Voluntary Pollution Control and Regulation

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Presented at
Voluntary Pollution Control Workshop
Ohio State University, May 20, 2012

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Voluntary Pollution Control Programs: A Taxonomy

- Pure public
  - Common in the US (33/50, Energy Star, ISO 14001)

- Private-public partnerships
  - Common in Europe

- Pure private: voluntary abatement market
  - World-wide

Source: Brouhle et al 2005

Pure Private: Growing Presence

- "Green is the next big thing"
    - ~10% of all new products in US are 'green'

    - Several states/utilities with green electricity programs

    - 'Sustainability scores' for apparel (NYT, 2011)

    - 'Green Rankings Report' (Newsweek, 2010)

Policy Framework: Overview

- ## Main question
  - How does the presence of purely private voluntary abatement affect traditional regulation policies?

- ## Framework
  - Private provision of public goods, altruism (Cornes & Sandler 1986, Clark et al 2003)

- ## Answer
  - Regulation is less effective: crowding out
  - Optimal regulation accounts for reaction in voluntary market
  - Traditional regulation may be higher/lower

Demand Side: Pure Altruism

- Two consumers: identical preferences
  - $U_i = U(X_i, E)$ X: numeraire, E: envi quality

                                      X, E > 0, normal goods

  - $E = Z_i + Z_{\sim i} + E_0$ Z: abatement

                                      E, Z: pure public goods

  - $Z_i \geq$ mandated abatement ≥ 0

  $\rightarrow Z_i = Z(P; M_i, Z_{\sim i}, E_0)$ i = 1, 2

- ## Different incomes
  -### High income: positive voluntary abatement
    - $Z_1 > 0$
  - ### Low income: no voluntary abatement, consume mandated abatement
    - Z_2 = mandated abatement = $\bar{Z} \geq 0$

- ## Voluntary, mandatory control: perfect substitutes
  - ### Crowding out of voluntary abatement

Supply Side

- Firms sell abatement in <u>perfectly competitive</u> private abatement market
  - Price takers: P

- Total abatement cost: $C(E) = C(Z + \overline{Z})$
  - Positive, increasing marginal cost

- Firm's problem: maximize profits
  → Supply curve: $P = C'(Z; \overline{Z})$

Voluntary Market Equilibrium

- Demand for abatement = Supply of abatement

The Case for Regulation

- Private market ignores cost & benefit to non-participating consumers/firms

- Regulation specifies minimum abatement consumed by each person

Regulation & Environmental Quality

- Mandatory abatement → <u>crowding out</u> of private (voluntary) abatement
  - Private & mandatory abatement = perfect substitutes
  - Demand curve for private abatement shifts leftward
  - Decline in equilibrium P & Q in voluntary market

- Mandatory abatement → <u>increase in envi. quality</u>
  - Crowding out is less than one-for-one: normal goods

- Regulation is <u>less effective</u>

Voluntary Control & Regulation

- <u>Optimal regulation</u>
  - Max. net social benefits from regulation
  - Factor in private abatement market reaction
  - Private abatement market is in equilibrium

- <u>Traditional regulation</u>
  - Assumes no reaction in private abatement market
  - Assumes price and quantity remain constant

MC of Mandatory Regulation

- <u>MC of increase in environmental quality</u>
  - *Traditional regulator*: one-for-one increase
  - *True increase*: < one-for-one

→True MC < MC seen by traditional regulator
  - True MC curve lies below traditional MC curve

MB of Mandatory Regulation

- All consumers: <u>Increase in envi. quality</u>
  - *Traditional regulator*: one-for-one increase
  - *True increase*: < one-for-one

- <u>Voluntary mkt. consumers : Increase in disposable resources</u>
  - *Traditional regulator*: none
  - *True increase*: offsets smaller increase in environmental quality for these consumers
  - → true MB is higher for voluntary mkt. consumers

MB of Mandatory Regulation: Cases
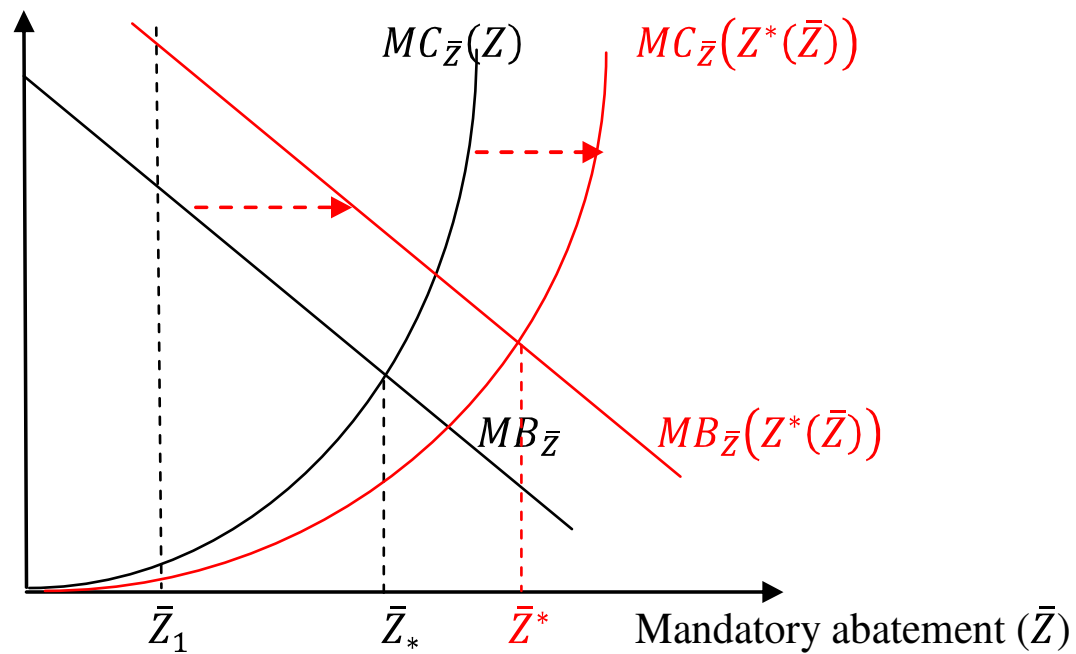
1. <u>True social MB > traditional social MB</u>

    – Larger MB in voluntary market offsets smaller MB outside private market

        • Large/deep voluntary abatement market

2. <u>True social MB < traditional social MB</u>

    – Larger MB in voluntary market does not offset smaller MB outside private market
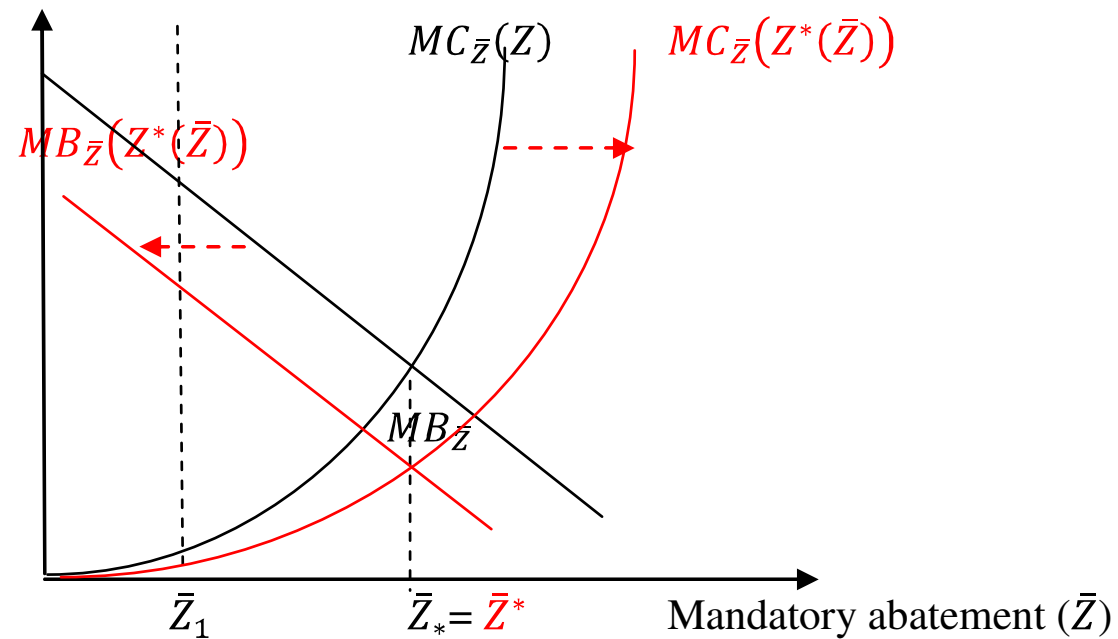
        • Small/shallow voluntary abatement market

Optimal Regulation: Case 1

MB, MC ($)

$MC_{\bar{Z}}(Z)$

$MC_{\bar{Z}}\big(Z^*(\bar{Z})\big)$

$MB_{\bar{Z}}$

$MB_{\bar{Z}}\big(Z^*(\bar{Z})\big)$

$\bar{Z}_1$ $\bar{Z}_*$ $\bar{Z}^*$ Mandatory abatement ($\bar{Z}$)

Optimal Regulation: Case 2

Special Case: Impure Altruism

- Crowding out is dampened
  - $\frac{\partial MU_Z}{\partial E} > 0$

- Crowding out is enhanced
  - $\frac{\partial MU_Z}{\partial E} < 0$
  - Warm glow driven by guilt?

- Qualitatively similar to pure altruism

Special Case: Crowding In

- ## Pure altruism
  - MU of numeraire declines with environmental quality (negative cross partial)

- ## Impure altruism
  - Numeraire is not normal
  - MU of voluntary abatement rises with environmental quality (positive cross partial)

Conclusions

- <u>Pure private programs</u>
  - Complement existing regulation; but

  - Regulation must account for reaction of voluntary market when demand is driven by altruism

  - Regulation less effective due to crowding out in private abatement market
    - Naïve regulation will not max. social welfare

  - Welfare maximizing regulation may be higher or lower than traditional level