Problem Set 4: Dynamic and Uncertain Games

November 20, 1997 © David K. Levine

1. Long Run versus Short Run

Consider a "chain store" game in which a short-run entrant must decide whether or not to enter the market. If no entry occurs the long-run incumbent monopolist gets 2 and the entrant nothing. If entry occurs, the incumbent must choose between fighting and cooperating. If he fights, both firms get –1. If he cooperates the firms split the market, each getting 1. Suppose that the game is repeated between a infinitely-lived incumbent with discount factor equal to δ and a sequence of short-lived entrants. What is the extensive and normal form of the stage game? What is subgame perfect in the stage game? What other Nash equilibria are there in the normal form? What is wrong with the Nash equilibrium that is not subgame perfect? Why is enter/cooperate subgame perfect equilibrium of the repeated game? For what value of δ is it a subgame perfect equilibrium for the incumbent to fight as long as he has fought in the past, for entrants not to enter as long as the incumbent has always fought, and for enter/cooperate to occur after an incumbent has cooperated at least once?

2. Bayes Law

A married woman is found dead. Suppose that 80% of married women who are murdered are murdered by their husbands. Suppose, in addition, that evidence is found on the scene that would have an 80% chance of being found if the husband did it, but only a 15% chance of being found if he did not. How probable is it that this woman was murdered by her husband? What if there is only a 5% chance of the evidence being found if the husband is innocent?

3. Mixed Strategy Equilibrium

In each of the following games, find all of the pure strategy Nash equilibria, determine whether or not there is a mixed strategy Nash equilibrium, and if so, what it is.

a)

	L	R
U	1,1	-1,100
D	100,-1	0,0

b)

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

c)

	L	R
U	4,2	3,5
D	2,4	4,2