Public Goods and Tax Policy

Chapter 14
Learning Objectives

1. Use the concepts of rivalry and excludability to distinguish among private goods, public goods, collective goods, and common goods

2. Show how economic concepts can be used to find the optimal quantity of a public good and describe the ways in which private firms can supply public goods

3. Analyze the types of efficiencies and inefficiencies that are associated with provision of a public good

4. Discuss the criteria that should be applied to taxation to promote efficiency
Government Is Unique

• Government is the only organization with the power to compel actions
  – Taxes
  – Military service
  – Imprison people

• All other institutions – family, business, charitable organizations, etc. – rely on voluntary transactions

• Government decisions can be analyzed using economic principles
Public Goods

• **Public good** is a good that is both nonrival and nonexcludable
  – A **nonrival good** is one whose consumption by one person does not diminish its availability to others
    • National defense
    • Economics lectures
  – A **non-excludable good** is one that is difficult or costly to exclude non-payers from consuming
    • Over-the-air broadcasts
    • Fireworks displays

• A pure public good is, to a high degree, both nonrival and nonexcludable
Public Goods and Government

• Pure public goods are provided by government
  – Cost of production are difficult to recover directly
    • Free-rider problem
  – MC of public goods is zero
    • Charging for them reduces total surplus
Public Goods and Government

- A **collective good** is a good or service that, to at least some degree, is nonrival but excludable
  - Sometimes provided by government
- A good is a **pure private good** if
  - Non-payers can easily be excluded **and**
  - Each unit consumed by one person means one less unit available for others
Public Goods and Government

• A pure commons good is a rival good that is nonexcludable
  – Results in a tragedy of the commons
  – Fish in open water
## Types of Goods

<table>
<thead>
<tr>
<th>Nonexcludable</th>
<th>Nonrival</th>
<th>Low</th>
<th>High</th>
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<tbody>
<tr>
<td>High</td>
<td>Commons good (ocean fish)</td>
<td>Public good (national defense)</td>
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<tr>
<td>Low</td>
<td>Private good (wheat)</td>
<td>Collective good (pay-per-view TV)</td>
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Government Decisions about Public Goods

- **Cost – Benefit Principle** applies to pure public goods, as all others
  - The cost of the public good is the sum of the explicit and implicit costs incurred to produce it

- Benefits of a public good are different from a private good
  - Benefit of an additional unit of a private good is the highest price someone would pay for it
  - Benefit of an additional unit of a public good is the sum of the reservation of all people who use it
    - Everyone who watches *Sesame Street*
Paying for Public Goods

- Not everyone benefits equally from a public good or service.
  - Taxing people in proportion to their willingness to pay is equitable … and impractical

- Example
  - Prentice and Wilson have adjacent properties
    - Fighting zebra mussel infestation
    - New device to control mussels is $1,000 to serve both properties
    - Wilson's income is higher; value for device is $800
    - Prentice values device at $400
Scenario 1: Sharing the Cost

• Prentice and Wilson negotiate the joint purchase
  – Value is $1,200; cost is $1,000
  – Cost – Benefit Principle satisfied

• Some conditions make a private negotiated solution difficult to achieve
  – Suppose there are a large number of parties
    • Communication and negotiation are costly
    • Free rider problem
    • "Fair" sharing of costs may be difficult to agree

• Government provision could be a solution
Scenario 2: "Equal tax" Rule

- Local government offers to install the device for Prentice and Wilson
  - Equal sharing of costs with a head tax
    - A head tax is a tax that collects the same amount from every taxpayer
    - Majority of affected parties must agree
  - Result: no new device
    - $500 is more than Prentice's reservation price
      - Prentice vetoes device
  - A regressive tax has a tax rate that varies inversely with income
Scenario 3: Proportional Tax on Income

- A proportional income tax requires all taxpayers to pay the same proportion of their incomes in taxes
  - Majority rule applies
- Tax Prentice $333 and Wilson $667
- Government buys the device
  - Economic surplus:
    - Wilson:  $800 - $667 = $133
    - Prentice: $400 - $333 = $67
    - Total surplus increases $200
Marital Budgeting

• Married couples usually pool their incomes
  – If each contributed proportionately, consumption would be limited by the lower income
    • Higher income partner would want to spend more on all normal goods
  – Combining incomes allows them to consume at a level appropriate to their combined incomes
Private and Public Goods

- Individuals consume whatever quantity and quality of most private goods they choose to buy
  - Jointly consumed goods must be provided in the same quantity and quality for all
  - People's willingness to pay increases with income

- Suppose public goods are financed by a head tax
  - Higher income groups will not get the amount of public goods they demand

- Progressive taxes take a larger share of higher incomes as tax
  - These taxes support a better outcome for all groups
Unfair Taxation

• A head tax is regressive
• With a proportional tax, the tax bill, in dollars, is higher for high-income groups
• Some argue that progressive taxes unfairly burden the higher income groups
  – If public goods are normal goods, the higher income group demands more public goods than other groups
  – Evidence shows that the income elasticity of public goods is substantially greater than 1
The Market for Public Goods

- Problem: How much of a public good should be provided?
  - Cost – Benefit Principle applies
- Benefit of an additional unit of a public good is the sum of the reservation of all people who use it
  - Vertical interpretation of demand curve
- Costs are the same as for private goods
Private Good Demand

[Diagram showing two markets with demand curves and equations for total demand and quantity.]

- Market 1 (D1): Quantity at $18 = 24 units, Quantity at $24 = 9 units.
- Market 2 (D2): Quantity at $24 = 36 units, Quantity at $18 = 60 units.

Total Market:
- Total Demand (D) = D1 + D2
- Total Quantity (Q) = Q1 + Q2

Equations:
- Price (P) = P1 + P2
- Quantity (Q) = Q1 + Q2
Public Good Demand

Market 1

- Price ($/unit): 24
- Quantity (units/day): 24

Market 2

- Price ($/unit): 18
- Quantity (units/day): 24

Total Market

- Price ($/unit): 42
- Quantity (units/day): 36

\[ D = D_1 + D_2 \]
The Optimal Quantity of Parkland

Price ($000s/acre)

Demand

Marginal Cost

$A_0$

$A^*$

Acres of parkland
Government Provision of Public Goods

• Government provision has advantages
  – Low cost to collect additional revenue
  – Expedient: no negotiations over distribution of costs
  – Only feasible provider for nonexcludable goods

• Government provision has disadvantages
  – One-size-fits-all
    • Some pay for goods they don't want
    • Some don't get goods they would pay for
  – Taxation is coercive
Private Provision of Public Goods

• Alternative ways to raise revenues
  – Funding by donation
    • Volunteer action and funding (dot-orgs)
  – Exclude non-payers
    • Scrambled TV signals
    • Netflix Player by Roku
  – Private contracting
    • Gated communities and homeowners associations
  – Sale of by-products
    • Advertising on TV, Internet
Jerry Springer vs. Masterpiece Theatre

- Show funded by advertising
  - Advertiser values the largest audience
- Jerry Springer wins
  - Masterpiece Theatre is the efficient outcome
- Funding public goods through advertising does not assure maximum total surplus

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<thead>
<tr>
<th></th>
<th>Jerry Springer</th>
<th>Masterpiece Theatre</th>
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<tbody>
<tr>
<td>Market Share</td>
<td>20%</td>
<td>18%</td>
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<tr>
<td>Willingness to Pay</td>
<td>$10 million</td>
<td>$30 million</td>
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Making Advertising Work

• Pay-per-view methods avoid the inefficiency of advertiser's choosing public goods
  – Viewers register preferences
  – Willingness to pay measures strength of preferences

• Marginal social cost of watching a program is zero
  – Charging introduces inefficiencies

• Measure size of inefficiencies to select the optimal approach
  – Advertisers choose programs
  – Pay-per-view
Providing Public Goods

• Delivery by public or private sector varies
  – Technology influences choices
    • Can non-payers be excluded?
  – Funding mechanism
    • Tax, donation, private contracts, advertising
  – People's preferences
Pay-Per-View Market

- Broadcast viewing is free
  - Marginal cost of an additional viewer is zero
  - Audience is 20 million
- Pay per view fee $10
  - Audience is 10 million households
- Lost surplus from pay-per-view is $50 million
  - The more elastic the demand, the greater the loss in total surplus
Additional Functions of Government

• Two roles of government
  – Regulation of activities that generate externalities
    • Increase market efficiency
    • Examples: pollution, education, vaccinations, driving on the right
  – Defining and enforcing property rights
    • Example: regulating access to fishing waters and public forests

• Regulation entails costs
  – Regulation costs may be greater than the inefficiency created by the externality
Which Government?

• Advantages of local and state government
  – Better communication and responsiveness to citizens' preferences
  – Reflect the unique preferences of the area
    • Residents consider public goods when choosing a home

• Advantages of federal government
  – Economies of scale when capital costs are high
  – Positive and negative externalities may be nationwide
Structural Incentives Problem

• Sharing a restaurant bill equally increases the total
  – The dessert options and Sven's reservation price suggest no dessert tonight if Sven pays
  – Bill-sharing with 9 friends reduces cost to Sven to 10% of its menu price
    • $3 surplus from pudding and $2.40 from mousse

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<tr>
<th></th>
<th>Pumpkin Bread</th>
<th>Chocolate Mousse</th>
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<tbody>
<tr>
<td>Menu Price</td>
<td>$10</td>
<td>$6</td>
</tr>
<tr>
<td>Reservation Price</td>
<td>$4</td>
<td>$3</td>
</tr>
</tbody>
</table>
Structural Incentives Problem

• Pork barrel spending is public expenditure greater than the total value created
  – Supported by legislator because the benefits to his district exceed the costs to his district

• Suppose a voting district has 1% of the taxpayers
  – Project creates $100 million in benefits with total costs of $150 million
  – District's share of the cost is $1.5 million
    • $98.5 million surplus for the district

• Logrolling occurs when legislators support each other's pork barrel projects
Rent-Seeking

• Government projects have large gains for a few and small costs for many
  – Potential winners have large benefits
    • Can bear high costs
  – Potential losers have less at stake
    • Cost of gathering information exceeds benefits
Rent-Seeking

- **Rent seeking** is the term for socially unproductive efforts to gain a prize
  - Firms competing for a single contract spend potential profits on bid preparation and lobbying
    - Similar to inefficiency of positional arms race
Money for Sale

• Auction rules for $20
  – Bids increase in $0.50 amounts
  – Highest bidder wins, pays last bid, gets $20
    • Second-highest bidder pays his last bid and gets nothing
• Optimal outcome is to not bid
  – Participants are in a cost-escalation game
• Similar process occurs with bids for government contract or license
  – Modify selection process to increase efficiency
Starve the Government

- Milton Friedman argued that no government employee spends taxpayers' money as carefully as the taxpayer himself would spend it
  - Government spending can be wasteful
- Reducing the tax revenues may reduce inefficiency
  - In 1978, California passed Proposition 13 to limit property tax revenues
    - The result was a sharp decline in local government services such as public libraries and schools
- Many public services deliver value for our money
Tax Considerations

• The objectives for the tax system are to
  – Raise revenue to finance public goods and services
  – Minimize the side-effects of the taxes
    • Taxes affect costs and benefits of some activities

• Federal spending generally exceeds tax revenues
  – Government deficits cause crowding out
    • **Crowding out** is the reduction in private investment caused by increases in interest rates from government borrowing

• If markets work efficiently, adding taxes creates inefficiency
Tax on Cars

- Assume the car market is constant-cost and perfectly competitive
  - No external costs or benefits
- Initial equilibrium is $20,000 and 6 million cars
  - $2,000 tax on cars shifts supply curve up
  - New equilibrium at $22,000 and 4 million
- Total surplus decreases
Tax Policy Issues

- Some economists argue that the economy performs better with low taxes and smaller government spending
  - However, the economic loss of a tax may be offset by the surplus created from the public good or service
- Deadweight loss from a tax is smaller if the good taxed has inelastic demand and supply
Tax Policy Issues

• Taxes on externalities increase economic efficiency
  – Taxes to reduce traffic congestion
  – Carbon taxes on greenhouse gas emissions by cars and factories
  – Deposits on containers to reduce litter
Public Goods and Tax Policy

- Tax Policy and Efficiency
- Types of Goods
- Optimal Quantity
- Size of Government
- Public Goods
- Who Provides?
- Role of Government