

# Voluntary Agreements and Private Enforcement of Environmental Regulation

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# Introduction

- Policy makers increasingly rely on Voluntary Agreements (VAs) to improve environmental quality as a complement to both conventional command-and-control regulation and market-based alternatives.

# Introduction

- Growing recognition of the inflexibility of standard-based regulation;
- Technological change that has made enforcement more difficult and costly;
- Political and budgetary limitations to enforcement of traditional regulation and to implementation of market-based approaches.

# Introduction

- VAs promise to address these concerns through potential cost savings due to increased flexibility, better cooperation between regulators and polluters, and improved environmental outcomes.

# Introduction

- Most common types of VAs:
  - Public voluntary programs: regulator sets the requirements and the rewards of the program, and firms choose whether to participate or not.
  - Negotiated agreements: abatement targets and rewards are determined by negotiation between the regulator and the firm.

# Introduction

- Focus on a negotiated agreement in which the regulator offers regulatory relief for the participating firm in exchange for environmental improvements.
- Regulator commits to giving up “letter of the law” compliance in return for environmental performance exceeding what traditional regulation, constrained by practical and budgetary limitations in enforcement, is expected to produce.

# Introduction

- If regulator does not have statutory authority to provide regulatory relief, the VA can leave the firm more vulnerable to citizen lawsuits by environmental advocacy groups seeking to ensure compliance.

# Introduction

- Project XL: EPA waved existing regulatory requirements in return for “superior environmental performance.”
- Billed as a prototype for a new approach to environmental regulation and as the flagship of the EPA’s regulatory reinvention initiative.
- Failed to elicit significant interest from regulated firms and in general fell short of policy makers’ expectations.



# Introduction

## *Key Results:*

- An agreement is not necessarily reached for any positive probability of agency enforcement, and a higher probability of agency enforcement does not necessarily increase the abatement level.
- The abatement level and the net social benefits resulting from a VA exceed the abatement effort and net benefits attainable from compliance with the regulatory standard if the probability of enforcement is low enough, the expected cost from a citizen suit is high enough, and the bargaining power of the firm is low enough.

# Background: Private Enforcement

- When permit or statutory violations are not pursued by the EPA or state regulator, private parties may sue the polluting firm or the regulator to compel an enforcement action.
- Citizen suits are relatively common: Naysnerski and Tietenberg (1992) reported over 1200 cases between 1978 and 1987, Smith (2004) found 287 cases between 1995 and 2000, and a recent exhaustive search of the PACER (Public Access to Court Electronic Records) database yielded 7800 lawsuits between 1973 and 2011.

# Background: Private Enforcement

- A citizen suit is preempted if the EPA or the state regulator are “diligently prosecuting” a violation.
- Plaintiffs are required to notify the EPA, the state authority, and the alleged violator 60 days prior to filing a suit. The citizen suit can be officially filed in a district court only if, after this notice-of-intent period expires, the regulator has not commenced enforcement actions

# Background: Private Enforcement

- Costs of private enforcement to sued facilities are often considerable.
- Substantial fines to the US treasury, compliance with costly action-based consent decrees, and reimbursement of litigation expenses to the plaintiff.

# Background: Literature

- Some of the literature on voluntary pollution abatement has accounted for the role of environmental advocacy groups through boycotts (Maxwell et al. 2000; Sinclair-Desgagne and Gozlan 2003; Innes 2006; Lyon and Maxwell 2011) or endorsements (Heyes and Maxwell 2004).
- Several studies acknowledge that participation in a VA may increase the risk of citizen lawsuits (Marcus et al. 2002; Delmas and Mazurek 2004; Lyon and Maxwell 2004), but the role of citizen enforcement through lawsuits has not yet been analyzed.

# Background: Literature

- Efficiency of citizen suits (Naysnerski and Tietenberg 1992; Baik and Shogren 1994; Heyes 1997; Heyes and Rickman 1999).
- Implications of private enforcement for self-reporting of compliance status (Langpap 2008).
- Interaction between private enforcement and agency enforcement (Langpap 2007; Langpap and Shimshack 2010)

# Model Setup

- Regulator's enforcement is imperfect: noncompliance with an emissions standard cannot always be discovered and penalized.
- The regulator and the firm negotiate a voluntary pollution abatement agreement.
- The regulator agrees not to enforce the standard and allows the firm to develop alternative pollution control strategies in return for environmental performance exceeding what traditional regulation is expected to bring.
- The regulator does not have statutory authority to waive enforcement of the law as part of the VA.

# Model Setup

- VAs in the U.S. typically exclude environmental advocacy groups.
- Private group does not participate directly in the VA process.
- The private group may file a citizen suit if the firm is not in compliance and the regulator does not pursue the violation.



# Model Setup

- Firm's level of abatement for the regulated pollutant:  $a$
- Emissions are random with a stochastic component  $\varepsilon$ , which is uniformly distributed over the range  $[-\theta, \theta]$ .
- Maximum level of emissions ( $a = 0$ ):  $\bar{e}$
- Emissions :  $e = \bar{e} - a + \varepsilon$ .
- Firm is in compliance if:  $\bar{e} - a + \varepsilon \leq S$
- Probability of compliance for a given abatement level  $a$  :

$$G(a) \equiv \Pr(\bar{e} - a + \varepsilon \leq S) = \Pr(\varepsilon \leq S - \bar{e} + a) = \int_{-\theta}^{S - \bar{e} + a} \frac{1}{2\theta} d\varepsilon = \frac{S - \bar{e} + a + \theta}{2\theta}$$

# Model Setup

- When  $e > S$  the regulator, as agreed, does not enforce the standard.
- The environmental group sues the polluter with probability  $\pi$ , in which case the firm incurs total cost of  $F$ .
- Environmental benefits generated by abatement  $a$ :  $B(a)$ , with  $B'(a) > 0$ ,  $B''(a) < 0$ .
- Abatement costs:  $C(a) = ca$ .
- Net social benefits from:  $NSB(a) = B(a) - ca$ .

# Model Setup

- If the firm and the regulator fail to reach an agreement, the firm becomes part of the pool of polluters subject to traditional regulatory enforcement.
- The regulator enforces the law with probability  $p \in (0, 1)$ .
- Firm is required to implement  $a_S$ , the abatement level necessary to achieve a desired probability of compliance  $G(a_S)$ .
- If the regulator does not enforce the law, the environmental group sues with probability  $\pi$  and the firm faces cost  $F$ .

# Conditions for Existence of a VA

## *The Firm's Participation Decision*

- Firm's expected cost of participating in a VA:

$$G(a_v)ca_v + (1 - G(a_v))[\pi(ca_v + F) + (1 - \pi)ca_v] = ca_v + (1 - G(a_v))\pi F$$

- Expected cost of not participating in a VA:  $pca_s + (1 - p)\pi F$

- The firm participates if and only if:

$$ca_v + (1 - G(a_v))\pi F \leq pca_s + (1 - p)\pi F$$

# Conditions for Existence of a VA

- Maximum abatement level acceptable to the firm:

$$ca_v^{\max} + (1 - G(a_v^{\max}))\pi F = pca_s + (1 - p)\pi F$$

$$a_v^{\max} = \frac{2\theta p(ca_s - \pi F) + (S - \bar{e} + \theta)\pi F}{2\theta c - \pi F}$$

# Conditions for Existence of a VA

## Lemma 1:

- (i) *The maximum abatement level acceptable to the firm is increasing in the probability of agency enforcement if the probability of a citizen suit is low enough:  $\partial a_v^{\max} / \partial p > 0$  if  $\pi < ca_s / F$ ;  $\partial a_v^{\max} / \partial p \leq 0$  otherwise.*
- (ii) *The maximum abatement level acceptable to the firm is increasing in the probability of a citizen suit if the probability of agency enforcement is low enough:  $\partial a_v^{\max} / \partial \pi > 0$  if  $p < (\bar{e} - \theta - S) / (a_s - 2\theta)$ ;  $\partial a_v^{\max} / \partial \pi \leq 0$  otherwise.*

# Conditions for Existence of a VA

## *The Regulator's Participation Decision*

- Expected benefit of participating :  $B(a_v) - ca_v = NSB(a_v)$
- Expected benefit of not participating:  $p(B(a_s) - ca_s) = pNSB(a_s)$ .
- Minimum level of abatement required to participate:

$$NSB(a_v^{\min}) = pNSB(a_s)$$

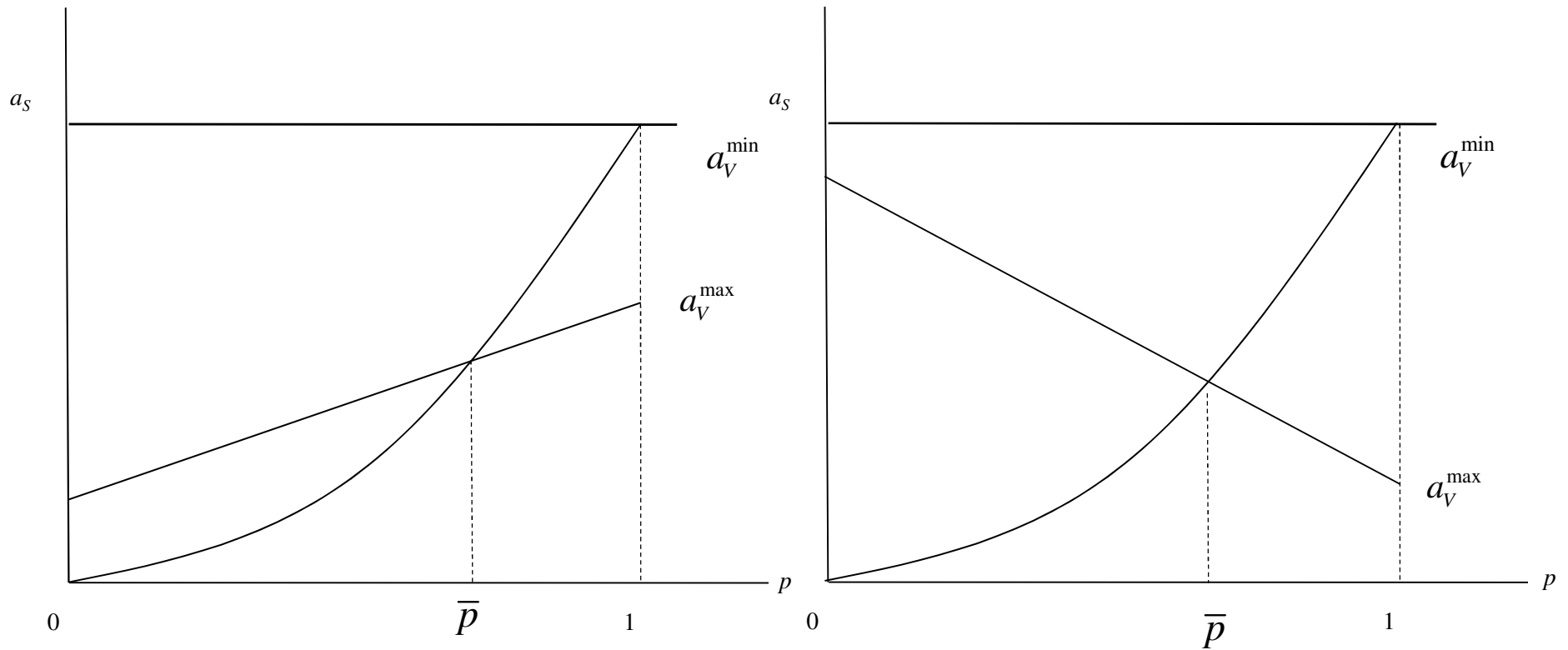
# Conditions for Existence of a VA

*Conditions for a VA*

**Proposition 1:** *Given the probability of a citizen suit, a VA is an equilibrium outcome if and only if the probability of enforcement is low enough:  $a_V^{\max} \geq a_V^{\min}$  if and only if  $p \leq \bar{p}$ .*



# Conditions for Existence of a VA



$$\pi < ca_s / F$$

$$\pi \geq ca_s / F$$

# Conditions for Existence of a VA

- Maximum abatement level acceptable to the firm:

$$ca_v^{\max} + (1 - G(a_v^{\max}))\pi F = pca_s + (1 - p)\pi F$$

- Minimum level of abatement required to participate:

$$NSB(a_v^{\min}) = pNSB(a_s)$$

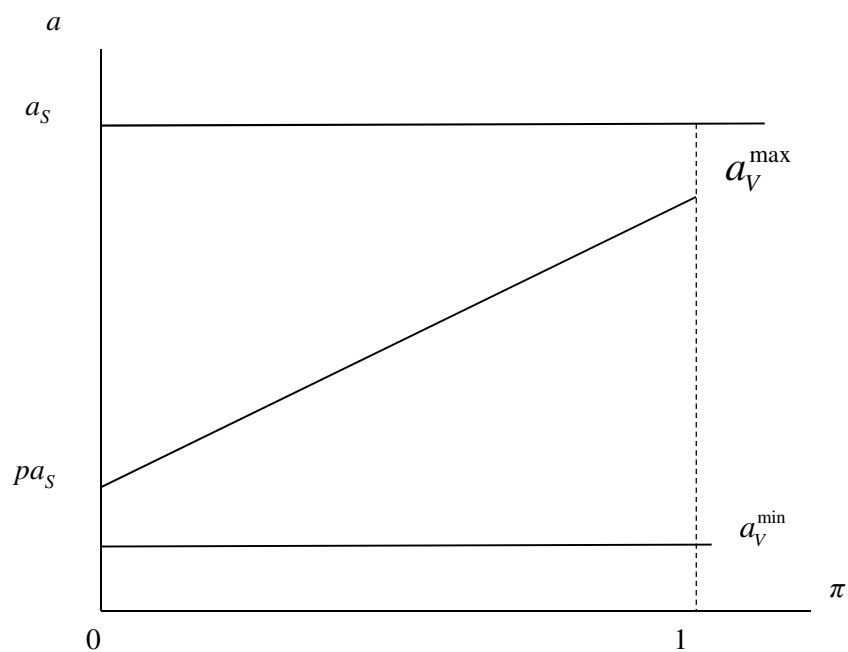
- High  $p$ : Agency enforcement very likely when not participating and thus a citizen suit is possible (almost) only in a VA. Regulator's expected payoff from not participating high. VA less likely.
- Low  $p$ : Chance of a citizen suit when not participating is higher. Regulator's expected payoff when not participating is low. VA more likely.

# Conditions for Existence of a VA

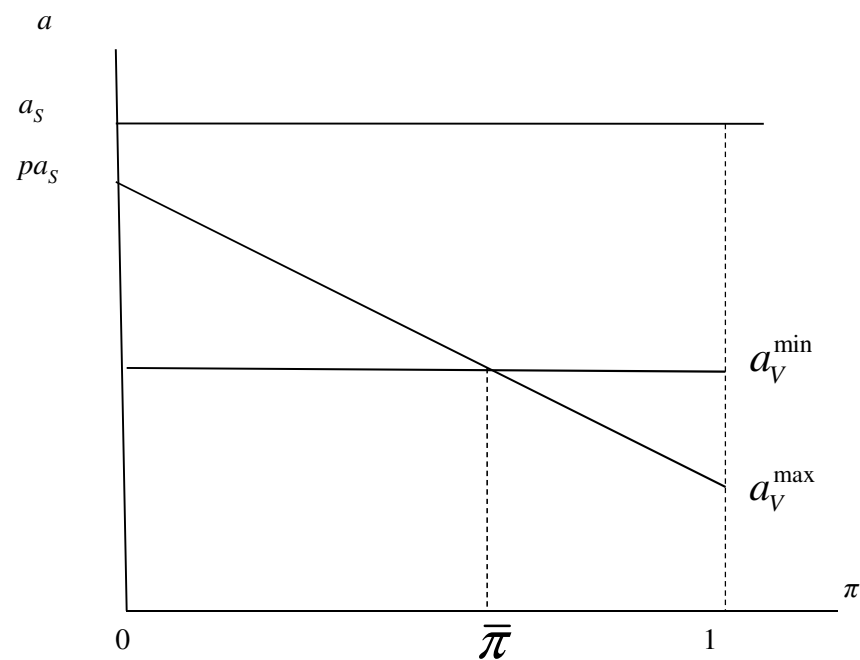
## Proposition 2:

*Given a low enough probability of agency enforcement, a VA is the outcome for any probability of a citizen suit. Otherwise, a VA is the outcome if and only if the probability of a citizen suit is low enough: if  $p \leq p^*$ ,  $a_V^{\max} \geq a_V^{\min}$  for all  $\pi \in [0,1]$ ; for  $p > p^*$ ,  $a_V^{\max} \geq a_V^{\min}$  if and only if  $\pi \leq \bar{\pi}$ .*

# Conditions for Existence of a VA



$$p < p^*$$



$$p \geq p^*$$

# Conditions for Existence of a VA

- Maximum abatement level acceptable to the firm:

$$ca_V^{\max} + (1 - G(a_V^{\max}))\pi F = pca_S + (1 - p)\pi F$$

- Minimum level of abatement required to participate:

$$NSB(a_V^{\min}) = pNSB(a_S)$$

- When  $\pi$  is very low the maximum abatement acceptable to the firm is close to the abatement level expected from agency regulation ( $a_V^{\max} \approx pa_S$ ). The regulator is risk averse and is willing to accept a lower abatement level ( $a_V^{\min} < pa_S$ ).
- The firm and the regulator will reach an agreement when a citizen suit is unlikely.

# Conditions for Existence of a VA

- Maximum abatement level acceptable to the firm:

$$ca_V^{\max} + (1 - G(a_V^{\max}))\pi F = pca_s + (1 - p)\pi F$$

- Minimum level of abatement required to participate:

$$NSB(a_V^{\min}) = pNSB(a_s)$$

- If  $p < p^*$  the regulator's expected payoff from not participating in a VA is low. Agency enforcement is unlikely to preempt a citizen suit. The firm is willing to accept higher abatement levels in a VA as the probability of a suit increases, so  $a_V^{\max} > a_V^{\min}$  for any  $\pi$ .

# Conditions for Existence of a VA

- Maximum abatement level acceptable to the firm:

$$ca_V^{\max} + (1 - G(a_V^{\max}))\pi F = pca_s + (1 - p)\pi F$$

- Minimum level of abatement required to participate:

$$NSB(a_V^{\min}) = pNSB(a_s)$$

- If  $p \geq p^*$  the regulator requires more abatement to participate. A citizen suit is more likely to be preempted by agency enforcement if the firm does not participate. A rising  $\pi$  mostly impacts the firm's expected cost of participation, making it willing to accept only lower abatement levels in a VA.

# Conditions for Existence of a VA

- A high probability of enforcement means that the regulator requires higher levels of abatement to enter into a VA.
- It also means that a citizen suit is likely to be preempted when there is no agreement.
- Increases in the probability of a citizen suit have a greater impact on the firm's cost of participating than on its cost of not participating.
- The firm is only willing to accept relatively low abatement levels, and hence an agreement is unlikely.



# Conditions for Existence of a VA

- A low probability of enforcement has the opposite effect.
- The regulator requires only modest abatement levels to participate in a VA.
- A citizen suit is not likely to be preempted by regulation, and increases in the probability of a citizen suit have a bigger impact on the firm's cost of not participating.
- The firm is thus willing to accept higher abatement levels in a VA
- An agreement is more likely.

# Pollution Abatement in a VA

*Equilibrium abatement level*

$$N(a_v) = \left[ -ca_v - (1 - G(a_v))\pi F + pca_s + (1 - p)\pi F \right]^\alpha \times \left[ NSB(a_v) - pNSB(a_s) \right]^{1-\alpha}$$

*FOC:*

$$(1 - \alpha)NSB'(a_v^N) \left[ ca_v^N + (1 - G(a_v^N))\pi F - pca_s - (1 - p)\pi F \right] +$$

$$\alpha \left( c - \frac{\pi F}{2\theta} \right) \left[ NSB(a_v^N) - pNSB(a_s) \right] = 0$$

# Pollution Abatement in a VA

## Proposition 3:

*The level of abatement agreed to in a VA:*

- (i) Increases with the probability of agency enforcement if the probability of a citizen suit is low enough:  $\partial a_V^N / \partial p > 0$  if  $\pi < ca_s / F$ ;*
- (ii) Increases with the probability of a citizen suit and the corresponding cost to the firm if the probability of agency enforcement is low enough:  $\partial a_V^N / \partial \pi > 0$  and  $\partial a_V^N / \partial F > 0$  if  $p < G(a_V^N)$ ;*
- (iii) Decreases with the bargaining power of the firm:  $\partial a_V^N / \partial \alpha < 0$*

# Pollution Abatement in a VA

*Comparing VAs with regulatory enforcement*

## **Proposition 4:**

*For  $a_s \leq a^*$ ,  $a_v^N \geq a_s$  if  $p$  is low enough,  $\pi$  and  $F$  are high enough, and  $\alpha$  is low enough. For  $a_s > a^*$ ,  $a_v^N < a_s$ .*

- A low probability of enforcement means the firm is more willing to accept higher abatement levels, and a high expected cost from citizen enforcement provides additional incentives to exert abatement effort and avoid noncompliance in a VA

# Pollution Abatement in a VA

*Comparing VAs with regulatory enforcement*

## **Corollary 1:**

*If  $p$  is low enough,  $\pi$  and  $F$  are high enough, and  $\alpha$  is low enough, then  $NSB(a_V^N) \geq NSB(a_S)$ .*

# Pollution Abatement in a VA

- Negotiated agreements can yield higher abatement levels than compliance with incompletely enforced regulatory requirements, as well as higher net social benefits.
- This is the case when the probability of agency enforcement is relatively low and the expected penalty from a citizen suit is relatively high.
- Agency enforcement is unlikely to preempt a citizen suit when the firm does not participate in a VA, and the combination of high expected costs from private enforcement and a firm with a relatively weak bargaining position can yield more abatement than the regulatory standard.

# Conclusions

- Private enforcement reduces the likelihood that the firm and the regulator reach an agreement.
  - Given a positive probability of a citizen suit a VA is reached only if the probability of regulatory enforcement is low enough.
  - A high probability of private enforcement can reduce the likelihood of an agreement.
- When an agreement is reached, a higher probability of agency enforcement does not lead to more abatement if the threat of a citizen suit is high.
- A higher likelihood of private enforcement can lead to less abatement in a VA.

# Conclusions

- A VA can result in higher abatement and net social benefits than regulation if the probability of private enforcement and accompanying costs are high and the probability of agency enforcement is low.



# Conclusions

- In a model without private enforcement a higher  $p$  has one effect: to increase the expected cost of not participating.
- Private enforcement introduces an important additional role for  $p$ : to preempt a more costly citizen suit.
- A high  $p$  means a citizen suit is more likely when participating in an agreement than when not participating. This makes a VA relatively less appealing, since the only way to reduce the likelihood of a suit is to increase abatement, which is costly for the firm.
- Private enforcement entails a more nuanced effect of agency enforcement, which implies that when  $p$  is high the firm may be less, rather than more, willing to participate in a VA.

# Conclusions

- In a Project XL agreement with 3M, the Natural Resources Defense Council raised objections to permit conditions negotiated as part of the agreement. Both the EPA and 3M expressed concern about the possibility of litigation, which made them less willing to proceed with the agreement.
- More generally, it has been argued that few firms have sought the flexibility offered by Project XL because its legality is not assured.