The Repeated Prisoner's Dilemma

recall the prisoner's dilemma game

	Player 2	
Player 1	don't confess	confess
don't confess	32,32	28,35
confess	35,28	30,30

- This is a simultaneous move game with a unique Nash equilibrium, and a unique strictly dominant strategy solution at 30, 30.
- The unique non-cooperative solution is Pareto dominated by 32, 32
- with repeated play, incentive are changed by the possibility of punishments and rewards in the future.

Intertemporal Preference

$u_i(t)$ is the utility or payoff received by player *i* in period *t*

the game is repeated indefinitely and that intertemporal preferences are given by average present value

$$U_i = (1-\delta)\sum_{t=1}^{\infty}\delta^{t-1}u_i(t)$$

where the common discount factor δ is between 0 and 1.

- a basic feature of repeated games: regardless of the discount factors, the repeated static equilibrium is a subgame perfect equilibrium of the repeated game

Grim Strategies

the *grim strategy* in the repeated game is

- cooperate in the first period
- cooperate in subsequent periods as long as all players have cooperated in every previous period
- cheat in any period in which some player has cheated in any previous period

suppose the other player plays the grim strategy

- payoff to cheating

  $(1-\delta)\left(35+30\delta+30\delta^2\ldots\right)$

  $=(1-\delta)35+30\delta=35-5\delta$

- payoff to cooperating

  32

- optimal to cooperate if

  $32 \geq 35-5\delta$ or

  $\delta \geq 3/5$

- if $\delta \geq 3/5$ both players playing the grim strategy is a subgame perfect equilibrium

why subgame perfect?