Public Finance II.

Lecture V - **Public Goods**

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Readings:

- Gruber, J. (2005). Public finance and public policy. Macmillan.
- Congdon, W. J., Kling, J. R., & Mullainathan, S. (2011). Policy and choice: Public finance through the lens of behavioral economics. Brookings Institution Press.
- Sunstein, C. R. (2020). Behavioral science and public policy. Cambridge University Press.

Let’s play a little game…

Private vs. public

- There are many examples of services provided by government that do not work very well. As a result, residents are often frustrated.

- Why they don’t scrap the public service and rather pay for a private service instead? The free market might solve their problem after all…

- The problem is that private services finance by voluntary fees paid by residents face the free rider problem. Every resident can refuse to pay his share and hope that others would pick up the costs for him.

- If other residents cover the cost of service, this free rider gets all the benefits of that service but pays none of the costs.Yet, if some in the neighborhood free ride, others will feel exploited by their non-paying neighbors’ and these residents might decide not to pay either. Eventually, the number of free riders might grow large enough that the city would not be able to raise sufficient funds to finance service from a private company.

Public goods

- The problem on the previous slide illustrate the difficulties of effectively addressing the free rider problem through a private mechanism.

- Goods that suffer from this free rider problem are known in economics as public goods. The private sector is in fact likely to underprovide public goods due to the problem.

- Should the government be involved in the provision of public goods then and of so, how much? There are serveral difficulties with figuring out how much:

  - when private parties are already providing the public good, government provision may simply crowd out this private provision so that the total amount of the public good provided does not rise

  - measuring the actual costs and benefits of public goods (which is required for determining optimal public goods provision) is difficult.

  - determining the public's true preferences for public goods, and aggregating those preferences into an overall decision on whether to pursue public goods projects, raises a variety of challenges.

- https://mru.org/courses/principles-economics-microeconomics/public-goods-example-asteroid-defense

Defining public goods

- 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.

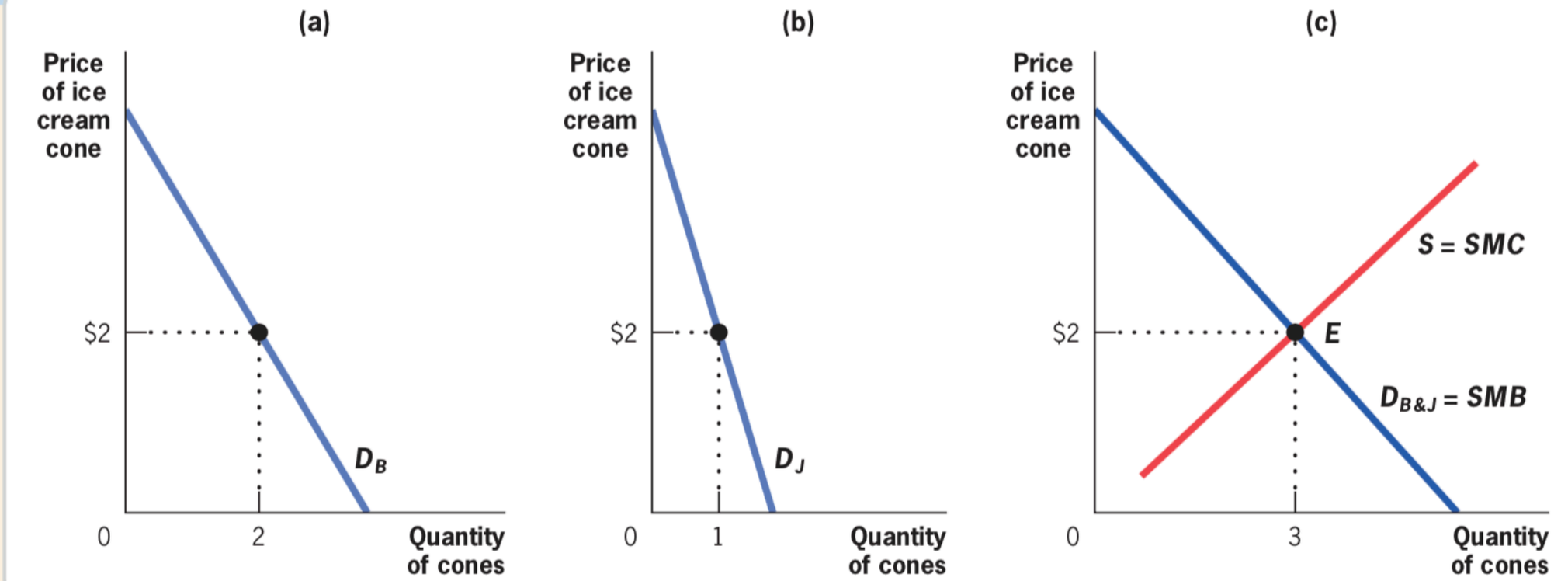
- It is helpful to think about a public good as one with a large positive externality. If I set off fireworks high into the sky, it benefits many more people beyond myself, because many people will be able to see the display. I am not compensated for other people's enjoyment, however: I can't exclude others from seeing the fireworks, so I can't charge them for their enjoyment.

Defining public goods

	Good is rival in consumption	Good is not rival in consumptionm
Good is excludable	Private good (car, food, clothing…)	Club goods (private parking, satellite television)
Good is not excludable	Common-pool resource (fish in the sea, timber, coal)	Public goods (free-to-air TV, air, national defense, street lights)

Optimal Provision of Private Goods

■ FIGURE 7-1



Horizontal Summation in Private Goods Markets • In private goods markets, we horizontally sum the demands of Ben and Jerry to get market demand for ice cream cones. If Ben demands 2 ice cream cones at $2, and Jerry demands 1 ice cream cone at $2, then at a market price of $2 the quantity demanded in the market is 3 ice cream cones.

Optimal Provision of Private Goods

- we compute Person 1 demand and Person 2 demand, and then add them to produce a total market demand. The demand curve also represents the social marginal benefit (SMB) consumption, that is, the value to society from the consumption of that good.

- The market supply curve represents the marginal cost of producing goods for a firm. In a market with no failures, this curve also represents the social marginal cost (SMC) production, the cost to society from the production of that good.

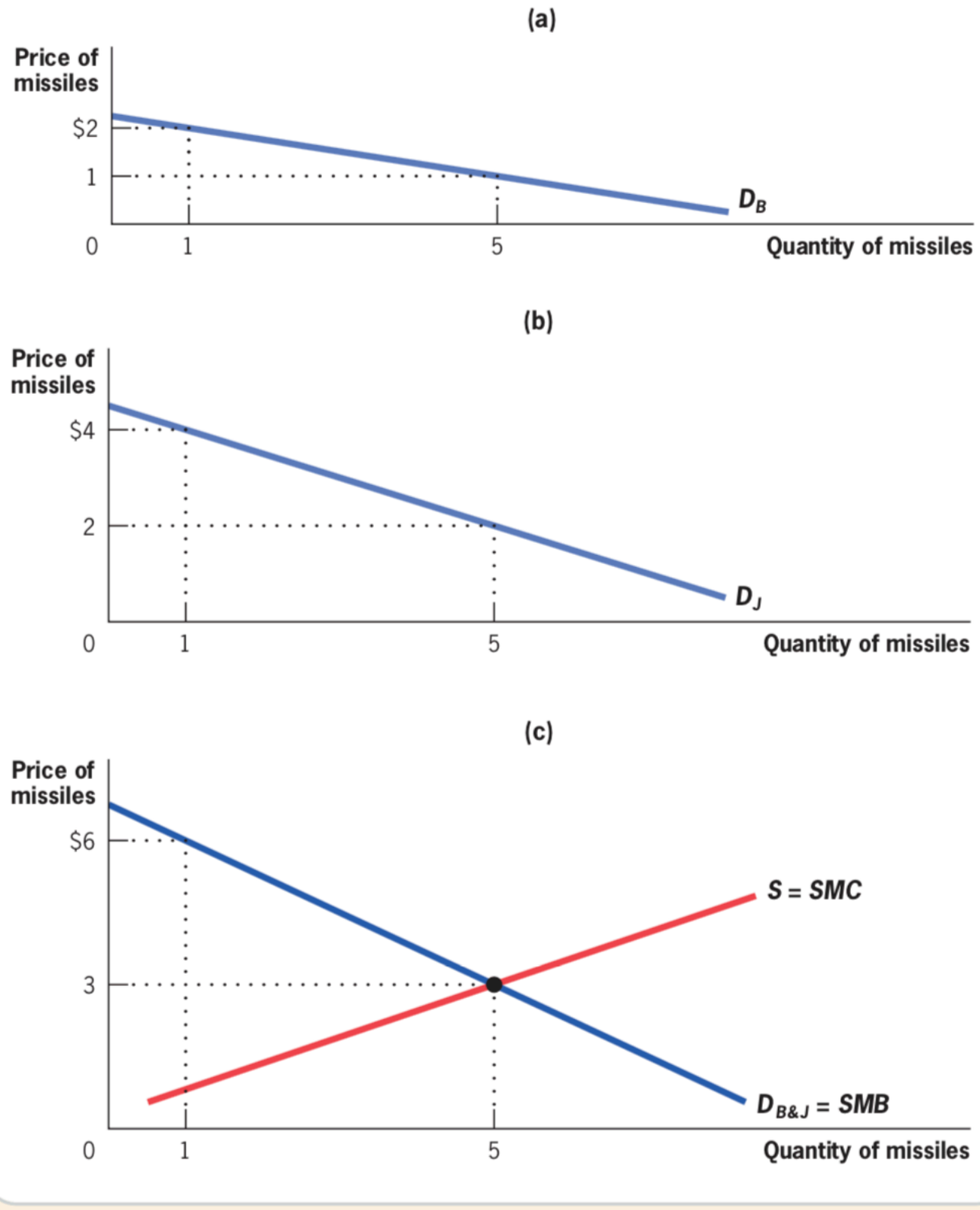
- In a private market, then, equilibrium occurs where SMB = SMC, the point at which supply and demand intersect.

- A key feature of the private market equilibrium is that consumers demand different quantities of the good at the same market price.

- The private market equilibrium is also the social-efficiency-maximizing choice (the point that maximizes social surplus).

Optimal Provision of Public Goods

■ FIGURE 7-2



Vertical Summation in Public Goods Markets • For public goods, we vertically sum the demands of Ben and Jerry to get the social value of the public good. If Ben is willing to pay $1 for the fifth missile, and Jerry is willing to pay $2 for the fifth missile, then society values that fifth missile at $3. Given the private supply curve for missiles, the optimal number of missiles to produce is five, where social marginal benefit ($3) equals social marginal cost ($3).

Optimal Provision of Public Goods

- Now, imagine that Person 1 and Person 2 are choosing not the amount of public good.
- For public good, whatever amount is provided must be consumed equally by all. Each person is now forced to choose a common quantity of the public good.
- To arrive at the market demand for public good, we do not sum horizontally, as with private goods (where we sum the individual quantities demanded at the given market price). Instead, we sum vertically by adding the prices that each individual is willing to pay for the fixed market quantity.
- A supply curve for public goods again equals their marginal cost of production. The socially optimal level of production is the intersection of this supply with the vertically summed demand. That is, given that public goods are provided to everybody, the producer should consider the sum of all valuations (willingness to pay) in making its production decision.
- Social efficiency is maximized when the marginal cost is set equal to the sum of the MUs, rather than being set equal to each individual's MU. This is because the public good is non-rival: since it can be consumed jointly by all consumers, society would like the producer to take into account the sum of all consumers' preferences.

Private Provision of Public Goods

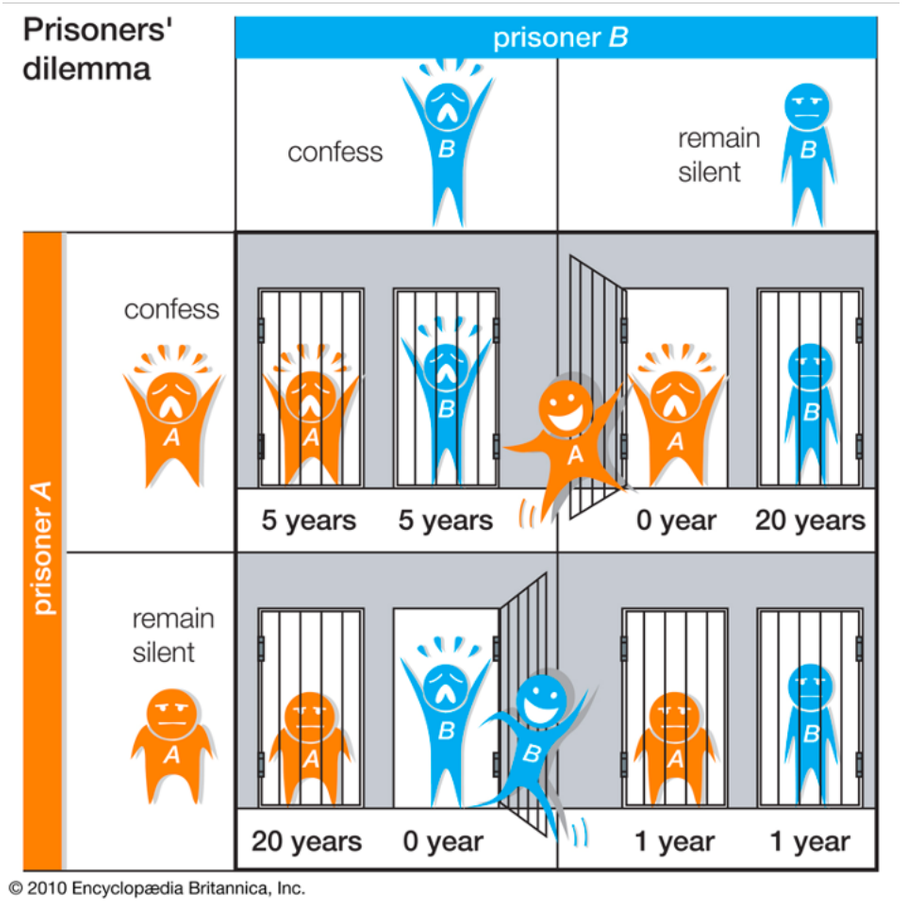
- We have now developed the conditions for the optimal provision of public goods: public goods should be produced until the marginal cost for producers equals the sum of the MUs for all consumers.

- With this finding in mind, the first question to ask (as always) is: Does the private sector get it right? If the private sector provides the optimal quantity of goods at the market price, then there is no market failure, and there is no potential role for the government in terms of improving efficiency.

- In general, the private sector in fact underprovides public goods because of the free rider problem: since my enjoyment of public goods is not solely dependent on my contribution to them, I will contribute less to their provision than is socially optimal.

- The free rider problem leads to a potential role for government intervention.

Public good provision as a multi-person Prisoner's dilemma



- Prisoner's dilemma: the crux of the problem is that both players can be better off if they cooperate, but individual rationality and the desire to maximize one's own pay-off dictates free-riding on the cooperation of others, which is the dominant strategy. When they both rely on their dominant strategies, they are collectively worse off. There is, thus, a tension between cooperating and maximizing the joint benefit, or free-riding and trying to maximize one's own pay-off at the expense of others.

Public good provision as a multi-person Prisoner's dilemma

- Collectively, we are better off if we cooperate, but the cooperative outcome is often hard to sustain, since, if everyone is cooperating, then one person can be better off by reneging and free-riding. But if it makes sense for one person to free-ride, then it does so for others as well, so, the equilibrium is that we all free-ride and we end up with global warming, fast depleting oceans and forests, and dirty streets.

- And once we arrive at that bad outcome, we might regret it, but we are often unable or unwilling to change the situation, because we would need everyone to change at the same time. One person choosing to cooperate while everyone else free-rides does not change things and makes the one co-operator worse off. But getting everyone to change their minds at the same time poses similar problems of collective action which led to the Nash equilibrium in the first place.

- What helps? If players know that they will interact over and over again, or that they can make binding commitments that can be enforced by a third party, then the outcome might be different.

- What is the best strategy? Tit-for-tat.

Can Private Providers Overcome the Free Rider Problem?

- While the free rider problem clearly exists, there are also examples where the private market is able to overcome this problem to some extent. There are are three factors that are likely to determine the success of private provision:
  - differences among individuals in their demand for the public good
  - altruism among potential donors to the public good
  - utility from one's own contribution to the public good

Some Individuals Care More than Others

- Private provision is particularly likely to surmount the free rider problem when individuals are not identical, and when some individuals have an especially high demand for the public good.

- The key intuition here is that the decision about how many public goods to provide for any individual is a function of the enjoyment that the individual gets from total public good, net of their cost. If a person gets a lot of enjoyment, or has a lot of money to finance the public good, he will choose to purchase more of it, even though he is sharing the benefits with others: as enjoyment net of costs gets very large for any one individual, the provision of the public good starts to approximate private good provision.

- Higher incomes or stronger tastes for the public goods can mitigate the free rider problem to some extent, but they are not likely to solve the problem. Even when one individual provides all of a public good, the individual still does not take into account the benefit to other individuals, and so the public good is usually still underproduced.

Altruism

- Another reason that private agents may provide more of a public good than our model would predict is that the model assumes purely selfish utility-maximizing agents. In fact, there is much evidence that individuals are altruistic—that is, they care about the outcomes of others as well as themselves. If individuals are altruistic, they may be willing to contribute to a public good even if the free rider problem suggests they should not.

- Evidence for altruism comes from laboratory experiments in which there is a very clear incentive to free ride off the contributions of others, so that economists predict theoretically that no one should ever contribute to the public fund. However, the experimental evidence shows that nearly every such public goods experiment results in 30–70% of the participants contributing to the public fund. Interestingly, in experiments with multiple rounds, such as the one just described, contributions tend to decline as the rounds progress, but rarely, if ever, reach zero.Thus, altruism appears to trump the purely selfish prediction that underlies the theory of the free rider problem. Some real-world evidence is also consistent with altruism in private support of public goods.

- What determines altruism? A central finding of this field is that individuals are likely to be more altruistic when they are more “trusting” of others. Most of the attitudinal and behavioral measures of trust were positively correlated with high contributions to the public good.

Warm glow

- A final reason that private individuals might provide more of the public good than suggested by theory is that individuals might care about their own contributions per se.
- Under the warm glow model, individuals care about both the total amount of the public good and their particular contributions as well. Perhaps they get a plaque with their name on it from making contributions, or maybe their contributions are known publicly so that their friends praise them for their generosity, or maybe they get a psychological benefit that is directly related to how much they give.

Public Provision of Public Goods

- In principle, the government could solve the optimal public goods provision problem previously presented and then either provide that amount of the good or mandate private actors to provide that amount.

- In practice, however, governments face some significant barriers when they attempt to solve the free rider problem in the provision of public goods. Three of those barriers are

  - private responses to public provision, or “crowd-out”

  - the difficulty of measuring the costs and benefits of public goods

  - the difficulty of determining the public’s preferences for public goods

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

- In some instances, public goods will not be provided at all by those in the private sector unless the government tells them they must provide the good. In other cases, the private sector is already providing the public good to some extent before the government intervenes, and this private provision will react to government intervention. In particular, public provision will to some extent crowd out private provision: as the government provides more of the public good, the private sector will provide less. This decrease in private provision will offset the net gain in public provision from government intervention.

- The extent of such crowd-out depends on the preferences of the private individuals providing the public good. This outcome illustrates the fundamental robustness of economic equilibria: if a person starts from his or her individual optimum, and the market environment changes, and if the person can undo this change to get back to that optimum, he or she will do so.

- For example, suppose that in the pregovernment optimum, Ben and Jerry were each providing 10 fireworks, at a cost of $10 for each person.The total private provision is therefore 20 fireworks, but let's say the social optimum is 30 fireworks.To reach the social optimum, the government decides to take $5 each from Ben and from Jerry, and use the $10 raised to buy 10 more fireworks. Ben and Jerry each have $5 less, and they observe the government providing 10 fireworks.They simply cut their spending on fireworks by $5 each, so that they spend the same ($5 on fireworks, $5 to the government), and see the same total fireworks (20). So they are exactly where they originally wanted to be, and the government intervention has done nothing. This is a case of full crowd-out. The government intended to do the right thing by increasing fireworks to the social optimum. But, in fact, it ended up having no effect, because its actions were totally offset by changes in individual actions.

Partial crowd-out

- Full crowd-out is rare. Partial crowd-out is much more common and it 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

Measuring the Costs and Benefits of Public Goods

- Consider the example of improving a highway in order to reduce traffic slowdowns and improve safety. There is a clear free rider problem in relying on the private sector for this improvement.The benefits of highway improvement are fairly small for any one driver, although they may be quite large for the total set of drivers using the highway. Thus, no one driver will invest the necessary resources to improve the highway.

- Should the government undertake these highway improvements? That depends on whether the costs of doing so exceed the sum of the benefits to all drivers who use the highway. In practice, however, it is quite difficult measure both the benefits and costs of providing public goods.

How Can We Measure Preferences for the Public Good?

- In practice, there are at least three problems facing a government trying to turn individual preferences into a decision about public goods provision.

    - preference revelation: individuals may not be willing to tell the government their true valuation, for example, because the government might charge them more for the good if they say that they value it highly.

    - preference knowledge: even if individuals are willing to be honest about their valuation of a public good, they may not know what their valuation is, since they have little experience pricing public goods such as highways or national defense

    - preference aggregation: how can the government effectively put together the preferences of millions of citizens in order to decide on the value of a public project?

- Andrew, Beth, and Cathy live in Lindhville. Andrew's demand for bike paths, a public good, is given by Q = 12 - 2P. Beth's demand is Q = 18 - P, and Cathy's is Q = 8 - P/3.The marginal cost of building a bike path is MC = 21.The town gov- ernment decides to use the following procedure for deciding how many paths to build. It asks each resident how many paths they want, and it builds the largest number asked for by any resident.To pay for these paths, it then taxes Andrew, Beth, and Cathy the prices a, b, and c per path, respectively, where a + b + c = MC. (The residents know these tax rates before stating how many paths they want.)

- a) If the taxes are set so that each resident shares the cost evenly (a = b = c), how many paths will get built?

- b) Show that the government can achieve the social optimum by setting the correct tax prices a, b, and c.What prices should it set?