Public Economics

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2- Redistribution and Fairness

2.1) Preference-based fairness criteria (Thomson)

Preference-based Fairness Criteria

How to define what is a fair distribution of goods?

Preference-based:

- 1. No-Domination: No agent should receive more of both goods than the other;
- 2. No-Envy: No agent should prefer another agent's allocation to their own;
- 3. Equal Treatment of Equals: Identical agents should be indifferent between their allocations;
- 4. Equal Division Lower Bound: No agent should be worse-off than equal division of all goods;
- 5. Egalitarian Equivalence: There should exist a bundle (even if unfeasible) such that both agents are indifferent between this bundle and their own allocation.



PS 2: Preference-based Fairness Criteria

Ex.7) Consider the classical setting with 2 agents and 2 goods, where the goods are perfect complements for both agents

a) Show (in an Edgeworth box) the set of envy-free and efficient allocations.

b) Show (in an Edgeworth box) the set of efficient allocations that also satisfy egalitarian equivalence

c) Compare your answers to a) and b).

The same!



Previous midterms – Fall 22

II (4 points)

Consider an economy with two consumers with utility functions $U_1 = min\{2x_1, y_1\}$ and $U_2 = \sqrt{8x_2, y_2}$. Assume there is 1 unit of x and 2 units of y to distribute among the agents.

a. (2.25 points) Using an Edgeworth box, find the set of Pareto efficient points and find the utility possibility frontier.

Efficient allocations will be such that $2x_1=y_1$ and $2x_2=y_2$ Then, for all efficient allocations, $U_1=2x_1$ and $U_2=4x_2$. Therefore, $U_2=4(1-U_1/2)$ and $U_2=4-2U_1$.

Grading: 1.25 points for the identification, justification and description of efficient allocations; 1 point for the calculation of the UPF.

b. (1.75 points) Find the Rawlsian choice for this economy. Will the resulting allocation be envy-free?

We want to maximize min $\{U_1, U_2\}$ s.t. $U_2 = 4-2U_1$ We have $U_1=U_2$ and therefore $U_1=U_2=4/3$. The resulting allocation is $x_1=2/3$, $y_1=4/3$, $x_2=1/3$, $y_2=2/3$ and this is not envy-free: agent 2 will envy agent 1 (and in fact the allocation violates no-domination - and preferences are monotonic).

Grading: 0.5 for the formulation, 0.5 for the solution, 0.5 for the analysis of no-envy and 0.25 for the conclusion.



3- Externalities and Public Goods

3.1) Externalities (Chapter 5-6 Gruber)

Externalities

Externalities arise whenever the actions of one economic agent **directly** affect (positively or negatively) another economic agent outside the market mechanism

Key concepts Private marginal cost (PMC): Cost to producers of producing an additional unit of a good;

Social marginal cost (SMC): PMC + additional costs associated with the production of the good that are imposed on others and that producers do not take into account;

Private marginal benefit (PMB): Benefit to consumers of consuming an additional unit of a good;

Social marginal benefit (SMB): PMB + additional benefits associated with the consumption of the good that affect others;



Externalities

How do externalities affect efficiency?

- Efficiency implies that: SMC = SMB
- Market sets PMC = PMB
- Whenever we have production externalities: PMC ≠ SMC
- Whenever we have consumption externalities: PMB ≠ SMB
- Production or consumption externalities lead to inefficiency (1st Welfare Theorem does not hold)



How to correct externalities?

Quantity Regulation

• Imposing maximum (or minimum) quantities

Pigouvian Tax

• Tax agent's actions so that they internalize the externality – for a socially optimal decision, the unit value of the tax (or subsidy) must be equal to the size of external damage, evaluated at the optimum

Property Rights (Coase Theorem)

• By assigning property rights and allowing agents to trade, a market for the externality is created. Under complete information, negligible transaction costs and costless bargaining: the socially optimal outcome is attained

Merger

• If (all) involved parties join efforts, the socially optimal outcome is chosen



PS 3: Externalities

Ex.1)

• Can the government assignment and enforcement of property rights internalize an externality?

Yes – under Coase Theorem assumptions, defining property rights (to whatever agent) and letting agents freely trade is enough to guarantee the socially optimal outcome

• Will this approach work as well as, better than, or worse than direct government intervention? Explain your answers and describe one of the difficulties associated with this solution



PS 3: Externalities

• Will this approach work as well as, better than, or worse than direct government intervention? Explain your answers and describe one of the difficulties associated with this solution?

It depends!

Direct government intervention, through taxes or subsidies, requires the government to know a lot of information: What is the socially optimal quantity? What is the size of the externality at that point?

If this is unattainable to the government, then simply assigning property rights can lead to a more efficient outcome!

On the other hand, assigning property rights also have difficulties associated, namely:

- 1. Redistribution the choice of the initial status quo won't matter efficiency-wise, but has important implications in terms of redistribution of wealth
- 2. Negotiation with too many parties involved, bargaining costs will arise (holdout problem)



PS 3: Externalities

Ex.2) For each of the following examples:

1. Smoking by individuals

- 2. Toxic waste production by firms
- 3. Research and development by a high-tech firm
- 4. Individual vaccination against communicable illness

Negative consumption Negative production Positive production Positive consumption

a) Is there an externality? If so, describe it, including references to whether it is positive or negative, and whether it is a consumption or production externality



PS 3: Externalities

Ex.2.b) If there is an externality, does it seem likely that private markets will arise that allow this externality to be internalized? Wby or why not?

1. Smoking by individuals

Unlikely. Smoke is widely dispersed – many agents to negotiate May be difficult to identify every affected agent

2. Toxic waste production by firms

Possible.

Particularly if firms producing waste are easily identified, and a finite number of people in a town or community are affected

3. Research and development by a high-tech firm

Possible, through patents or licenses.

However, sometimes it is hard to completely restrict the flow of information

4. Individual vaccination against communicable illness

Unlikely.

Many agents are beneficiaries of increased vaccination rates – with many agents, harder to negotiate



PS 3: Externalities

Ex.3) Suppose that demand for a product is Q = 1200 - 4P, and supply is Q = -200 + 2P. Furthermore, suppose that the marginal external damage of this product is \$8 per unit.

• How many more units of this product will the free market produce than is socially optimal?

• Calculate the DWL associated with the externality



PS 3: Externalities

Ex.4) The marginal damage averted from pollution cleanup is MD = 200 - 5Q. The marginal cost associated with pollution cleanup is MC = 10 + Q.

• What is the optimal level of pollution reduction?

• Show that this level of pollution reduction could be accomplished through taxation. What tax per unit would generate the optimal amount of pollution reduction?



Midterm Fall '22

III (5 points)

A competitive refining industry releases one unit of waste into the atmosphere for each unit of refined product. The inverse demand function for the refined product is p = 20 - q, which represents the marginal benefit curve. The inverse supply curve for refining is MPC = 2 + q, which represents the marginal private cost curve when the industry produces q units. The marginal external cost curve is MEC = q, where MEC is the additional marginal cost caused to society when the industry releases q units of waste.

- a. (1.5 points) How much of the chemical should the market supply in the social optimum? How much would be chosen without government intervention?
- b. (1 point) Identify in a graph and calculate the deadweight loss associated with the externality.
- c. (1.25 points) Suppose that the government imposes an emission fee of *T* per unit of emission. What should be the value of *T* if the market is to produce the efficient amount of the refined product?
- d. (1.25 points) The Prime-Minister is considering the possibility of introducing tradeable emission licenses instead of the emission fee. As her advisor, what would you recommend? (without additional calculations, max 10 lines)



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