Problem set 3–Yancen Dong

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Problem 1:

(a) $E(U_{\text{health insurance}}) = 0\times 0.2 + 100\times 0.75 + 10000\times 0.05$

$= 0 + 75 + 500 = 575$

(b) current is poor, $\alpha = \frac{3}{4}$

$P(poor)\cdot \tilde{U}(c, poor|poor) + P(fair)\cdot \tilde{U}(c, fair|poor) + P(good)\cdot \tilde{U}(c, good|poor)$

$= P(poor)\cdot[(1-\alpha)\cdot U(c|poor) + \alpha\cdot U(c|poor)] + P(fair)\cdot[(1-\alpha)\cdot U(c|fair) + \alpha\cdot U(c|poor)]$

$+ P(good)\cdot[(1-\alpha)\cdot U(c|good) + \alpha\cdot U(c|poor)]$

$= 0.05\times[\frac{1}{4}\cdot 10000 + \frac{3}{4}\cdot 10000] + 0.75[\frac{1}{4}\times 100 + \frac{3}{4}\times 10000] + 0.2\times[\frac{1}{4}\times 0 + \frac{3}{4}\times 10000]$

$= 0.05\times 10000 + 0.75\times 7525 + 1500$

$= 500 + 5643.75 + 1500 = 7643.75$

(c) current is good, $\alpha = \frac{3}{4}$

$P(poor)\cdot \tilde{U}(c, poor|good) + P(fair)\cdot \tilde{U}(c, fair|good) + P(good)\cdot \tilde{U}(c, good|good)$

$= P(poor)\cdot[(1-\alpha)\cdot U(c|poor) + \alpha\cdot U(c|good)] + P(fair)\cdot[(1-\alpha)\cdot U(c|fair) + \alpha\cdot U(c|good)]$

$+ P(good)\cdot[(1-\alpha)\cdot U(c|good) + \alpha\cdot U(c|good)]$

$= 0.05\times(\frac{1}{4}\cdot 10000 + \frac{3}{4}\times 0) + 0.75(\frac{1}{4}\times 100 + \frac{3}{4}\times 0) + 0.2(\frac{1}{4}\times 0 + \frac{3}{4}\times 0)$

$= 125 + 18.75 + 0 = 143.75$

(d) current is fair, pay 500$, $\alpha = ?$

$P(poor)\cdot \tilde{U}(c, poor|fair) + P(fair)\cdot \tilde{U}(c, fair|fair) + P(good)\cdot \tilde{U}(c, good|fair) = 500$

$P(poor)\cdot[(1-\alpha)U(c|poor) + \alpha\cdot U(c|fair)] + P(fair)\cdot[(1-\alpha)\cdot U(c|fair) + \alpha\cdot U(c|fair)]$

$+ P(good)\cdot[(1-\alpha)U(c|good) + \alpha\cdot U(c|fair)] = 500$

$0.05\cdot[(1-\alpha)10000 + \alpha\cdot 100] + 0.75[(1-\alpha)100 + \alpha\cdot 100] + 0.2[(1-\alpha)0 + \alpha\cdot 100] = 500$

$0.05\cdot(10000 - 10000\alpha + 100\alpha) + 0.75\times 100 + 0.2\times 100\alpha = 500$

$500 - 500\alpha + 5\alpha + 75 + 20\alpha = 500$

$75 = 475\alpha$

$\alpha = \frac{3}{19}$