

MAS COLLEGE CHAPT 23

## MECHANISM DESIGN

PROBLEM INDIVIDUAL PREFERENCES MUST BE  
AGGREGATED FOR A SOCIAL DECISION (COLLECTIVE)  
AND PEOPLE MAY NOT REVEAL THEIR TRUE  
PREFERENCES

SO IT IS IMPORTANT TO STRUCTURE  
INSTITUTIONAL MECHANISMS SUCH THAT  
INDIVIDUALS WILL REVEAL THEIR TRUE PREF.

THIS IS THE MD PROBLEM

DIRECT MECHANISM

INDIRECT ↗

MODEL

I AGENTS  $i \in I$   $i = 1, \dots, I$

THEY HAVE TO MAKE A COLLECTIVE DECISION

ON THE SET  $X$ . THEY HAVE TO CHOOSE  $x \in X$   
↓  
ALTERNATIVES

EACH AGENT HAS PREFERENCES OVER  $X$ , ARE MADE AFTER HAVING OBSERVED THEIR TYPE  $\theta_1, \dots, \theta_I$

$\theta_i \in \Theta_i$  TYPE SPACE HARSANY

$U_i(x, \theta_i) \rightarrow v_i(\theta_i)$  OVER  $X$   
↑ ALTERNATIVE (DENSITY)

TYPES ARE DRAWN FROM A PROB. DISTR.

$\phi(\theta)$  WHERE  $\theta = (\theta_1, \dots, \theta_I)$ . SINCE PLAYER'S

PREFERENCES MAY DEPEND ON  $\theta_i$  THE SOCIAL DECISION  
MAY DEPEND ON  $\theta$

# DEFINITION 1 (SOCIAL CHOICE FUNCTION)

SCF

A SCF  $f: \underbrace{\theta_1 \times \theta_2 \times \dots \times \theta_I}_{\text{PRODUCT TYPE SPACE}} \rightarrow X$

So  $f(\theta) = x \Rightarrow$  THE ALTERNATIVE  $x \in X$  HAS BEEN IMPLEMENTED BY SCF  $f$ , WHEN THE AGENTS TYPES

ARE  $\theta = (\theta_1, \dots, \theta_I) \quad \forall \theta \in \Theta$  (PARTIAL)

DEFINITION 2 A SCF  $f: \Theta \rightarrow X$  IS EX-PAST

EFFICIENT IF FOR NO PROFILE  $\theta$ ,  $\exists x \in X$  SUCH THAT

$\forall i \in I, U_i(x, \theta_i) \geq U_i(f(\theta), \theta_i)$  AND  $U_i(x, \theta_i) > U_i(f(\theta), \theta_i)$

FOR SOME  $i$ .

PROBLEM HOW TO IMPLEMENT PARETO EFF.

SCF? BECAUSE THE IMPLEMENTATION REQUIRES

AGENTS TO REVEAL THEIR PREF, BUT SOMETIMES THEY MAY WANT TO LIE

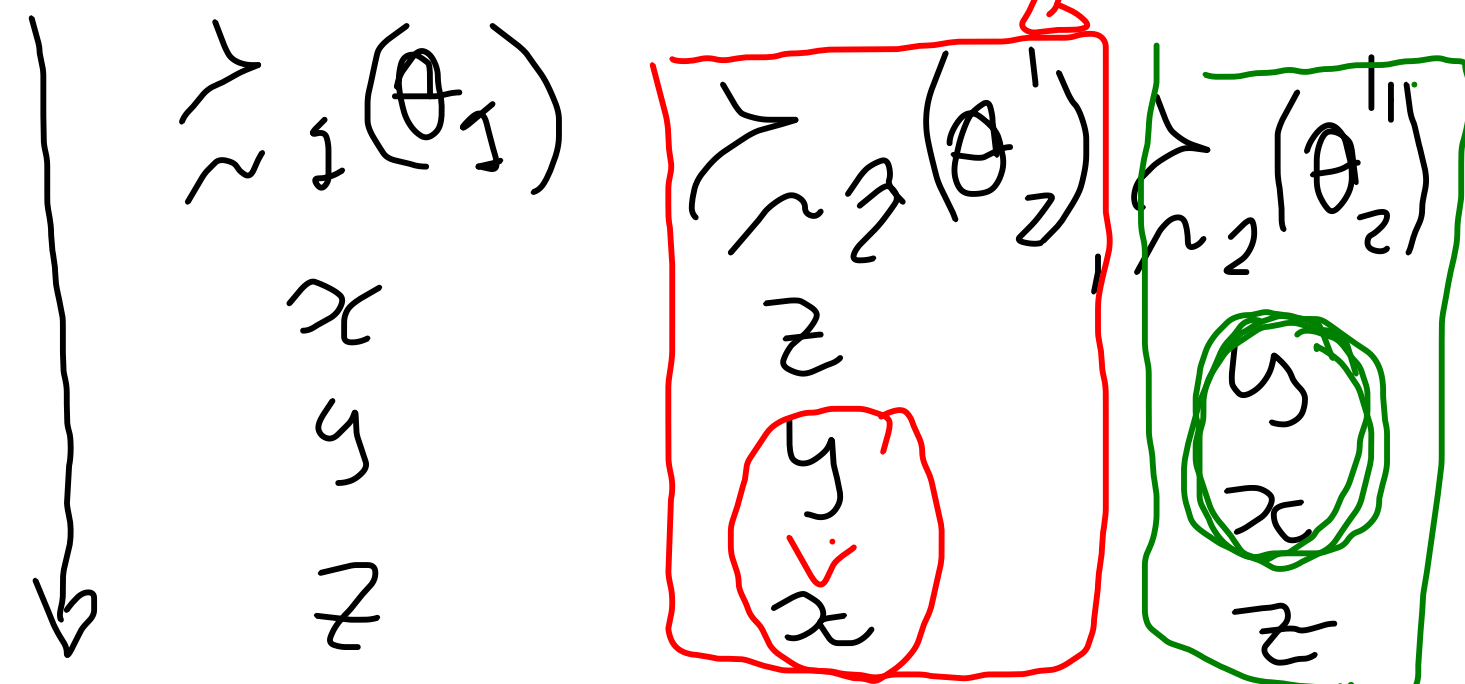
EX  $X = \{x, y, z\}$

2 INDIVIDUALS

AGENT 1  $\Theta_1 = \{\theta_1\}$

AGENT 2  $\Theta_2 = \{\theta_2', \theta_2''\}$

RANKING



SUPPOSE WE WANT TO IMPLEMENT SCF

$f(\theta_1, \theta_2) = y$   
 $f(\theta_1, \theta_2'') = x$