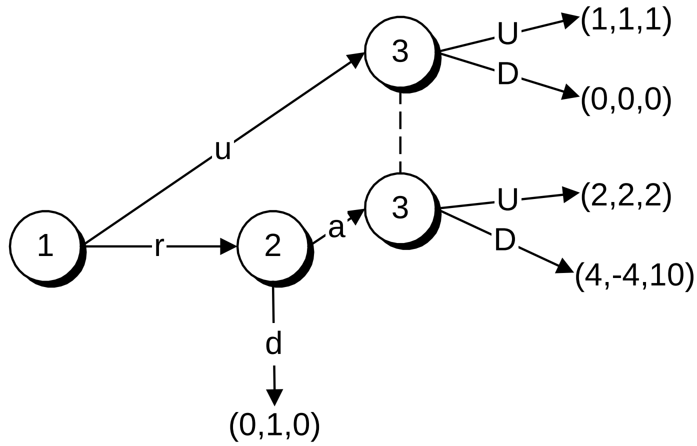
First Year Behavioral Game Theory Problem Set

Rushing for the Exits

The Chairman of the FRB appears on national television in the US to announce with a tear in his eye that the economy is in a state of collapse. The stock market falls into emotional pandemonium with traders running about like headless chickens yelling “Sell! Sell! Sell!” and the prices of stocks drop by over 30% in the next hour before trading is halted. Is this inconsistent with rational behavior by traders? Who benefits and who is harmed by halting trading? The following day the Chairman again appears on television this time with a smile on his face and announces that it was all a mistake – a decimal point had been entered incorrectly in a spreadsheet in which bank reserves had been computed. Stock prices quickly rebound but still remain 10% below their former level. Is this evidence of irrationality?

Notions of Equilibrium

In the following extensive form game.



consider the strategy profile (u, d, U).

a. Is this a Nash equilibrium?

b. Is this a sequential equilibrium?

Next consider the strategy profile (u, a, U).

c. Is this a Nash equilibrium?

d. Is this a self-confirming equilibrium?

e. Does any player use a weakly dominated strategy?

f. If player 1 knows the payoffs of all players and believes that they are rational and have beliefs consistent with their observations of (u, a, U) what should she do?

Long Run Versus Short Run

2. Consider the simultaneous move game

	Player 2		
Player 1		**Out**	**In**
	+1	0,0	1,1
	-1	0,0	2,-1

a. What are all the Nash equilibria of this game?

b. What is the Stackelberg equilibrium in which Player 1 moves first?

Now suppose that the game is infinitely repeated between a long-run player 1 with discount factor δ and a sequence of completely impatient player 2's. Consider for any strategies of the players (in the repeated game) an auxiliary process with two states called "R" (for reward) and "P" (for punishment). This process is driven by a public randomization device observed by all players, so at the beginning of each period all players observe the current state. The initial state is R. If the state is R and player 1 plays +1 then with probability $1-\varepsilon$ the next state is again R and with probability ε is P. If player 1 plays –1 then the next state is P for certain. If the state is P then the next state is R with probability ϕ (for "forgiveness") and P with probability $1-\phi$. Consider the following strategies by the players. The short-run players play Out in state P and In in state R. The long-run player plays +1 in state R and –1 in state P.

c. Given the long-run player strategy, are the short-run players playing optimally?

d. Given the short-run player strategies, formulate the optimization problem of the long-run player as a finite state dynamic programming problem and determine for which values of $\varepsilon, \phi, \delta$ the proposed long-run player strategy is optimal.

e. In light of your answer to (d) what can you say about forgiveness?

f. What does the set of all perfect public equilibrium look like as a function of the discount factor?