

COST BENEFIT ANALYSIS

14.42 LECTURE PLAN 4A: FEB 10, 2011

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PASTURE 1: COST-BENEFIT ANALYSIS INTRO

LEFT BOARD 1: Supply and demand for pollution abatement

Initial condition: suboptimal pollution abatement

Where do these S&D curves come from?

Demand: Health, visibility

Supply

How certain are these curves?

If we move to optimum, is this a Pure Pareto Improvement?

-Both supply and demand win in aggregate, but some win and some lose within that.

-Is this a violation of the First Welfare Theorem? No – it's a public good, so nobody is buying it and nobody is getting paid for it.

-Kaldor-Hicks efficient, yes: Potential Pareto Improvement

-How can we compensate?

INCIDENCE

Question: Who gains and who loses from this policy?

RIGHT BOARD 1: Supply and demand for electricity

How does this policy affect the supply curve?

Does it raise marginal or fixed costs? Could be no pass-through if all fixed!

What determines incidence? Elasticity of supply and demand

What is the slope of these curves?

What determines elasticity of demand?

1. How easily consumers can substitute to unregulated suppliers
2. How easily consumers substitute to other goods

Do we think supply and demand for electricity are elastic or inelastic?

Does this vary in the US vs. other countries?

Define on board: Forward and backward incidence.

EQUIMARGINAL PRINCIPLE

Question: What would you do here? Pass the policy or no?

Other Policy Options:

1. Tax on water pollution
2. Quantity restriction
3. Require all power plants to meet BACT

What policy has the largest difference between benefits and costs?

What is this point? The intersection of MB and MC! (Optimum)

PASTURE 2: DISCOUNT RATES

LEFT BOARD 2: NPV of costs and benefits

$$NPV = \sum \beta^t \{B_t - C_t\}$$

$$B = 1/(1+r)$$

Auction \$1. How much willing to pay for a dollar?

-Today vs. tomorrow. Then last day vs. day before last day.

Two concepts:

1. Hyperbolic discounting
2. High discount rates relative to social!
-Is this just a rate of time preference? What about forgetting? Or if my check bounces later?

Two approaches: "Opportunity cost" of capital and "equal standing" of generations

Opportunity Cost:

r from risk-adjusted market

Figure: Consumption today on y-axis, consumption tomorrow on x-axis.

Draw analogy to PPF and ICs for goods instead of time

Draw PPF (investment returns)

Draw Indifference curves

Find where they are tangent! MRT=MRS=relative prices =discount rate

RIGHT BOARD 2: EQUAL STANDING

Equal standing: Ethical Judgment

$$r = \eta g + \delta$$

r=Interest rate

g=growth rate

η =(abs value of the) income elasticity of the marginal utility of consumption

δ =pure rate of time preference

Concepts:

1. Calibrate how much of a difference these make for the value of a payoff in 50 or 100 years.
2. Efficiency vs. intergenerational equity
 - a. Some of this is an equity issue: If we invest in shorter-term projects, then our generation might reap the benefits. Climate change necessarily has benefits in the future – unless we borrow from the future to pay for it. Then we have to ask if the future generations would want to be impoverished by paying back loans.

PASTURE 3: CRITIQUES OF CBA

LEFT BOARD 3 AND RIGHT BOARD 3: Possible critiques:

1. Measurement: how to get the right values of S and D?
 - a. If we can't measure, do we assume 0? (Revesz: CBA biased against regulation)
 - b. How to get baseline/counterfactual?
 - c. VSL: from labor market studies. What about emotional costs to the undead of the death?
 - d. False precision: are we overweighting CBA results relative to other criteria?
2. Theory of the second best: prior distortions to S&D make CBA difficult
3. Compensation principle rarely invoked.
4. Unfairly benefit the rich because they have higher WTP.
5. Equity.
6. Uncertainty: should use precautionary principle
 - a. Response: add risk aversion!
 - b. Sunstein: "How precautionary should we be"? What level of arsenic in drinking water?
 - c. Sunstein: Precaution on what side? E.g. new drug approval. Risk if approved or not approved. E.g. genetically modified crops: risky technology, but we know it reduces land use (deforestation), which helps the environment!
7. Administrative simplicity in a program matters (Kolstad)
8. Moral duties can't be monetized (Kelman). E.g. lying, killing.
 - a. Response: Can we not quantify this?
 - b. Kelman: but sometimes we still think things are wrong, e.g. framing people, killing people. Two worlds example. Which one would you want to live in?
 - c. Entitlement language: "Right" to a healthy workplace. Response: health is a gradation, and gradations cost money.
9. Don't put dollar values on non-market benefits and costs (Kelman)
 - a. People's own behavior shouldn't inform social decisions (e.g. value of a life)
 - b. Valuing stuff cheapens it (e.g. friendship, sex.) Give Christina winter travel example.
 - i. Solow: don't put in money terms, just talk about willingness to trade off other goods.
 - c. Some things are priceless, i.e. not for sale. E.g. Yosemite Valley.
 - i. Response: give Hetch Hechee example – we did choose to dam something nicer than Yosemite Valley.
 - ii. Who decides what is priceless?

10. CBA is costly, i.e. not free, so we should only do it if the info is useful.

Me:

1. Are the objections are because the answers aren't what the objectors want?
2. This is a valuable piece of information to be used as **part** of a decision.
3. In the end, we must make a decision. Lots of these numbers are implicit in the decision. Let's make them explicit.

(If time) PASTURE 4: ALTERNATIVES

Cost effectiveness analysis. When the environmental goal is exogenously set.

What examples?

1. Energy efficiency programs
2. Air pollution regulations where the CAA has set the NAAQS. (But were these implicitly set based on some form of CBA? If not, why didn't they set pollution standard = 0 pollution?)
3. Protection of endangered species: must be protected at any cost.

Distributionally-weighted.

New Delhi example: clean up pollution in Old Delhi or South Delhi?

1. CBA => South Delhi, because greater WTP
2. But if want to produce greatest good for greatest number, then Old Delhi.
 - a. Use weighted CBA – weight poor people higher for higher MU income
3. This is like having a social welfare function that aggregates utility.

WRAP UP

Who can summarize?

EXTERNALITIES AND PUBLIC GOODS

14.42 LECTURE PLAN 4B

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PASTURE 1: EXTERNALITIES

LEFT BOARD 1

Externalities

Consider two firms: electricity (W) and tourism (T)

$$\begin{aligned}\pi_w &= p_w W - C(W, E) \\ dC/dE \mid (E=0) &< 0 \\ d^2C/dE^2 &> 0 \\ \pi_t &= p_t T(E) - C_T \\ dT/dE &< 0 \\ d^2T/dE^2 &< 0\end{aligned}$$

What is equilibrium level of emissions E?

Take $d\pi/dE_e$

What is optimum?

Max total surplus.

Draw supply and demand for Pollution.

MB: $d\pi_w/dE$

MC: $-d\pi_t/dE$

Should we eliminate all externalities?

No – just want to get to the optimum. “Internalize the externality”

Question: Evaluate this statement: “All externalities bad. We should eliminate them.”

Positive vs. negative externalities

What about a breathing mask company?

Pecuniary vs. non-pecuniary externalities.

Question: Doesn't the electricity supplier's use of capital also raise the cost of capital? Why is this not an externality?

Answer: These are externalities, but there is no inefficiency.

PASTURE 2: PUBLIC GOODS

Excludability

Is excludability a fundamental property? No – a property of the technology.

Rivalry

RIGHT BOARD 1

Examples of non-rival, non-excludable goods (and separate one for bads)

	Rival	Non-Rival
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Excludable		
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Non-excludable		
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RIGHT BOARD 2: Public Goods Game

Write individual payouts

Play game.

How to solve free riding?

1. Coordination: mandate contributions
2. Pricing: put an appropriate private price on the contribution (give people back their own doubled contribution).
3. Information (allows social pressure)

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