

Topic

Voluntary Environmental Actions

Prepared from Chapter 14

of

Charles Kolstad : Environmental Economics, 2nd Edn

Voluntary Environmental Actions

A voluntary action is an environmentally beneficial action by a firm or an organisation that is not induced by any applicable laws or regulations, either through regulatory requirements or substantial positive or negative incentives.

Two broad categories of voluntary actions are:

1. Voluntary actions that are purely motivated by market- consumers, employees, competitors or investors. (please read details of this from Kolstad, P. 279-284)
2. Voluntary actions that require the presence of a government regulator. The regulator may be actively engaged with the firms or may be just hovering in the wings (posing a potential threat to the firms).

Three main categories of voluntary actions:

- A. Voluntary Agreement:** When a regulator and a firm or a group of firms negotiate an environmental agreement involving real actions and commitments to be met by the firms voluntarily.
- B. Voluntary program:** wherein the regulator sets an optimal regulatory arrangement and asks firms to voluntarily accede (or not) to that.
- C. Pre-emptive Actions:** A firm or an association of firms takes a pro-environmental action unilaterally to pre-empt an impending legislation or to influence the design of a mandatory legislation.

A. Voluntary Agreement

We assume the presence an active firm, an active regulator and of a passive legislature.

1. Legislature is passive in the sense that it may act and pass a mandatory legislation when the voluntary actions do not come forth from the firms.
2. The role of the regulator is to monitor and to pose a credible threat for a mandatory legislations if the firms fail to take at least acceptable voluntary measures.
3. The clear goal of the regulator is to maximize net social benefits from enviropnmental regulations
4. We assume that the marginal costs of mandatory legislation and voluntary legislations are c_M and c_V respectively wherein $c_M > c_V$ because mandatory legislations do not have the flexibility in choosing the method of abatement.
5. Total Cost of abatement under two regimes (mandatory and voluntary) are:

$$C_M(a) = c_M a$$

$$C_V(a) = c_V a$$

6. Net social benefits (NSB) under two regimes (mandatory and voluntary) are:

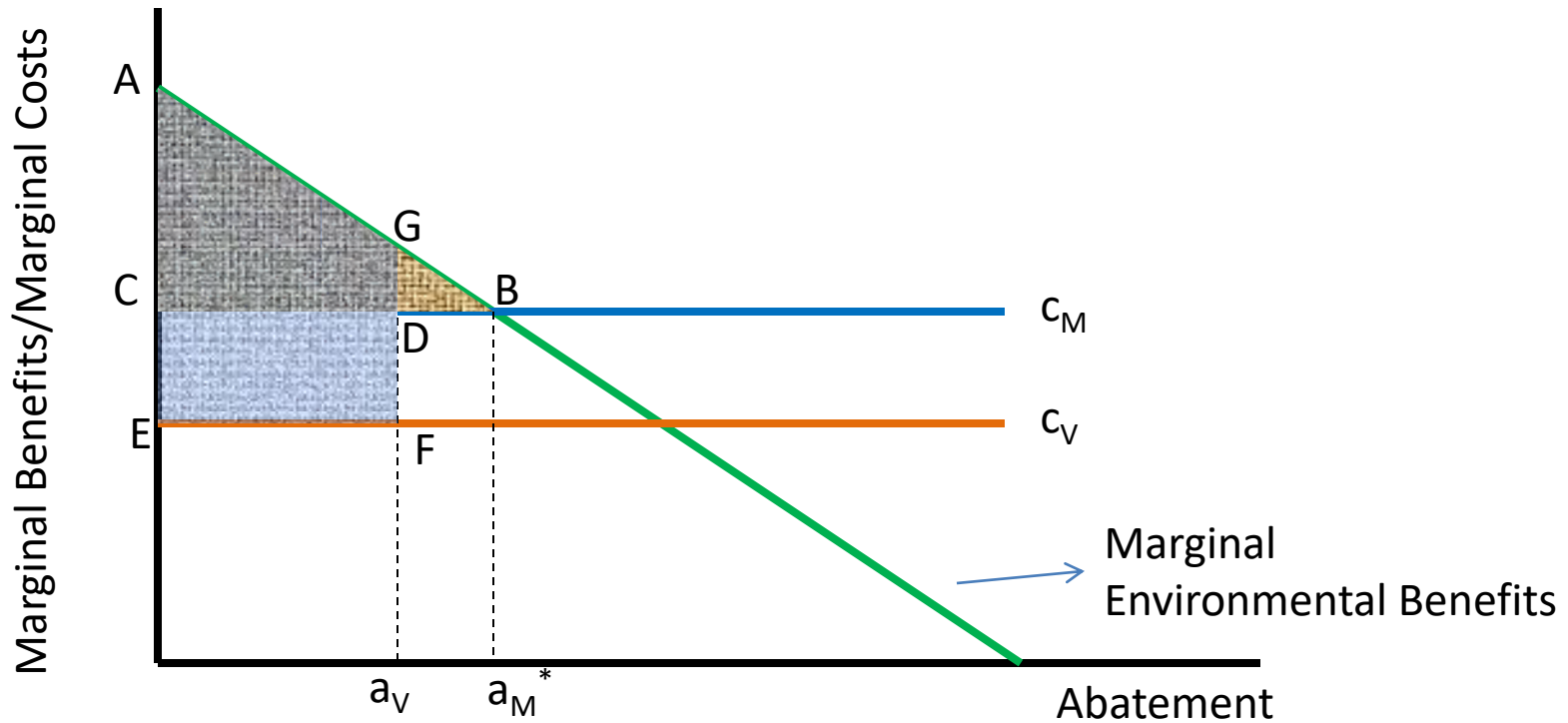
$$NSB_M(a) = B(a) - c_M a$$

$$NSB_V(a) = B(a) - c_V a$$

$B(a)$ stands for total benefits from abatements.

Regulatory Game for Voluntary Agreement

NSB from optimal mandatory and arbitrary voluntary measures
Legislature chooses a_M to maximize $NSB(a_M)$



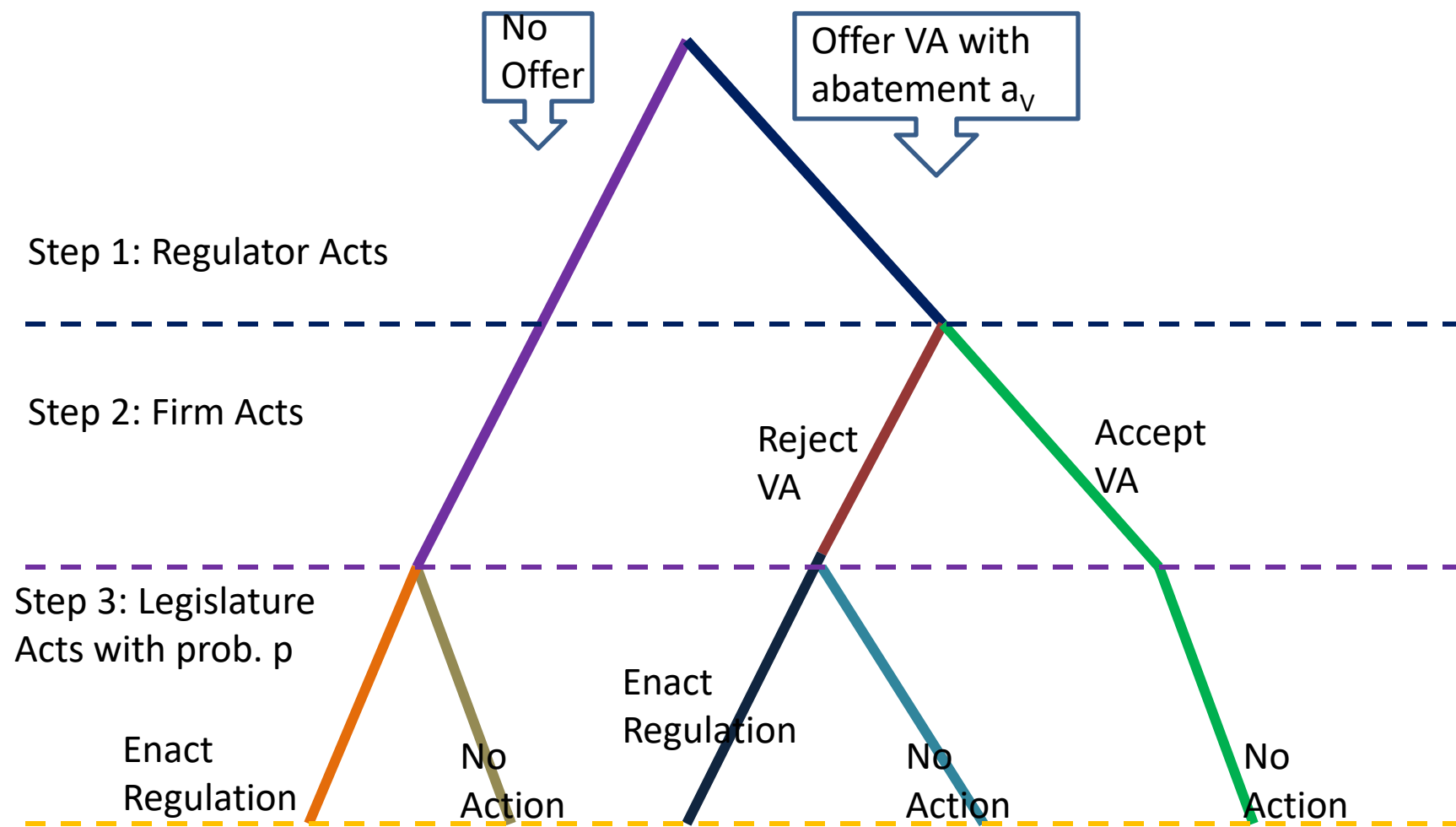
NSB from optimal mandatory measures = Area ABC
NSB from arbitrary voluntary measures = Area ACFG

Regulatory Game for Voluntary Agreement

- As mentioned before legislature may act only when Voluntary Agreement (VA) breaks down. It may bring a legislation with probability p and may not bring it with a probability $1-p$.
- Even if p is close to 1 regulator still prefers a voluntary agreement than a mandatory legislation because a voluntary agreements bring more net social benefits than a mandatory regulation.
- Even a less than perfect VA may generate more NSB than an optimal mandatory regulation.
- However, the regulator will not accept just any level of abatement. It has to be sufficiently strong to higher expected NSB than relying on an uncertain mandatory regulation.
- So, there is minimum acceptable VA abatement a_v^{\min} (identify in the diagram).
- Regulator prefers more and more abatement in its voluntary agreement with the firms but does not ask for too much fearing that the agreement (offer) may be rejected by the firm.
- Firm may choose either to accept or to reject a voluntary agreement offered by the regulator.
- Firm may accept the voluntary agreement offered fearing that if it rejects it may face even a worse deal from the legislature.

Regulatory Game for Voluntary Agreement

Legislature, Regulator and a Polluter (firm)



Payoffs

Regulator's	$NSB_M(a_M^*)$	0	$NSB_M(a_M^*)$	0	$NSB_V(a_V)$
Firm's	$-c_M a_M^*$	0	$-c_V a_V$	0	$-c_V a_V$

Regulatory Game for Voluntary Agreement

Looking at the payoffs in the game tree:

If the VA fails to materialize, expected payoffs to regulator is $pNSB_M(a_M^*)$ and expected cost to the firm is $pc_M a_M^*$

VA can work only if the regulator and the firm are better off with VA than under the Mandatory regulation.

The firm will compare the pay off and makes its decision:

Firm will accept the VA if $c_V a_V \leq pc_M a_M^*$

Firm will reject the VA if $c_V a_V > pc_M a_M^*$

VA will be accepted by the firm : $0 \leq a_V \leq (pc_M a_M^*)/c_V \equiv a_V^{\max}$

It means the firm can accept any abatement between 0 and a_V^{\max}

The regulator can not accept any voluntary abatement which does not give at least $pNSB_M(a_M^*)$ net social benefits and it would not want to go above a_V^* which maximizes NSB.

So, for regulator minimum acceptable abatement under VA (a_V^{\min}) is that which ensures $pNSB_M(a_M^*)$ net social benefits.

Regulator offers a_V such that $a_V^{\min} \leq a_V \leq a_V^*$

Regulatory Game for Voluntary Agreement

If a_v satisfies the condition for the firm and the regulator it will work. If it does not it will fail.

The firm and the regulator have opposite goals. The regulator wants to have as much abatement as possible and the firm wants as little as possible.

Nevertheless, a VA is better for both.

IS society better off under VA?

The answer to this question is yes as long as the legislature is unpredictable. We have assumed that the regulator tries to ascertain higher possible NSB. So the goal of the regulator itself ensues that society will be better off under VA.

On the other hand, if the legislature is more reliable then VA is not required so much.

We have taken $c_v < c_M$. So even if $p=1$ (the legislature is perfectly reliable) then also a VA is better for society than a mandatory regulation because

$$NSB_V(a) = \{B(a) - c_v a\} > NSB_M(a) = \{B(a) - c_M a\}$$

B. Voluntary Programme

Voluntary program (VP) is an extension of voluntary agreement (VA) and there is minor difference between them.

The regulator designs a programme detailing what the participating firms are expected to do and includes incentives for complying.

There can be an array of VPs yet we can think of a generic structure prototypes of which are large in number in real life. Two features are common in most of the VPs:

- 1. Environmental Expectations from the participating firms:** Such as some emission targets with set timeline.
- 2. Reward to participating firms:** Such as positive publicity or some relaxation in some other areas of regulation. Important thing is that such rewards are very modest which may induce some but not all firms to participate in a VP.

Other Uncommon Feature:

In some of the VPs, there may be Penalties for non-performing participant firms. Once a firm agrees to VP it has no choice left but to comply or face penalties.

Drawback of VPs

Any actual environmental improvement may not occur because the best performing firms are more likely to join leaving out worst performing firms.

A. Pre-emptive Actions

This include a set of actions take by the firms to pre-empt any mandatory regulations.

Firms know that if they take aggressive voluntary actions to dissipate an environmental threat the mandatory regulation by government may be deferred.

Sometime firms may take pre-emptive actions but with intention to promote adoption of regulations that are advantageous/disadvantageous to competitors.

Numerical Question on Voluntary Action:

Q. Consider a voluntary environmental agreement involving environmental regulator (State pollution control board), a polluting cement firm and the state legislature. Total benefits from the abatement are given by $B(a) = 100a - a^2/2$ Total cost of abatement are given as $C_M(a) = 20a$ and $C_V(a) = 10a$ under mandatory abatement and voluntary abatement respectively. In case the voluntary agreement is not made legislature can bring a mandatory optimal abatement with a probability of 0.5. Find the minimum acceptable voluntary abatement offer for the regulator and maximum acceptable voluntary abatement offer for the firm. Do you think that regulator's offer $a_V = 82$ will be rejected by the firm? Find out the optimal mandatory abatement level.

Answer: Minimum acceptable voluntary abatement for the regulator = 10 (obtained by solving quadratic equation which gives two values 10 and 80 one is min and the other is max for the regulator). Maximum acceptable voluntary abatement for the firm would be 40. So the offer of 32 will be accepted. Optimal mandatory abatement will be 40 which maximizes expected net social gains.