state
$$\rightarrow s_1 s_2 s_3$$

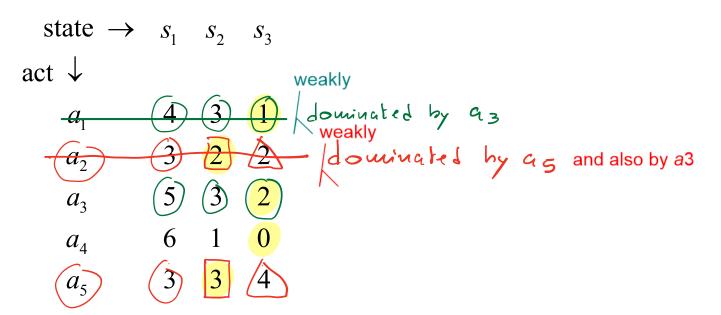
act \downarrow
 $act \downarrow$
 $a_1 4 3 1$
 $a_2 6 2 2$
 $a_3 5 3 2$
 $a_4 6 1 0$
 $a_5 3 2 5$
Dominance:
 a_3 weakly dominates a_1
 a_7 a_1 is weakly dominated by a_3
 a_2 weakly dominated by a_3
 a_2 weakly dominated by a_3
 a_4 is weakly dominated by a_2

So we can simplify

state
$$\rightarrow s_1 \quad s_2 \quad s_3$$

act \downarrow
 $a_2 \quad 6 \quad 2 \quad 2$
 $a_3 \quad 5 \quad 3 \quad 2$
 $a_5 \quad 3 \quad 2 \quad 5$
What then?
Maxi Min = $\{a_2, a_3, a_5\}$
two-step Lexi Min = $\{a_3, a_5\}$
two-step " = $\{a_3, a_5\}$

First a different example:

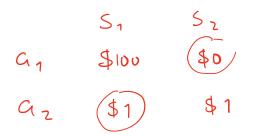


One criterion that can be used is the **MaxiMin** criterion.

$$S_1 S_2 S_3$$

 $a_3 5 3 (2)$
 $a_4 (2) 1 (0)$
 $a_5 3 (3) 4$

MaxiMin =
6
 5



\$1 $MaxiMin = \{a_2\}$

A refinement is the **LexiMin**

state $\rightarrow s_1 \quad s_2 \quad s_3$ act \downarrow $a_2 \quad 6 \quad 2 \quad 2$ $a_3 \quad 5 \quad 3 \quad 2$ $a_5 \quad 3 \quad 2 \quad 5$

Here the LexiMin picks

One more example:

state \rightarrow	<i>S</i> ₁	<i>S</i> ₂	<i>S</i> ₃	<i>S</i> ₄	
act \downarrow					MaxiMin =
a_1	2	3	1	5	
a_2	6	2	2	3	
a_3	5	3	2	4	LexiMin =
a_4	6	1	0	7	
a_5	3	2	5	1	

$$Max_1 Min = \{a_2, a_3, a_5\}$$

 $Oue-step leximin = \{a_3, a_5\}$
 $Two-step i = \{a_3, a_5\}$

Special case: outcomes are sums of money

state \rightarrow	<i>S</i> ₁	S_2	S ₃	S_4
act ↓	-3	<u> </u> 6	5/2	12
a_1	\$12	\$30	\$0	\$18
$\rightarrow a_2$	\$36	\$6	\$24	\$12
a_3	\$6	\$42	\$12	\$0

Suppose that we are able to assign probabilities to the states:

state
$$\rightarrow s_1 \quad s_2 \quad s_3 \quad s_4$$

 $\frac{1}{3} \quad \frac{1}{6} \quad \frac{5}{12} \quad \frac{1}{12}$
 $a_1 \text{ is the lottery } \begin{pmatrix} \$(2 \quad \$30 \quad \$0 \quad \$| \$) \\ \frac{1}{3} \quad \frac{1}{6} \quad \frac{5}{12} \quad \frac{1}{12} \end{pmatrix} \quad E[a_1] = \frac{1}{3} (2 + \frac{1}{6} 30 + \frac{5}{10} 0 + \frac{1}{12}) \$$
 $a_2 \text{ is the lottery } = 10.5$
 $a_3 \text{ is the lottery } \begin{pmatrix} \$36 \quad \$6 \quad \$24 \quad \$12 \\ \frac{1}{3} \quad \frac{1}{6} \quad \frac{5}{12} \quad \frac{1}{12} \end{pmatrix} \quad E[a_2] = 24$
The expected values are: $\begin{pmatrix} \$6 \quad \$42 \quad \$12 \\ \frac{1}{3} \quad \frac{1}{6} \quad \frac{5}{12} \quad \frac{1}{12} \end{pmatrix} \quad E[a_3] = 14$

Money lottery
$$\begin{pmatrix} \$x_1 & \$x_2 & \dots & \$x_n \\ P_1 & P_2 & \dots & P_n \end{pmatrix}$$

The expected value of L,
 $E[L] = P_1 \times 1 + P_2 \times 2 + \dots + P_n \times n$
if choice is between $L = \begin{pmatrix} \$0 & \$120 \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$
"\$60 For mino" or L $E[L] = \frac{1}{2} 0 + \frac{1}{2} 120 =$
 $\begin{pmatrix} \$60 \\ 1 \end{pmatrix}$ $\begin{pmatrix} 1 \\ \dots \\ 1$

Definition of attitude to risk

Given a money lottery L, imagine giving the individual a choice between L and the expected value of L for sure, that is, the choice

between
$$\binom{\mathbb{E}[L]}{1}$$
 and L or, written more simply, between $\mathbb{E}[L]$ and L

- If she says that preference $\mathbb{E}[L] \succ L$ we say that she is risk *Coverse* relative to L • $\mathbb{E}[L] \sim L$ we say that she is risk $N \in \mathcal{V}$ relative to L
- $L \succ \mathbb{E}[L]$ we say that she is risk *loving* relative to L

So in the above example, if we assume that the agent is risk neutral relative to every lottery and her preferences are transitive, then, since

 $\mathbb{E}[a_1] = 10.5$ $\mathbb{E}[a_2] = 24$ $\mathbb{E}[a_3] = 14$

Can we infer risk attitudes from choices?

Let
$$L = \begin{pmatrix} \$40 & \$60 \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$$
 Then $\mathbb{E}[L] = \frac{1}{2} \cdot 40 + \frac{1}{2} 60 = 50$

Suppose Ann's preferences are transitive, she prefers more money to less and she says that she prefers \$49 to L. She is indifferent between \$49 and L \$50 > \$49 > L by transitivity \$50 > L Ann is risk averse

Suppose Bob's preferences are transitive, he prefers more money to less and he says that he prefers 51 to *L*.

Could Bob be risk neutral?

$$51 \neq 50 \sim L \implies 51 \times L$$

Could be be risk averse?
 $51 \times 50 \times L \implies 51 \times L$ Yes

Could be be risk loving? Lasso 51 > 50.50 y L Yes Lass Lass Lass Si