

The Entry-Deterring Effects of Inflexible Regulation

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- But limit pricing does not occur in a vacuum!
 - The monopolist activity is regulated by government agencies.
 - Emission fees, subsidies, etc.
- **Our question:** These agencies may facilitate (or hinder) the transmission of information to potential entrants, thus affecting entry patterns.

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 - the **emission fee** set by the regulator.

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 - attracting the entrant only when the incumbent's costs are high.
- Social welfare (SW) is

$$CS(Q) + PS(Q) + T - EnvD(Q)$$

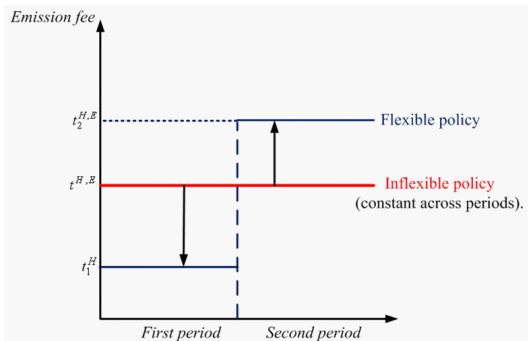
where $EnvD(Q) \equiv d \times Q^2$.

Complete Information

- **Low costs?** No entry. Therefore the regulator sets a constant fee $t^{L,NE}$ that induces efficient output levels in both periods.
- **High costs?** Entry. The regulator hence wants set:
 - a lax fee on the 1st period monopoly, but
 - a more stringent fee on the 2nd period duopolists.
- But he must choose a single tax!! (Not readjusted upon entry).
 - Hence, any constant fee t produces inefficiencies in one or both periods.
 - The regulator selects a fee that minimizes the sum of these inefficiencies.

Complete Information - Example

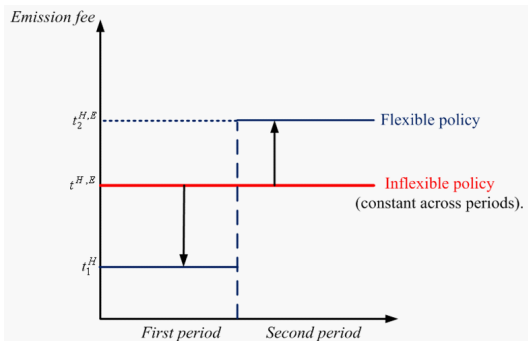
- When $\delta = 1$, the reg. selects $t^{H,E} = \frac{9}{25} t_1^H + \frac{16}{25} t_2^{H,E}$:



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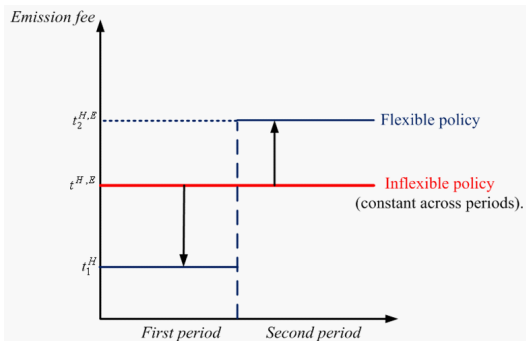
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 - What about Incomplete info?
 - Yes! Emission fees can help conceal info., thus deterring entry.

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- 4 **Second period:**
 - 1 If entry does not occur (NE), the incumbent responds producing a monopoly output $x_{inc}^{K,NE}(t)$.
 - 2 If entry ensues (E), firms respond producing duopoly output $x_{inc}^{K,E}(t)$ and $x_{ent}^{K,E}(t)$.

Informative equilibrium

- An **informative PBE** can be sustained when priors p are sufficiently high, where:
 - The regulator selects type-dependent fees, and
 - The incumbent chooses $q^H(t)$ and $q^A(t)$ when her costs are high and low, respectively,
 - where $q^A(t_1) > q^L(t_1)$.

Informative equilibrium - Welfare comparisons

1. Relative to Complete information:

- Under complete info.: since entry does not occur, the reg. can induce q^{SO} in both periods.
- Under incomplete info: the inc. produces a different output in the first and second period, but the reg. selects a single t (\implies inefficiencies).
 - Hence, $W_{CI}^{L,R} > W_{IE}^{L,R}$.

2. Relative to ED models in which the regulator is Absent:

- When the reg. is absent: overproduction emerging in the IE induces additional pollution.
- When the reg. is present: Despite not inducing q^{SO} , he ameliorates such overproduction (second best).
 - yielding that $W_{IE}^{L,R} > W_{IE}^{L,NR}$.

Uninformative equilibrium

- An **uninformative equilibrium** can be sustained when priors p are low, in which:
 - The regulator selects a type-independent fee $t^{L,NE}$, and
 - Both types of incumbent choose output function $q^L(t)$.
- Hence, the high-cost incumbent “over-produces,” while the regulator “over-taxes.”
 - They conceal information from the entrant,
 - and entry is deterred.

Uninformative equilibrium

- When considering ED, the reg. faces a trade-off:
 - **Costs:** overtaxing emphasizes the inefficiencies of $t^{L,NE}$ (which was already a second-best policy under CI), but
 - **Benefits:** it entails savings in the fixed entry cost F .
 - When those savings are sufficiently large, i.e., $F > F^{Inflex}(d)$, deterring entry becomes welfare improving.
- Hence, the reg. overtaxes (facilitating ED) when doing so is welfare improving.

Uninformative equilibrium - Welfare comparisons

1. Relative to Complete information:

- Under complete info: Inefficient regulation, both under CI and UE.
- Under incomplete info: Since the reg. is willing to overtax,
 $W_{UE}^{H,R} > W_{CI}^{H,R}$.
 - Hence, if the UE exists, it must be welfare improving.

2. Relative to ED models in which the regulator is Absent:

- When the reg. is absent: overproduction emerging in the UE induces additional pollution, i.e., $W_{UE}^{H,NR}$ is low.
- When the reg. is present: Despite not inducing q^{SO} , he ameliorates such overproduction (second best).
 - Hence, $W_{UE}^{H,R} > W_{UE}^{H,NR}$.

Flexible vs. Inflexible regimes

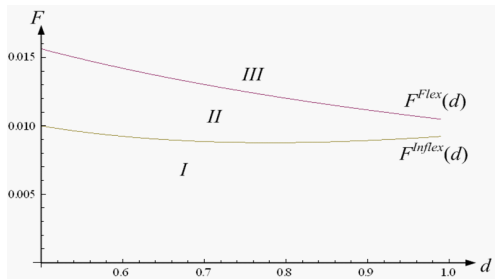
- What if, instead, the regulator is capable of rapidly readjusting emission fees if market conditions change?
 - Some environmental policies are changed upon entry,
 - while other policies remain rigid along time,
 - Examples:
 - California timber taxes (unaffected since 1976),
 - Electricity tax in Spain (unaffected during 1998-2003),
 - Tax on aviation noise pollution in France (constant since 2003).

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- **Flexible regime:** The reg. is less attracted to the UE, since the alternative (IE) yields **optimal** outcomes.

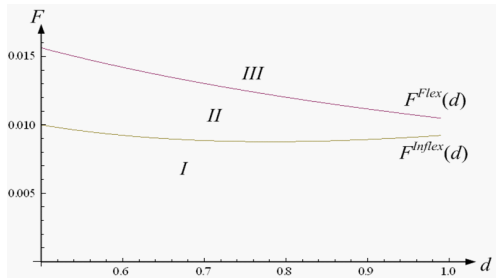
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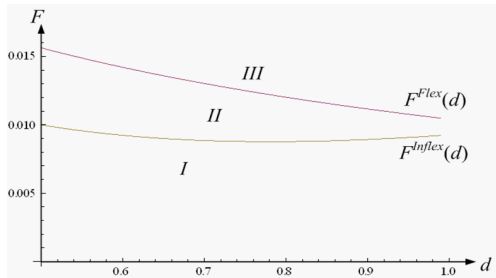
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- **Inflexible regime:** The reg. is more attracted to the UE, since the alternative (IE) yields **suboptimal** outcomes.
 - UE can be supported in regions *III* + *II*.

Discussion

- **More responsive environmental agencies:**
 - Environmental protection agencies that rapidly adjust to market conditions can *hinder* firms' ED practices.
 - While rigid agencies (e.g., in developing countries) would actually *facilitate* firms' ED.
- **Why not just publicize the incumbent's costs?**
 - Not necessarily optimal for the reg:
 - Playing the UE can entail a larger SW than the CI outcome.
 - Otherwise, SW is larger under CI than UE.

Related literature

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 - *Contribution:* Reg. can anticipate the inc.'s actions, and successfully conceal info., but only if it is welfare improving.