Problem Set 2

Due September 24th by 3pm

Please program using the full-solution methods

1. For this problem use `dataassign21.mat` which has data on the choices (the Y's) and data on regressors that do not vary over time (the X_1's) and data on regressors that do vary over time (the X_{1t}'s). Both sets of X's are individual-level characteristics so the coefficients on these variables need to vary by choice. There is a cost to switching actions in the future that is common across all switches. The choice in period 0 is given by LY. Once an individual chooses option 0 then that individual makes no further choices (you can verify this as if $Y_{it} = 0$ then $Y_{it+1} = 0$). The columns of Y and X_{1t} indicate observations over time, ten periods in all (so in period 10 it is a static problem). The only uncertainty from the individual's perspective is on their error term. The error structure is Type 1 extreme value

   (a) Estimate the dynamic discrete choice model including the discount factor.

   (b) What variation in the data allows the discount factor to be identified?

   (c) What variation in the data allows the switching cost to be identified?

2. For this problem use `datassign22.mat` which is constructed the same way as in problem 1. Now, however, individuals only have expectations on the future values of X_{1t}. Given X_{1t} and Y_t, X_{1t+1} is given by:

$$X_{1t+1} = \alpha_0 + \alpha_1 X_{1t} + \alpha_2(Y_t == 2) + \alpha_3(Y_t == 3) + \alpha_4(Y_t == 4) + \epsilon_{t+1}$$

   for $Y_t > 0$ where ϵ_{t+1} is distributed $N(0, \sigma)$ and is unknown to the individual until time $t+1$.

   (a) Estimate the transition parameters, the α's.

   (b) Estimate the dynamic discrete choice model including the discount factor.

   (c) What variation in the data allows the discount factor to be identified?

   Note: only use observations on X_{t+1} and Y_{t+1} for which $Y_t > 0$ when estimating both the transition process for X_{t+1} and the dynamic discrete choice problem.

3. For this problem use `dataassign23.mat`. The variable mt gives move opportunity times, with $Naturemove$ indicating that nature moved (1) or that the individual moved (0). When

nature moves, the state of the market changes from either 0 to 1 or from 1 to 0. *State* gives the current value of the market state. *IState* gives whether the player is currently in the market. If the player leaves the market (or chooses not to enter when given the chance) then the player is replaced by a new one (exiting is permanent). The flow payoff of being in the market depends on the state. There is no instantaneous cost to player decisions (besides the errors) when the player is an incumbent. When the player is not an incumbent, the player must pay a cost c to enter the market. The instantaneous errors are distributed Type 1 extreme value. ρ, the discount rate, is .05 and the time covered by the data goes from 0 to 10000. At time 0 there is no incumbent.

(a) Estimate the move arrival process for nature and for the player.

(b) Estimate the flow payoffs as well as the instantaneous cost of entry.