Laffont and Tirole

- Indivisible public project - has values S

(1) $C = \beta - e$; $e > 0$ $\beta \sim [\underline{\beta}, \bar{\beta}]$

(2) $R_f = c + t$ payment to firm

(3) $U = t - \Psi(e)$ firm utility

(4) $t - \Psi(e)$ individual rationality

(5) $S - (1+\overset{\text{shadow cost of public funds}}{\tilde{\lambda}})(t + \beta - e)$ surplus for consumers

(6) $W = S - (1+\lambda)(t+\beta-e) + t - \Psi(e)$ total welfare

$$= S - (1+\lambda)(\beta - e + \Psi(e)) - \lambda(t - \Psi(e))$$

$$= S - (1+\lambda)(\beta - e + \Psi(e)) - \lambda U$$

$$= S - (1+\lambda)(C + \Psi(e)) - \lambda U$$

<u>Benchmark</u>: Regulator has complete information

- take-it-or-leave-it Regulator:

$\max W$ s.t. $U \geq 0$

- $U = 0 \Rightarrow t = \Psi(e^*) \Rightarrow \Psi'(e^*) = 1$

Consider: $t(C) = a - (C - C^*)$

with $a = \Psi(e^*)$

$C^* = \beta - e^*$

- fixed price contract

$\Rightarrow$ leads to first best.

Incomplete information
- cannot observe β, e (assume $|\text{supp}(\beta)|=2$)
- can observe function $\psi(e)$.

Specify a menu to

$\max W$ s.t. $U \geq 0$ (IR)

and (IC) constraints.

General result:
- Get low β firm to exert optimal effort, but must leave some rent
- High β firm exerts suboptimal effort but achieves no rents.

For $\underline{\beta}, \bar{\beta}$,

$$t(C) = \psi(e^*) - C(-C^*)$$
$$= \psi(e^*) - (C - \beta + e^*) \qquad \text{if } e = e^*$$
$$= \psi(e^*) - (e^* - e)$$

(1) $\underline{R}_f = (\underline{\beta} - e^*) + \psi(e^*)$

(2) $\bar{R}_f = (\bar{\beta} - e^*) + \psi(e^*)$

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assume ν is prob $\beta = \underline{\beta}$ and $1-\nu$ is prob $\beta = \bar{\beta}$.

Define $\Delta\beta = \bar{\beta} - \underline{\beta}$

Let $\Phi(e) = \psi(e) - \psi(e - \Delta\beta)$

Regulator wants to:

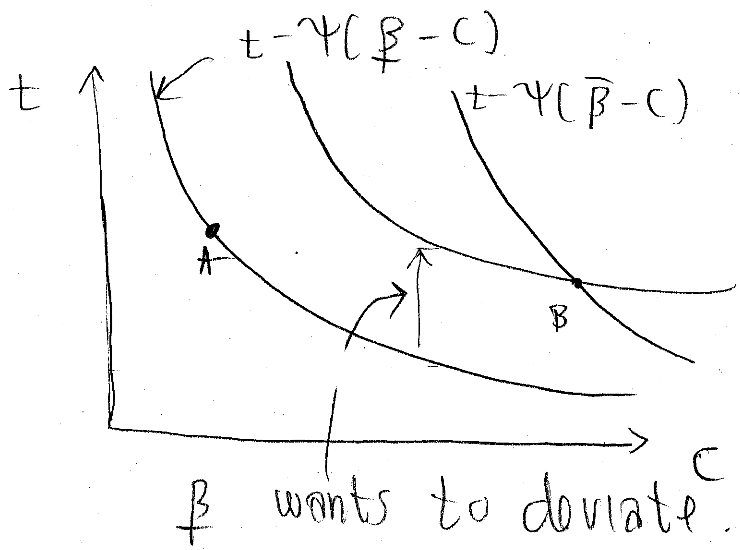
$$\max_{\underline{c},\bar{c},\underline{u},\bar{u}} \{\nu[S-(1+\lambda)(\underline{c}+\psi(\underline{\beta}-\underline{c}))-\lambda\underline{u}] + (1-\nu)[S-(1+\lambda)(\bar{c}+\psi(\bar{\beta}-\bar{c}))-\lambda\bar{u}]\}$$

s.t. (IR) and (IC)

FOCs will give:

$$\psi'(e_L)=\psi'(\underline{\beta}-\underline{c})=1 \Rightarrow \underline{e}=e^*$$

$$\psi'(e_H)=\psi'(\bar{\beta}-\bar{c})=1-\frac{\lambda}{1+\lambda}\frac{\nu}{1-\nu}\Phi'(\bar{\beta}-\bar{c}) \Rightarrow \underbrace{\bar{e}<e^*}_{\text{distortion.}}$$



(A,B) is not IC