Recitation 3

Moral Hazard

- Two agents - principal and agent
  P makes a take-it-or-leave-it offer to A, who has reservation utility $\underline{U}$.

  If contract is accepted, A takes action $a \in \mathcal{A}$ which (stochastically) affects outcome $x \in [\underline{x}, \bar{x}]$.

  Assume x is verifiable so we can write wages/payments $w(x)$ and go to court with it.

  P's payoffs
  $$V(x - w(x)),\ V' > 0,\ V'' \leq 0.$$

  A's payoffs
  $$U(w(x), a) = u(w(x)) - \psi(a),\ u' > 0,\ u'' \leq 0.$$

  Let $F(x, a)$ be CDF over x for a given effort a. Assume $F_a(x, a) < 0$ at all x. What does this mean?

Let effort be observable and verifiable.

$$\max_{w(\cdot),a} \int_{\underline{x}}^{\bar{x}} V(x - w(x)) f(x,a) dx,$$

subject to

$$\int_{\underline{x}}^{\bar{x}} u(w(x)) f(x,a) dx - \psi(a) \geq \underline{U}.$$

The Lagrangian is

$$\begin{aligned} \mathcal{L} &= \int_{\underline{x}}^{\bar{x}} V(x - w(x)) + \lambda u(w(x)) f(x,a) dx \\ &\quad -\lambda \left(\underline{U} + \psi(a) \right). \end{aligned}$$

FOCs:
[(1)] For every x, foc for $w(x)$:

$$0 = -V'(x - w(x)) + \lambda u'(w(x)) \iff \lambda = \frac{V'(x - w(x))}{u'(w(x))}.$$

[(2)] FOC for effort:

$$\int_{\underline{x}}^{\bar{x}} V(x - w(x)) + \lambda u(w(x)) f_a(x, a) dx = \lambda \psi'(a).$$

- Intuition for (1)?
- Intuition for (2)?

Now action is hidden

$$\max_{w(\cdot),a} \int_{\underline{x}}^{\bar{x}} V(x - w(x)) f(x,a) dx,$$

subject to

$$\int_{\underline{x}}^{\bar{x}} u(w(x)) f(x,a) dx - \psi(a) \geq \underline{U}.$$

$$a \in \text{argmax} \int_{\underline{x}}^{\bar{x}} u(w(x)) f(x,a') dx - \psi(a').$$

Interpret!

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