Power Point Slides to Accompany:

Public Finance

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Chapter 3

Welfare Economics and Public Goods

Introduction

- In this chapter we set the standard by which to consider the well being of people in society.
- The analysis of peoples' welfare, in comparison to a precisely defined ideal, is known as welfare economics.
- We then consider the special issues involved with the provision of public goods and services.

政府觀點

- 1.有機體說(the Organic View)
- Natural organism
- 2.機械論(the Mechanistic View)
- 政府只是被創造出來的裝置
- 福利經濟學(pp.68-80)

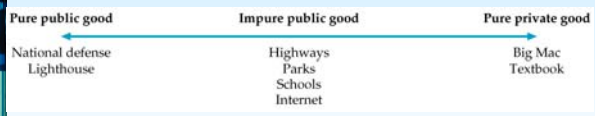
The Nature of Public and Private Goods

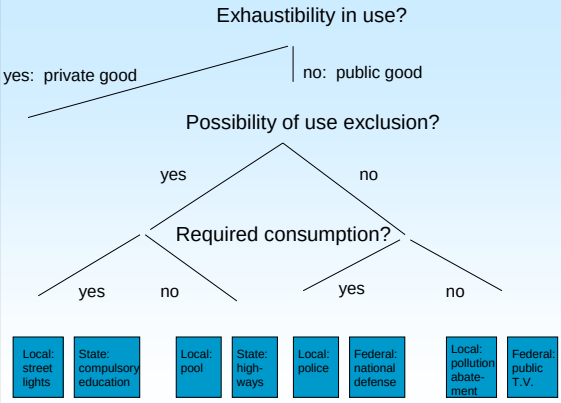
- Pure public goods.
- Impure public goods and club goods.
- Implications for public policy.

Public Good Properties

- Non-rival in consumption
- Non-excludable

Figure 3.1: Private and Public Goods





Implications for Public Policy

- If public goods are to be provided, there is a potential role for government.
- Markets for private goods fail to allocate sufficient resources to producing public goods.
- Consider the following example.

Implications for Public Policy

- Suppose you are willing to pay $20 for the navigational services of a lighthouse where you enjoy sailing.
- There is a small chance of an accident, probability of 0.001.
- Your sailboat is worth $20,000.

TABLE 3.1 Sailing, Expected Outcomes

	No Lighthouse	Lighthouse
No accident	.999	1.000
Accident	.001	.000

Sailing Example, [*continued*]

- Your expected loss is
- EV = 0.999(0) + 0.001(20,000) = 20.
- Hence, you would be willing to pay $20 per summer for the services of the lighthouse.
- No private company will build and operate the lighthouse, however.

Sailing Example, [*continued*]

- The problem is that of the free-rider.
- Since lighthouse services are non-rival in consumption and no exclusion is possible, the private market will not provide lighthouse services.

Allocation of Public and Private Goods

- Private goods are allocated by markets,
- But public goods are allocated by governments.
- As a consequence, there are two very different ways of modeling the provision of private and public goods.

Figure 3.2: Market Demand for a Private Good

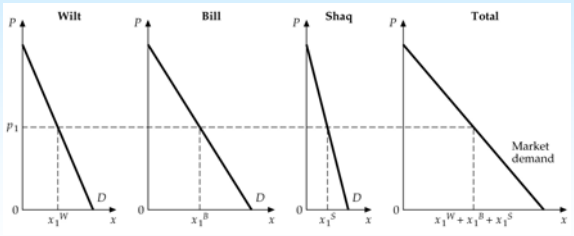
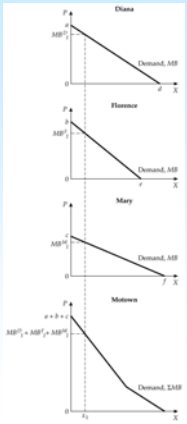


Figure 3.3: Demand for a Public Good



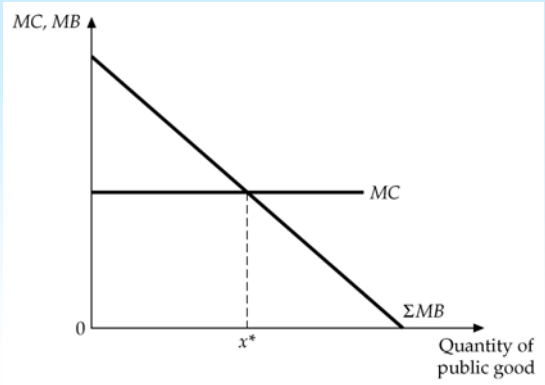
Efficiency in Public Good Provision

- One public good.
- The optimal quantity of the public good to provide is that quantity where the sum of citizens' marginal benefits equals the marginal cost of production:

Optimal Provision of a Public Good

$$\sum_{i=1}^{n} MB^i = MC.$$

Figure 3.4: Optimal Quantity of a Public Good: The Samuelson Rule



Street Light Example

- Suppose that a community consists of three residents with the following marginal benefits for streetlights:
  - $MB^1=100-.5x$
  - $MB^2=200-.5x$
  - $MB^3=200-x$

Street Light Example, [*continued*]

- The sum of marginal benefits is:

$$\sum_{i=1}^{3} MB^i = 500 - 2x$$

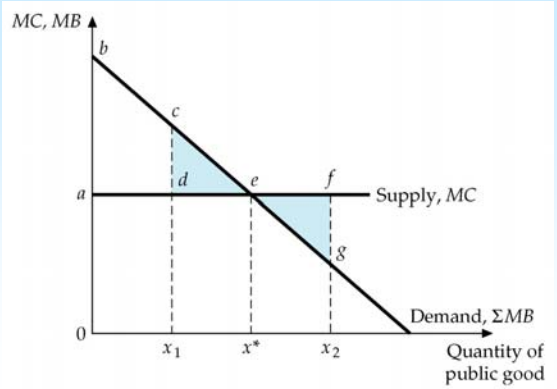
Street Light Example, [*continued*]

- Set the sum of marginal benefits equal to the marginal cost of 300.
- Solve for x.
- Solution is x=100.
- The community should provide one hundred street lights.

Street Light Example, [*continued*]

- Notice that at x=100, residents have the following marginal benefits:
- $MB^1=50$
- $MB^2=150$
- $MB^3=100$

Figure 3.5: Welfare Effects of Public Good Provision



Markets and Efficient Allocation of Resources

- *First fundamental theorem of welfare economics*:
- Under certain circumstances the market mechanism provides an efficient allocation of resources.

First Fundamental Theorem of Welfare Economics, [*continued*]

- Those circumstances include:
- households and firms acting competitively, taking prices as given (no ability to set prices),
- a full set of markets for inputs and outputs (no missing markets), and.
- full information on the part of buyers and sellers (no asymmetric information).

First Fundamental Theorem of Welfare Economics, [*continued*]

- The market mechanism provides an efficient allocation in the *Pareto* sense.
- No one can be made better off without someone else being made worse off.

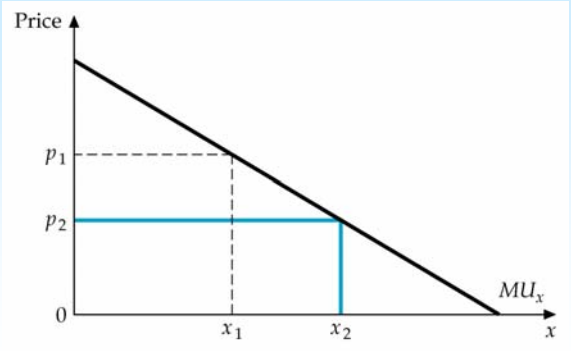
Markets and Efficient Allocation of Resources

- *Second fundamental theorem of welfare economics*:
- Given any Pareto efficient allocation, we can be sure that it is supported by a competitive market allocation.
- This is the converse of the first theorem.

Consumer Purchase Principles

- The consumer purchases the quantity of a good x where:
- The marginal utility of the last unit purchased is equal to the price.
- $mu_x = p_x$.
- Recall that marginal utility declines with quantity consumed.
- Figure 1 illustrates the demand curve.

Figure 3.6: Demand for a Private Good



Consumer Purchase Principles,
[*continued*]

- In the two-good case, the consumer purchases that combination of the goods *x* and *y* where:
- The marginal rate of substitution equals the price ratio.
- $MRS_{xy}=p_x/p_y$.
- Figure 2 illustrates.

Figure 3.7: Optimal Consumption of Two Goods

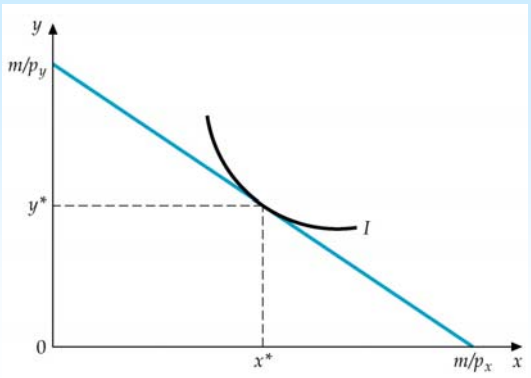


TABLE 3.2 Efficiency in Consumption

One-Good Case	Two-Good Case
Consume the quantity of good where the marginal utility equals the price: MU = p.	*Consume the quantity of goods x and y where the ratio of marginal utilities equals the ratio of prices:* $MU_x/MU_y = p_x/p_y$.

Figure 3.8: Exchange Possibilities

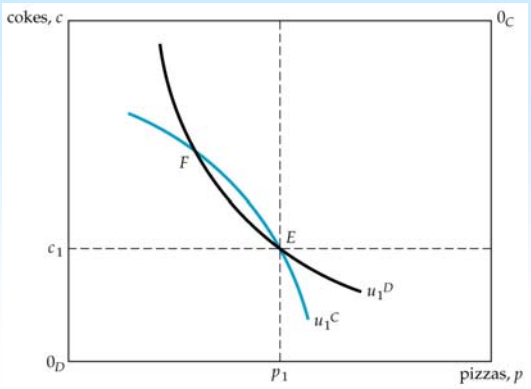
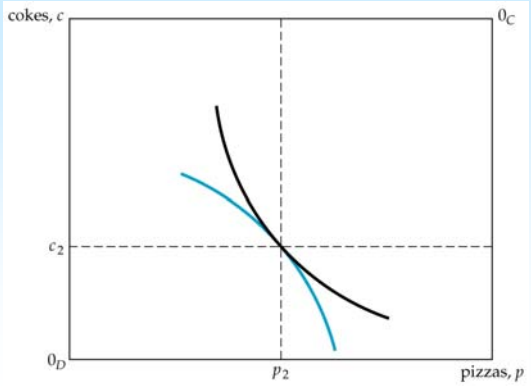


Figure 3.9: Efficiency in Exchange



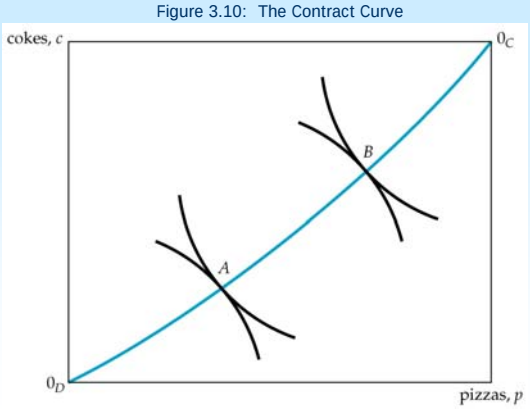
Pareto Efficiency

- Points where the consumers' *MRS*'s are equal are said to be Pareto efficient.
- This concept of efficiency is based on the notion that if you can make at least one person better off without making anyone else worse off, that reallocation would increase total social welfare and be efficiency enhancing.

Pareto Efficiency, [*continued*]

- Once you have an allocation where the only way to make one person better off is to make someone else worse off, however, it is not clear that such a reallocation is beneficial. It involves interpersonal comparisons.
- Hence, economists often use the concept of Pareto efficiency to avoid interpersonal comparisons.

Figure 3.10: The Contract Curve



Contract Curve

- Allocations off the contract curve are inefficient.
- Points on the contract curve are efficient in the Pareto sense.
- Movement from an allocation off the curve to an allocation on the curve are Pareto-improving.
- Movement along the curve is not Pareto-improving.

TABLE 3.3 Efficiency in Production, Inputs

One-Input Case	Two-Input Case
Use the quantity of labor where the value of the marginal product equals the input price: $p \cdot MP_l = w$.	*Use the quantity of capital* **k** *and labor* **l** *where the ratio of marginal products equals the ratio of input prices:* $MP_k/MP_l = r/w$.

TABLE 3.4 Efficiency in Production, Products

One-Product Case	Two-Product Case
Produce that quantity of a product x where the marginal cost of production equals the price: $MC = p$.	*Produce that quantity of products x and y where the marginal rate of transformation (ratio of marginal costs of production) equals the price ratio:* $MRT_{xy} = MC_x/MC_y = p_x/p_y$.

TABLE 3.5 Market Efficiency

	Efficiency in Exchange	Market Prices	Efficiency in Production
One-Good Case	*MU*	p	*MC*
Two-Good Case	$MU_x/MU_y(MRS_{xy})$ *Identical for all consumers*	p_x/p_y	$MC_x/MC_y(MRT_{xy})$ *Identical for all producers*

Measurements of Economic Welfare

- Consumer surplus (CS)
- Producer surplus (PS)

Figure 3.11: Consumer and Producer Surplus

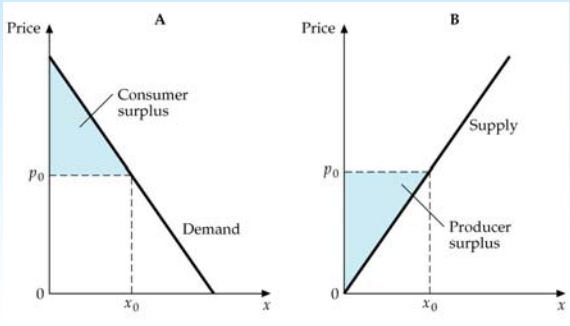


Figure 3.12: Changes in Consumer and Producer Surpluses

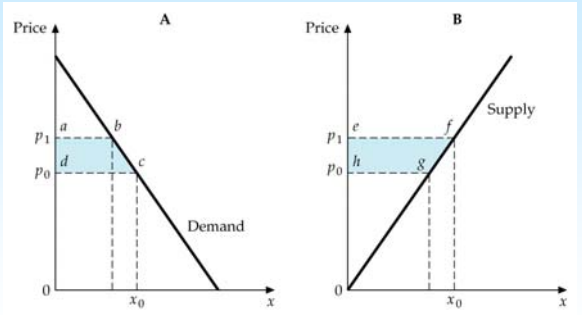


Figure 3.13: Welfare Is Maximized at the Market Equilibrium Price and Quantity