Lecture 6

ECON 4910, Environmental Economics

Spring 2008

Voluntary contributions to public goods

- Voluntary contributions:
  - Recycling
  - Eco-labels
  - Climate tickets
  - CSR
  - Ethical investment
- Compared to standard/simple theory predictions:
- (Some) consumers contribute more
- (Some) firms pollute less
- Altruism? Norms?
- How to analyze this?

Readings

- Nyborg and Rege (2003) (compendium)
- See also Heyes (comp.), Section IV
- Supplementary reading:
  - Besley, T. and Ghatak, M.: *Retailing Public Goods: The Economics of Corporate Social Responsibility*, 2007. Journal of Public Economics 91 (9), p. 1645-1663. (Link, course webpage)
  - Less technical survey: Lyon, T.P., and J.W. Maxwell (2007): Corporate Social Responsibility and the Environment: A Theoretical Perspective. Available at http://papers.ssrn.com/abstract=1011793

Voluntary approaches: Firms

- Firms violate less than predicted
  - The ”Harrington paradox” (Heyes)
- Voluntary regulation
  - voluntary/negotiated agreements
- Firms abate more than predicted
  - Corporate social responsibility (CSR)

The Harrington paradox

- Harrington (1988):
  - For most sources, monitoring frequence is low
  - Even when violations are discovered, fines or other penalties are rarely imposed
  - Sources are, nonetheless, thought to be in compliance a large part of the time.

Theoretical prediction: $f'(e) = qP'(e)$

  - Firm pollutes until marginal abatement cost equals marginal expected penalty.
  - q low, P' close to zero: violations even with low f'
- Widely cited – poorly documented
  - Nyborg and Telle 2006: Low $qP'(e)$ well documented; high compliance largely undocumented

Voluntary agreements

- Negotiations industry/firm vs. regulator
- Agreement:
  - Firm/industry commits to abatement goal (e.g.: reduce non-recycled packaging waste by 60 per cent by 200x)
  - Regulator abstains from taxes/CAC measures
  - Firm's gain: No tax/CAC regulation
  - Regulator's gain: Under some conditions, more efficient abatement
- Problems:
  - Legal committment limitations, regulator
  - Openness, democratic control
- Public voluntary programs (US)
  - Government initiated, no credible regulatory threat

Corporate social responsibility

- ”A concept whereby companies integrate social and environmental concerns in their business operations and in their interaction with their stakeholders on a voluntary basis" (EU Commission 2002)
- Exxon, Chiquita, McDonald’s, Coca-Cola, Ford...
  - ”Corporate citizenship is a critical part of our business now and in the future. Our focus has expanded from philanthropy and community involvement to a broader look at how we use our resources to create sustainable growth and a better world.” (From Ford Motor Company’s homepage)
  - Only nice words?
- Business/industry organizations
  - NHO, HSH, EBL

CSR and markets

- Conventional wisdom:
  - Firms with extra costs are wiped out by competition
  - A perfectly competitive market does not allow for CSR
- But green production and CSR do exist
- Explanations suggested in the literature:
  1. Pre-emption of taxes or regulations
  2. Ethical customers: Extra WTP for green/”ethical” products
  3. Ethical investors
  4. Ethical workers: recruitment, motivation
  5. Market power: Firm can spend extra profits as it likes
  6. Market power: Vertical differentiation
- 2-6: Inconsistent w. standard model?

Homo Oeconomicus

$U_i = u(x_i, E)$ $(u'_x > 0, u'_E > 0, u$ quasiconcave)

- Homo Oeconomicus cares only about his own access to private goods (x_i) and to public goods (E).
- *Low* and *few* contributions:
  - If everyone has the same utility function and the same income, and one person contributes until f.o.c. for interior solution holds, no-one else contributes
  - If everyone has the same utility function (normal goods), but different income, only the richest person will contribute.

Homo Oeconomicus, cont.

- From Lecture 2&3: Person *i* contributes until marginal own benefit = marginal cost of better environment

  $(u'_E/u'_x)\, z' = f'_k$ or $(u'_E/u'_x) = f'_k/z'$
- Let $f'_k/z' = 1$ = price of contributions to E, exogenous to *i* (N&R 2003: $a_i = g_i$)
- Consumer's budget:

  $F_i = a_i + x_i$ (a_i = i's contribution)
- Environmental quality:

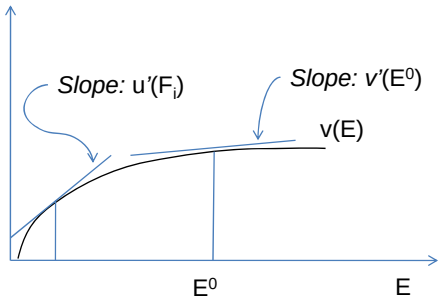
  $E = E^0 + a_i$

  (*i* considers others' contributions fixed)

Homo Oeconomicus and public goods

Ex: $U_i = u(x_i) + v(E)$ identical preferences; u, v concave & incr.
F.o.c.: $v' / u' = 1$
i.e.: $v'(E^0+a_i)/u'(F_i - a_i) = 1$ or: $v'(E) = u'(x_i)$

Marginal WTP for E *at* E^0 varies only with own (exogenous) income F_i



If E^0 is so large that $v'(E^0) < u'(F_i)$, consumer *i* contributes nothing
Richer persons (higher F_i) have lower $u'(F_i)$: Only the richest contribute

Pure altruism (Andreoni 1988)

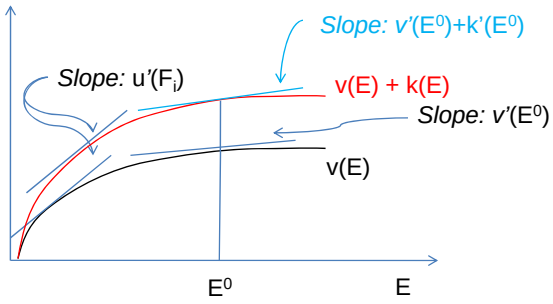
$U_i = \omega(x_i, E)$ ($\omega'_x > 0$, $\omega'_E > 0$, V quasiconcave)

- I care about my own income, and *my own and others'* access to the public good.
  - Example: $U_i = u(x_i) + v(E) + k(E)$

  where u, v and k are concave and increasing.
- Corresponds formally to the Homo Oeconomicus case
  - $k' > 0$ corresponds to a stronger preference for G
- May increase voluntary contributions, but does not solve the free-rider problem
- Few contributions:
  - Identical preferences, different incomes: Only the richest contribute

Pure altruism and public goods

Ex: $U_i = u(x_i) + v(E) + k(E)$ identical preferences
u, v, k concave & incr.
F.o.c.: (v'+k') / u' = 1
or: $v'(E) + k'(E) = u'(x_i)$
Marginal WTP for E at E^0 varies only with own (exogenous) income F_i



If $v'(E^0)+k(E^0) < u'(F_i)$, consumer *i* contributes nothing
Only the richest contribute

Pure altruism and voluntary contributions

- Unsatisfactory as explanation of voluntary contributions to public goods (e.g. purchase of eco-labelled goods):
  - Cannot explain substantial voluntary contributions by substantial numbers of people: Due to the free-rider problem, voluntary contributions will be small and made by few.
  - Predicts that if contributing, an individual will increase his contribution when others contribute less. Empirical studies find the opposite.
  - Predicts *full* crowding out when public supply increases. Empirical studies typically find some, but not full, crowding out.
  - In fact: Predicts that the entire tax system will be neutral…

Impure altruism (Andreoni 1989,1990)

$U_i = w(x_i, E, a_i)$ $(w'_x > 0, w'_G > 0, w'_a > 0, w$ quasiconcave)

- Own contribution produces a "warm glow"
  - Process/role orientation: I care not only about final resource allocations, but also how they came about
  - For a given x_i and E, I feel better if I did contribute myself (good conscience)
- An impure altruist may contribute
  - to get more of the public good (for selfish or altruistic reasons)
  - to get more warm glow
- Crucial difference:
  - Own contribution produces a *private good* to *i* herself
  - Reduces the free-rider problem

Impure altruism, cont.

- Ex: $U_i = u(x_i) + v(E) + h(a_i)$ u, v, h, concave and incr.
- Budget: $F_i = a_i + x_i$
- F.o.c.: $v'(E) + \mathbf{h'(a_i)} = u'(x_i)$
  or: $v'(E^0 + a_i) + h'(F_i - a_i) = u'(x_i)$
- The marginal benefit from "warm glow" *does not* depend on E^0 (others' contributions).
  - Hence, even if E^0 is very large, *i* may want to contribute.
- Others can provide a good environment for me; they cannot give me a good conscience.

”Pure”, ”impure”?

- Interpretation of Andreoni (1989, 1990):
- The pure altruist: $U_i = \omega(x_i, E)$
  - Assume E is included only because of care for others (e.g. E = poverty relief, and *i* is not poor)
  - Then *i* is altruistic in an ”unselfish” sense
- The impure altruist: $U_i = w(x_i, E, g_i)$
  - Assume E is included only because of care for others
  - Assume g_i is included because i wants a good conscience
  - Then part of *i*’s altruism is ”selfish”
- Pure altruism is equivalent to Homo Oeconomicus
  - If E is included only for *i*’s own use, *i* is no altruist at all!

Predictions, impure altruism

- Can explain substantial contributions by many
  - Even with high public provision/provision by others, *i* may contribute in order to get a warm glow
- Imperfect crowding out
  - *i* not indifferent as to *whom* provides the public good: Own provision provides warm glow, others’ does not
  - If public/others’ supply increases, this can replace i’s effort to secure a high E, but may not replace *i*’s feeling of warm glow
- Much used model for analysis of e.g. demand for eco-labeled goods, recycling, etc.
  - Climate tickets: Provide better climate & better conscience
  - But: Predicts that *i* will increase his contribution when others contribute less (like pure altruism). Empirical studies find the opposite.

Warm glow: Other interpretations

- Most important insight: Substantial voluntary contributions hard to explain without private benefit component of own contributions.
- What's this private benefit?
  - Good conscience?
  - Good self-image?
  - Approval from others?
  - Conformity (being "normal")?
- Does it vary with other things than own contributions?
  - Duty/responsibility (determined by…?)
  - Others' attitudes
  - Others' behavior
- Impure altruism model: Starting point for more sophisticated modeling of social/moral norms

Lab experiments: Public good games

- Groups of anonymous subjects (e.g. N=4)
- Each subject receives an amount of money, *X*
- Choice: Divide *X* between oneself and the group
- Simultaneous choice
- All contributions to the group are multiplied by a factor μ (where $1 < \mu < N$), and then shared equally between the *N* group members
- Contribution maximizing group payoff: *X*
- Contribution maximizing individual payoff, given others' contribution: 0

Typical findings, public good games

- One-shot, or first round of repeated games:
  - Average contributions 40-60 %
- Repetition, changing groups: Contributions decrease
- If punishment is possible:
  - Contributions are sustained, or increase (Fehr and Gächter 2000, 2002), even if punishing others is costly

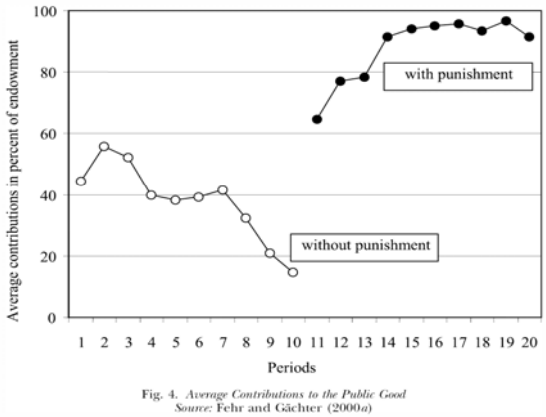


Fig. 4. *Average Contributions to the Public Good*
Source: Fehr and Gächter (2000*a*)

Reciprocity

- *Preference* for repaying good intentions by good actions, bad intentions by bad actions
  - Conditional cooperation: Prefers to contribute if others contribute
  - Willingness to punish: Feels better if non-contributors are punished
- Social interaction:
  - Free-riders undermine the motivation of reciprocal individuals
  - Contributors stimulate the motivation of reciprocal individuals
- Experimental studies:
  - Some free-riders (Homo Oeconomicus);
  - Many (sometimes majority) conditional cooperators
  - Some ”unsystematic”
  - Very few unconditional cooperators
- Fischbacher mfl. (2001):
  - 30 % free-riders(Homo Oeconomicus)
  - 50 % conditional cooperators
  - No unconditional cooperators

Reciprocity: Multiple equilibria

	Contribute	Not contribute
Contribute	**4,4**	-2,5
Not contribute	5,-2	**1,1**

(C,C): Both players think the other is being kind.

Each thus wants to help the other.

(D,D): Both players think the other is *not* being kind.

Each thus *does not* wants to help the other.

Social norms

- Private benefit: Social approval (I want others to be nice to me, or not to dislike me)
  - I contribute; people like me more
- Social interaction: Assume norm followers sanction more than others
  - Recyclers frown more at non-recyclers
- Marginal private benefit from own contributions increasing in others' contributions:
  - The larger share who recycle, the more approval I get when recycling
- Possibility: Multiple equilibria
  - I recycle if others do so (otherwise, all the recyclers would frown at me)
  - I do not recycle if the others don't (there are no recyclers to frown at me)
  - Once reached, both situations may be stable

Summary

- Firms and consumers contribute more to public goods than the simplest Homo Oeconomicus theory predicts
- Pure altruism (caring about others' access to a good environment) does not solve the puzzle
- However, if own contributions produce a private benefit to the contributor, substantial private contributions can be explained
- Further analysis:
  - What exactly is this private good?
  - Does it depend on other relevant variables than own contributions? How?

Term paper

- To be handed out: March 13
- To be submitted: April 7
- Solutions: April 21 (ordinary lecture time & place)

- Extra problems to work with: Previous exams at http://www.oekonomi.uio.no/studieinfo/eksamoppg/4910.htm