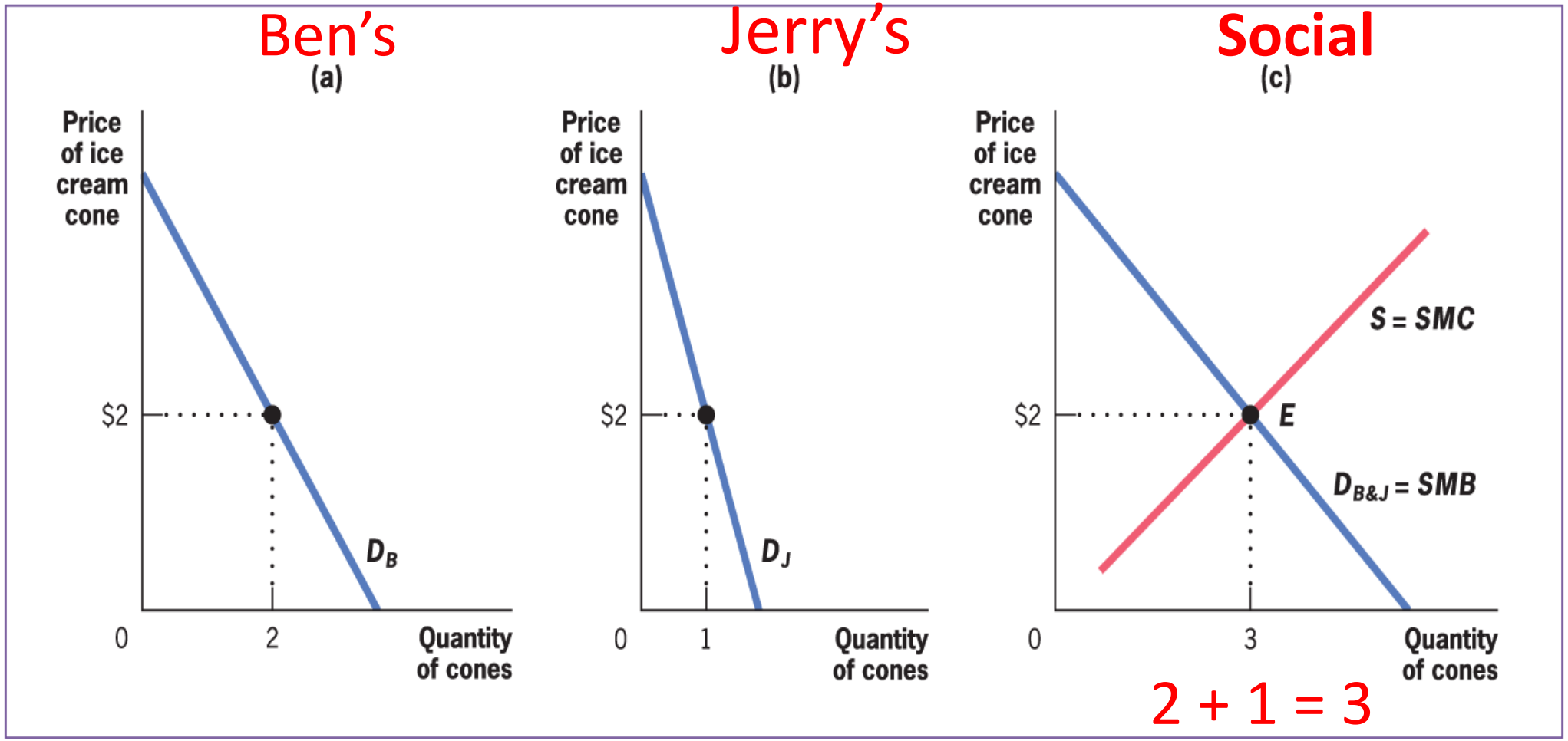
$$MC_{ic} = P_{ic}.$$

- Therefore, in equilibrium:

$$MRS = MC.$$

- MC, marginal cost of production, equals marginal benefit, MRS^B or MRS^J.

Horizontal Summation in Private Goods Market



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Optimal Provision of Public Goods

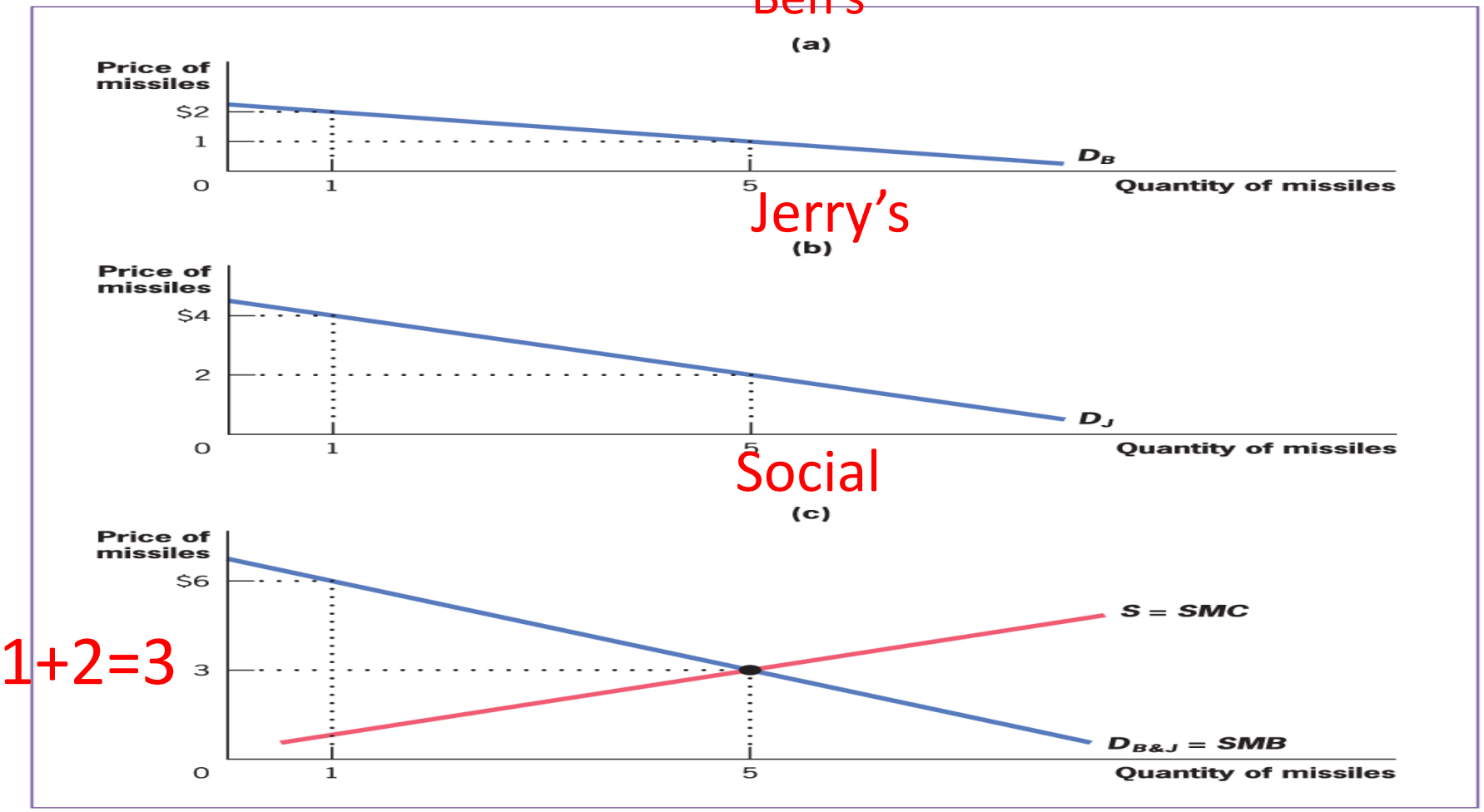
- With public goods, such as missiles (*m*), Ben's consumption doesn't reduce Jerry's.

- Therefore, the social-efficiency-maximizing quantity solves:

$$MRS^{B}_{m,c} + MRS^{J}_{m,c} = MC$$

- Social efficiency is maximized **when the marginal cost is set equal to the sum of the *MRS*s rather than being set equal to each individual's *MRS*.**

Vertical Summation in Public Goods Market



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Private Good

- Demand for individual *A* is given by $Q^A = a^A - b^A P$
- Demand for individual *B* is given by $Q^B = a^B - b^B P$
- Since this is a private good, individuals demand different quantities at any price P:

$$Q^A \neq Q^B$$

Private Good

- **We add quantities horizontally.**

- The aggregate demand for a private good is calculated by summing horizontally:

$$Q^A + Q^B = a^A - b^A P + a^B - b^B P$$

- The social marginal benefit is equal to:

$$P = SMB = \frac{a^A + a^B}{b^A + b^B} - \left(\frac{1}{b^A + b^B}\right) Q$$

Public Good

- Since this is a public good, it is consumed equally by all individuals

$$Q^A = Q^B = Q$$

- However, individuals will be willing to pay different prices for this common quantity

$$P^A \neq P^B$$

- Demand for individual *A* is written as $P^A = \frac{a^A}{b^A} - \frac{1}{b^A} Q$

- Demand for individual *B* is written as $P^B = \frac{a^B}{b^B} - \frac{1}{b^B} Q$

Public Good

- **We add prices vertically.**

- The social marginal benefit is equal to:

$$SMB = P^A + P^B = \frac{a^A}{b^A} + \frac{a^B}{b^B} - \left(\frac{1}{b^A} + \frac{1}{b^B}\right) Q$$

Example

Consumer's A demand for good Q is given by:

$$Q = 21 - 6P$$

Consumer's B demand is given by:

$$Q = 6 - 3P$$

Example (cont'ed)

- Suppose this is a private good, find the equation for the social marginal benefit.

- Suppose this is a public good, find the equation for the social marginal benefit.

- Private good:

$$SMB = 3 - Q/9$$

- Public good:

$$SMB = 5.5 - Q/2$$

Private Provision of Public Goods: Private-Sector Underprovision

- The market does not produce the efficient amount of public goods because of ***the free rider problem***.

- **Free rider problem:** When an investment has a personal cost but a common benefit, individuals will underinvest.

- Since Ben's consumption of missiles also benefits Jerry, Jerry may not want to pay (or vice versa).

- This results in the private market producing an inefficiently low quantity of the good.

APPLICATION: The Free Rider Problem in Practice 1

- The free rider problem is one of the most powerful concepts in all of economics.

- **Provision of Fire Services:**

  - Until 2013, fire services in Victoria, Australia, were financed by a tax on fire insurance policies. Individuals who did not insure still received services.

  - In 2013, Victoria moved to financing fire services through property taxes in order to address this issue.

APPLICATION: The Free Rider Problem in Practice 2

- **Public Art Institutions:**
  - Museums that do not charge for admission face a significant free rider problem.
  - The Metropolitan Museum of Art in New York has a “recommended” donation instead of an admission fee, so only 17% pay the full charge.
  - To address this, the Met has started charging admission to out-of-town visitors.

APPLICATION: The Free Rider Problem in Practice 3

- **Online information sharing:**
  - Over 500 million unique visitors consult Wikipedia.
  - The content is exclusively written by volunteers.
  - Less than 0.5% of readers contribute regularly.
  - About 1.5% of non-editing readers donated to the nonprofit by the end of Wikipedia's 2017 fund-raising campaign.
  - That leaves more than 490 million readers who free ride on both the editors' efforts and the donors' money.

Can Private Providers Overcome the Free Rider Problem?

- The free rider problem does not lead to a complete absence of private provision of public goods.
- When private suppliers are given the ability to overcome the problem of non-excludability, they can produce the efficient quantity of the good.
- The private sector can in some cases combat the free rider problem to provide public goods by charging user fees that are proportional to their valuation of the public good.

When Is Private Provision Likely to Overcome the Free Rider Problem?

- Markets can (mostly) overcome the free rider problem when some individuals care more than others.
- Suppose Ben cares much more about fireworks than Jerry.
- Then, Ben will want to buy a lot of fireworks for himself ($MRS^B = MC_f$).
- And the efficiency loss is not too great ($MRS^B \approx MRS^B + MRS^J$).

Altruism and Social Capital

- Private markets provide public goods when people are altruistic.
- **Altruistic:** When individuals value the benefits and costs to others in making their consumption choices.
  - Many laboratory experiments provide evidence for altruism and show that people contribute to public goods.
- **Social capital:** The value of altruistic and communal behavior in society.
  - The quantity of social capital depends on how much people of the same community affected by the public good can “trust” each other and are therefore willing to chance their personal investment of time and effort into paying for the public good without any formal guarantee of reciprocity from other community members.

Public Provision of Public Goods

- Even with private provision, there is a role for government provision of public goods.
- Under private provision, not everyone contributes to the good, even though everyone benefits.
- Government provision potentially solves the problem of noncontributors.
- Nonetheless, there are several challenges to government provision.

Private Responses to Public Provision: The Problem of Crowd-Out

- **Crowd-out:** As the government provides more of a public good, the private sector will provide less.
- In full crowd-out, government intervention accomplishes nothing because an increase of 5 units provided by the government results in a decrease of 5 units provided privately.
- Full crowd-out is rare. Partial crowd-out is much more common and can occur in two different cases:
  - When noncontributors to the public good are taxed to finance provision of the good
  - When individuals derive utility from their own contribution as well as from the total amount of public good

Contributors Versus Noncontributors

- Government provision is financed by payments by private individuals.
- By forcing noncontributors to contribute to the fund for public provision, the government can increase total public goods provision.
  - Noncontributors will be forced to increase their expenditures on the goods.
  - Contributors will experience an increase in effective wealth, which has a positive income effect on their purchase of the private good, so government intervention will not fully crowd out their spending.

The Right Mix of Public and Private

- One extreme is provision entirely by the public sector.
- The other extreme is subsidized or mandated private provision, with the government providing incentives.
- **Contracting out:** An approach through which the government retains responsibility for providing a good or service but hires private-sector firms to actually provide the good or service.
- Two problems with contracting out:
  - The private sector's incentives may not align with public goals, leading to lower public costs but worse outcomes along other dimensions that policy makers may care about.
  - Bidding in contracting out is often far from competitive.

Measuring the Costs and Benefits of Public Goods 1

- Optimal public good provision requires being able to measure both the benefits and the costs of providing public goods. In practice, this is quite difficult.

- Consider the case of a highway. Cost includes wages and materials.
  - What if, without this highway project, half of the workers on the project would be unemployed?
  - How can the government take into account that it is not only paying wages but also providing a new job opportunity for these workers?

Measuring the Costs and Benefits of Public Goods 2

- The benefits of highway construction are also difficult to measure.
  - What is the value of the time saved for commuters due to reduced traffic jams?
  - And what is the value to society of the reduced number of deaths if the highway is improved?

- These difficult questions are addressed by the field of *cost-benefit analysis*, which provides a framework for measuring the costs and benefits of public projects.

How Can We Measure Preferences for Public Good?

- Three challenges in measuring preferences for public goods.
- ***Preference revelation***: People may not want to reveal their true valuation because the government might charge them more for the good if they say that they value it highly.
- ***Preference knowledge***: People may not know what their valuation is.
- ***Preference aggregation***: How can the government combine the preferences of millions of citizens?
- These problems are addressed by the field of *political economy*, the study of how governments go about making public policy decisions, such as the appropriate level of public goods.

Conclusion

- A major function of governments at all levels is the provision of public goods.
- Sometimes the private sector can provide public goods but usually not the optimal amount.
- Government intervention can potentially increase efficiency.
- Success of intervention depends on the:
    - Ability of government to measure costs and benefits.
    - Ability to implement optimal plan.