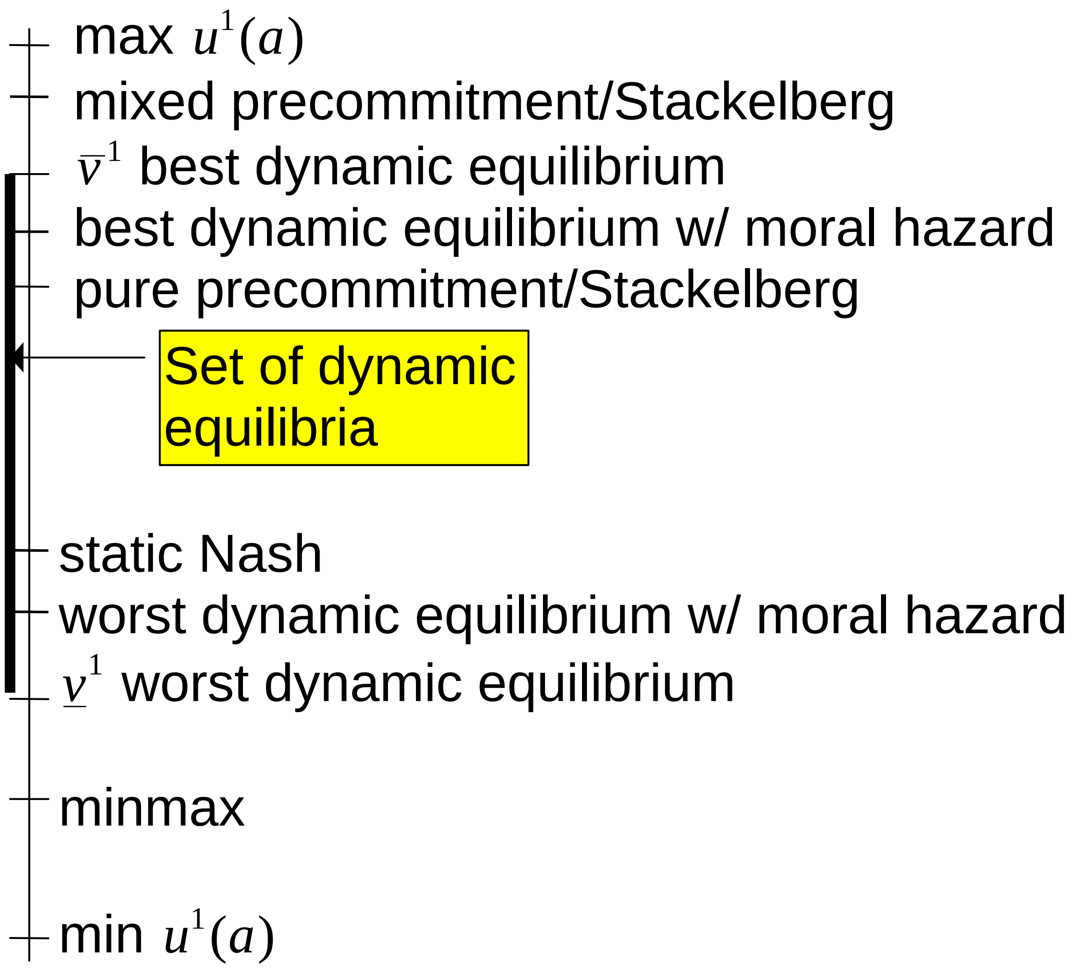
The Folk Theorem

Review of Long Run vs. Short run



- structure of an equilibrium
- role of reputation (can do strictly better when there is moral hazard)

Simple Folk Theorems

- socially feasible
- individually rational

Statement of Folk Theorem

Prisoner's Dilemma Game

	R	L
U	2,2	0,3
D	3,0	1,1

- Nash with time averaging
- perfect Nash threats with discounting

public randomization vs. discount factors near one

$$v_t = (1-\delta)u_t + \delta v_{t+1}$$
$$v_{t+1} = \delta^{-1}v_t - (1-\delta)\delta^{-1}u_t$$

note that coefficient add up to one

Fudenberg Maskin Theorem

issue: perfection and minmaxing

minmax followed by reversion to another equilibrium
note simultaneous determination of equilibria

Matching and Information Systems (Kandori)

$u^i(a)$

I a finite set of information states
$\eta : A \times I^2 \to I$ an information system
if at t you and your opponent played a_t and had states η_t^i, η_t^{-i}, then your next state is
$\eta_{t+1}^i = \eta(a_t, \eta_t^i, \eta_t^{-i})$

players randomly matched in a population
observe their current opponents current state

Ellison: even without information states could have cooperation due to contagion effects

But contagion effects diminish as population size grows

Folk Theorem for information systems: socially feasible individually rational payoff – exists an information system that supports it

Example

Prisoner's dilemma

	C	D
C	x, x	$0, x+1$
D	$x+1, 0$	1,1

$$I = \{r, g\}$$

$$\eta(a^i, \eta^{-i}) = \begin{cases} G & (a^i, \eta^{-i}) = C, G \\ R & (a^i, \eta^{-i}) = C, R \\ R & (a^i, \eta^{-i}) = D, G \\ G & (a^i, \eta^{-i}) = D, R \end{cases}$$

"green team strategy"
defect on red
cooperate on green

$V(g) = x$

$V(r) = \delta x$

C $(1-\delta)x + \delta V(g) = x$

D $(1-\delta)(x+1) + \delta V(r) = (1-\delta)(x+1) + \delta^2 x =$
$(1-\delta) + (1-\delta+\delta^2)x$

$x \geq (1-\delta) + (1-\delta+\delta^2)x$

So $\delta(1-\delta)x \geq (1-\delta)$

$\delta \geq 1/x$

Remark: this method works also with finitely-lived individuals, although naturally towards the end of their life, you may not be able to punish them very much