

PS 3 - Solution Sketch

In class, I covered up to question 7.

Both constraints are binding ($\mu > 0$ and $\lambda > 0$)

\Rightarrow the solution is ~~defined~~ by $(\bar{u}^M, \underline{u}^M)$ is defined by:

ICC : $\bar{u}^M = \underline{u}^M + \gamma / \Delta \tilde{\pi}$

PROFIT CONDITION : $\tilde{\pi}_1 (w - h(\bar{u}^M)) + (1 - \tilde{\pi}_1) (w - d - h(\underline{u}^M)) = 0$

re-write as :

$$w - d(1 - \tilde{\pi}_1) = \tilde{\pi}_1 h(\bar{u}^M) + (1 - \tilde{\pi}_1) h(\underline{u}^M)$$

Define $U^M \equiv E[u^M] - \gamma$

$$U^M = \underline{u}^M + \frac{\tilde{\pi}_1 \gamma}{\Delta \tilde{\pi}} - \gamma \quad (\text{using the ICC})$$

The profit condition implicitly defines U^M :

$$w - d(1 - \tilde{\pi}_1) = \tilde{\pi}_1 \cdot h\left(\underbrace{U^M + \gamma + \frac{(1 - \tilde{\pi}_1)\gamma}{\Delta \tilde{\pi}}}_{\bar{u}^M}\right) + (1 - \tilde{\pi}_1) \cdot h\left(\underbrace{U^M + \gamma - \frac{\tilde{\pi}_1 \gamma}{\Delta \tilde{\pi}}}_{\underline{u}^M}\right)$$

Market does not break-down iff :

$$U^M > u(\hat{w})$$

That is if the expected utility of the owner with insurance is higher than his expected utility under no insurance (outside option).

The condition for market break-down in the case of asymmetric info (Question 8) is $U^H > u(\hat{w})$. (2)

This condition is equivalent to:

$$\pi_1 h\left(u(\hat{w}) + \psi + \frac{(1-\hat{\pi}_1)\psi}{\Delta \hat{\pi}_1}\right) + (1-\hat{\pi}_1) h\left(u(\hat{w}) + \psi - \frac{(1-\hat{\pi}_1)\psi}{\Delta \hat{\pi}_1}\right) < w - d(1-\hat{\pi}_1) \quad (1)$$

Question 9

This is the complete info case. You can show that, as expected, the owner receives full insurance in this case: $\bar{w} = \underline{w} = w^*$.

Define: $U^* \equiv E[u^*] - \psi = u^* - \psi$

The profit condition in this case is:

$$h(u^*) = w - d(1-\hat{\pi}_1)$$

or

$$h(U^* + \psi) = w - d(1-\hat{\pi}_1)$$

Market does not break-down iff: $U^* > u(\hat{w})$

The condition is equivalent to:

$$h(u(\hat{w}) + \psi) < w - d(1-\hat{\pi}_1) \quad (2)$$

use the definition of $u(\hat{w})$ (see your notes):

$$h(\hat{\pi}_1 \cdot u(w) + (1-\hat{\pi}_1)u(w-d) - \psi + \psi) < w - d(1-\hat{\pi}_1)$$

Take the inverse $u(\cdot)$ on both sides. Note the sign of the inequality is the same because $u'(\cdot) > 0$ everywhere.

$$\hat{\pi}_1 \cdot u(w) + (1-\hat{\pi}_1)u(w-d) < u(w - d(1-\hat{\pi}_1))$$

This inequality always holds by Jensen inequality! \Rightarrow
Market never breaks down under complete info.

Final remark: note that the Jensen's inequality implies that the left-hand side of equation (1) is higher than the ~~right~~^{left}-hand side of equation (2), therefore the fact ~~that~~ that the ~~no~~ no-breakdown condition is always satisfied under complete info ~~then~~ (question 9), does NOT imply that the no-breakdown condition is always satisfied under asymmetric info (question 8).

⇒ Market ~~can~~^{may} break down under asymmetric info.

This Problem set was based on section 4.9.5 of the book, ~~the book~~ which is probably good to read to complement this solution sketch.