Ec951: Altruistic principal and limited liability

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Binding constraints with (binding) limited liability constraint, risk neutral agent

To induce effort we require:

IC: π_1+(1-π_1)$\underline{t} - \psi = \pi_0 \bar{t} + (1 - \pi_0)\underline{t}$
$\Delta\pi(\bar{t} - \underline{t}) - > \psi$
LL: $\underline{t} = l$
Hence $\bar{t} = \frac{\psi}{\Delta\pi} + l$
Discuss: why do we know these are the binding ones?

Non-altruistic principal: when to induce effort

$E(\Pi_1) = \pi_1(\bar{q} - \bar{t}) + (1 - \pi_1)(\underline{q} - \underline{t})$
$= \pi_1(\bar{q} - l - \frac{\psi}{\Delta\pi}) + (1 - \pi_1)(\underline{q} - l)$
$> E(\Pi_0) = \pi_0 \bar{q} + (1 - \pi_0)\underline{q} - l$
i.e.,
$(\pi_1 - \pi_0)\Delta q > \pi_1 \frac{\psi}{(\pi_1 - \pi_0)} = \psi(1 + \frac{\pi_0}{\pi_1 - \pi_0}) > \psi$
for technical efficiency $\Delta\pi\Delta q > \psi$

Altruistic principal

Assume principal gets "warm glow" utility $a(t - \psi(e))$, where $a'(x) > 0$ but $a'(x) < 1$ for paying t to the employee and inducing effort e. Hence paying extra t is never desirable by itself even with this altruism utility, so the LL (and IC) constraint still binds, so to induce high effort, $\underline{t} = l$, and $\bar{t} = \frac{\psi}{\Delta\pi} + l$.

But now the benefit to the principal of inducing high effort (relative to low effort) is greater, since he also benefit's from any LL rent he pays to the agent:

$E(\Pi_1^{alt}) = \pi_1(\bar{q} - \bar{t} + a(\bar{t} - \psi)) + (1 - \pi_1)(\underline{q} - \underline{t} + a(\underline{t} - \psi))$

$= \pi_1(\bar{q} - l - \frac{\psi}{\Delta\pi} + a(l + \frac{\psi}{\Delta\pi} - \psi)) + (1 - \pi_1)(\underline{q} - l + a(l - \psi))$

preferred to not inducing low effort iff...

$> E(\Pi_0^{alt}) = \pi_0\bar{q} + (1 - \pi_0)\underline{q} - l + a(l)$

i.e., $(\pi_1 - \pi_0)\Delta q > \pi_1(\frac{\psi}{(\pi_1 - \pi_0)} - (a(l + \frac{\psi}{\Delta\pi} - \psi) - a(l - \psi))$

Note that the right hand side of the previous equation is lower then in the case without altruism. Hence, the technical benefit (gross of costs) of high effort $(\pi_1 - \pi_0)\Delta q)$ need not meet as high a threshold. In other words, in cases where $\pi_1\frac{\psi}{(\pi_1 - \pi_0)} > (\pi_1 - \pi_0)\Delta q > \pi_1(\frac{\psi}{(\pi_1 - \pi_0)} - (a(l + \frac{\psi}{\Delta\pi} - \psi) - a(l - \psi))$ then effort will be induced only where the principal has (or expresses his) altruism $a()$.

Note that if an altruistic principal ignores ("separates") his altruism in such a case, he will attain a payoff $E(\Pi_0^{alt}) < E(\Pi_1^{alt})$, where

$$E(\Pi_0^{alt}) - E(\Pi_1^{alt}) = \underbrace{\Delta\pi\Delta q - \psi}_{\underline{\text{technical benefit}}} - \underbrace{\frac{\psi\pi_0}{\pi_1 - \pi_0}}_{\text{LL rent}} - \underbrace{\pi_1(a(l + \frac{\psi}{\Delta\pi} - \psi) - a(l -}_{\text{Altruism utility}}$$

The agent will of course be worse off as well, since she loses the LL rent.

This analysis should equally apply to a "fair trade" consumer in a competitive market where the producer will pass his additional net marginal costs on to an altruistic consumer who expresses such a preference. In such a case, with the conditions above, a consumer would pay an additional $\underbrace{\frac{\psi\pi_0}{\pi_1 - \pi_0}}_{\text{LL rent}} - \underbrace{\Delta\pi\Delta q - \psi}_{\underline{\text{technical benefit}}}$ but gain $\underbrace{\pi_1(a(I + \frac{\psi}{\Delta\pi} - \psi) - a(I - \psi))}_{\text{Altruism utility}}$, where we have already assumed that the latter exceeds the former.