

CEA case

$$[0.4, 0.3, 0.2, 0.1] \quad E = 40 \quad \text{claim} = 100$$

$$\backslash \quad k = 10 \quad \text{so} \quad X_0 = 10 \quad \text{agent} = 0$$

restricted $[0.4, 0.6, 0, 0]$

$$S_1 = 0.6 + 3x(0.3)$$

$$S_2 = 0 + 3 \times 0.2$$

$$S_3 = 0 + 3 \times 0.1 \Rightarrow C = (40, 37.5, 15, 7.5)$$

$$7.5 + 3x = 40 \quad x = 10.83$$

unbounded $S_1 = 4 \times 0.6 = 2.4 \quad S_2 = S_3 = 0 \quad (40, 60, 0, 0)$

$$0 + 2x = 60 \quad x = 20$$

$$[10 \rightarrow 10.83 \rightarrow 20]$$

agent = 1 and agent 2 similar procedure and no change.

$$S_0 = 0.7 + 3x0.4 = 1.9 \quad C_0 = 47.5$$

$$S_2 = 0 + 3 \times 0.2 = 0.6 \quad C_2 = 15$$

$$S_3 = 0 + 3 \times 0.1 = 0.3 \quad C_3 = 7.5$$

$$7.5 < x < 15 \quad 7.5 + 3x = 40 \quad x = 10.83$$

$$S_0 = 0.8 + 3 \times 0.4 = 2 \quad C_0 = 50$$

$$S_1 = 0 + 3 \times 0.3 = 0.9 \quad C_1 = 22.5$$

$$S_3 = 0 + 3 \times 0.1 = 0.3 \quad C_3 = 7.5$$

$$7.5 < x < 15 \quad 7.5 + 3x = 40 \rightarrow x = 10.83$$

$$S_0 = 2.8 \rightarrow C_0 = 70 \quad C_2 = C_3 = 0$$

$$0 + 2x = 40 \quad x = 20$$

$$0 + 2x = 40 \quad x = 20$$

agent 3. $0.4 + 0.3 + 0.2 = 0.9$

$$0.4 + a + b + c = 0$$

$$0.3 - [0.4 + a, 0.3 + b, 0.2 + c, 0.1]$$

$$\left\{ \begin{array}{l} S_0 = 1.6 + a \\ S_1 = 1.2 + b \end{array} \right.$$

$$\left\{ \begin{array}{l} S_2 = 0.8 + c \\ S_3 = 0.4 + d \end{array} \right.$$

$$C_0 = 2g + 25 \times 0.9 = 47.5$$

$$C_1 = 22.5$$

$$C_2 = 15$$

$$\text{Unbounded: } S_0 = 3.6 \quad S_0 = \frac{3.6}{4} = 0.9$$

$$S_1 = S_2 = 0 \Rightarrow$$

$$S_3 = 0.4 \Rightarrow S_3 = 0.4 / 4 = 0.1$$

$$C_0 = 100 \times 0.9 = 90$$

$$C_3 = 100 \times 0.1 = 10$$

$$\min(90, x) + \min(0, x) + \min(0, x) + \min(0, x)$$

$$x \geq 0 \quad x_3 = \min(10, 30) = 10$$

$$\bar{x}_i = \min(40, x) + \min(30, x) + \min(20, x) + \min(10, x) = 3x + 10 \quad x \geq 0$$

No improvement

$$[(0 \rightarrow 10 \rightarrow 10)]$$

CEA $[0.2, 0.3, 0.3, 0.2]$ $E=40$ claim = 100

$$4x = 40 \quad x = 10$$

restricted of agent = 0.

$$a+b+c = 0.8$$

$$C_0 = 25 \times 0.8 = 20$$

$$S_1 = 0.3x_3 + a = 0.9 + a$$

$$c_1 = 25 \times (0.9 + a)$$

$$S_2 = 0.3x_3 + b = 0.9 + b$$

$$c_2 = 25 \times (0.9 + b)$$

$$S_3 = 0.2x_3 + c = 0.6 + c$$

$$c_3 = 25 \times (0.6 + c)$$

$$a = 0.8 \quad b, c = 0 \quad C = (20, 42.5, 22.5, 15)$$

$$If 5 < x < 20 \quad \min(20, x) + \min(42.5, x) + \min(22.5, x) + \min(15, x)$$

$$= 3x + 15 = 40 \quad x = 8.3. \quad \text{not in range.}$$

$$\text{so for } 4x = 40 \quad x = 10 \quad v.$$

$$\therefore x_0 = \min(20, 10) = 10.$$

unrestricted $(0.8, 3.2, 0, 0) \quad \min(20, x) + \min(40, x) = 40.$

$$x = 20 \quad x_0 = \min(20, 20) = 20.$$

for agent 1.

restricted similarly $S_0 = 0.8 + 0.5 = 1.3.$

$$S_1 = 1.2$$

$$S_2 = 0.9$$

$$S_3 = 0.6.$$

since nothing change in other row. $[37.5, 30, 22.5, 15]$

$$x = 10 \quad x_1 = 10.$$

unrestricted $S_0 = 2.8 (70) \quad S_1 = 1.2 (a = 30) \quad S_2 = S_3 = 0.$

$$\min(70, x) + \min(30, x) = 40 \quad x = 20. \quad x_1 = \min(30, 20) = 20$$

(EA extreme $\{0.7, 0.1, 0.1\}$)

$$C = \{0.7, 10, 10, 10\} \quad \text{agent=0.}$$

$$\sum_{j=1}^4 C_j = 10 + 7 = 17. \quad x = 10.$$

$$\text{unbounded} \quad \min(7, x) + \min(3, x) + 0 + 0 = 4x$$

$$20x = 40 \quad x = 20. \quad \text{If } x > 30 \quad 30 < x < 40$$

$$\therefore x_0 = 20 \quad \boxed{10 \rightarrow 10 \rightarrow 20 \dots}$$

agent=1

original=10.

restricted

$$\begin{cases} S_0 = 2.8 - x & x = y + z \\ S_1 = 0.4x = 0.4 & C = (7 - 2.8x, 10, 0.4y, 10 + 2.8z) \\ S_2 = 0.4 + y \\ S_3 = 0.4 + z \end{cases}$$

Let $x=0, y=0$ will be min.

$$\min(7, x) + 3\min(10, x) = 40 \quad x_1 = \min(10, 10) = 10$$

$$\text{If } x > 10, \quad 10 + 3x = 40 \quad x \text{ still } = 10$$

unbounded

$$S_0 = \cancel{0.28} \quad 2.8 + 0.4 = 3.2$$

$$S_1 = 0.4$$

$$S_2 = S_3 = 0.$$

$$C_0 = 2.8 \times 3.2 = 8.9. \quad C_1 = 10 \quad C_2 = 0$$

$$\min(9, x) + \min(10, x) = 40.$$

$$\text{If } x > 10. \quad x + 10 = 40 \quad x > 30$$

$$x_1 = \min(10, 9) = 10. \quad \text{no improvement}$$

$$\boxed{10 \rightarrow 10 \rightarrow 10 \dots}$$

Uniform $[0.15, 0.25, 0.35, 0.45]$

still $4X = 40$ $X=10$

restricted

$$0.25 \leq 0.25 + k \leq 0.35 - k, 0.35 - k < X \leq 0.25 + k$$

$$S_0 = 0.25 \times 4 = 1.0$$

$$S_1 = 0.25 \times 3 = 0.75$$

$$S_2 = 0.25 \times 2 = 0.5$$

$$S_3 = 0.25 \times 1 = 0.25$$

$$C = (2.5, 3.5, 4.75, 6.25)$$

$$x_0 = \min(15, x) \quad x_1 = \min(17.5, x) = 10 \quad x_2 = x = 10$$

$$24 \quad 8.75 \leq X \leq 15, \quad X + 2.5 + 4.75 + 6.25 = 40 \quad X \geq 1.25 \quad X \text{ not in the range}$$

$$25 \quad X \geq 10 \quad X + 10 = 10 \quad X_0 = \min(10, 10) = 10$$

unbounded

$$C = (2.5, 3.5, 0, 0) \quad X < 15 \quad \text{so } X = 20.$$

$$\min(20, 20) \rightarrow X_0 = \min(20, 20) = 20.$$

$$10 \rightarrow 10 \rightarrow 20$$

extreme $C = [0.7, 0.2, 0.05, 0.05]$ agent 1

claim $[7.0, 2.0, 5, 5] \quad 5+5+2k=40 \quad X=15$

$$x_0 = \min(7.0, 15) = 15$$

restricted:

$$\begin{cases} S_1 = 0.6 + 0.1 \\ S_2 = 0.1 + 0.2 \\ S_3 = 0.15 + 0.3 \\ S_4 = 0.05 \end{cases}$$

$$a_1 + a_2 + a_3 + a_4 = 0.3$$

$$a_1 = 0.3 \quad a_2 = a_3 = 0$$

$$C = (7.0, 2.25, 3.75, 3.75)$$

$$2X + 3.75 + 3.75 = 40 \quad X = 16.25$$

$$x_{10} = \min(7.0, 16.25) = 16.25$$

unbounded:

$$C_0 = 7.0$$

$$\min(7.0, X) + \min(30, X) = 40 \quad X = 20$$

$$X_0 = \min(7.0, 20) = 20$$

similar for agent 1.

$$C = (0, 2.0, 5, 0)$$

$$\min(10, X) + \min(50, X) = 40 \quad X = 20$$

$$X_1 = \min(10, 20) = 20$$

$$[15 \rightarrow 16.25 \rightarrow 20]$$

for agent 2.

$$X = 15 \quad \min(X_2 = \min(5, 15)) = 5$$

restricted:

$$\begin{cases} S_0 = 4 \times 0.7 + 0.5 = 4.05 \\ S_1 = 0.2 \times 3 + 0.2 = 0.8 \\ S_2 = 0.05 \times 4 = 0.2 \\ S_3 = 0.05 \times 3 = 0.15 \end{cases}$$

$$C = (6.25, 15, 5, 2.75)$$

$$X + X + 5 + 3.75 = 40$$

$$2X = 40 - 8.75$$

$$X = 15.625$$

$$X_2 = \min(5, 15.625) = 5$$

unbounded:

$$C = (0.55, 0, 5, 0)$$

$$\min(9.5, X) + \min(50, X) = 40$$

$$X = 35$$

$$X_2 = \min(5, 35) = 5$$

$$[5 \rightarrow 35 \rightarrow 5]$$