Behavioral Economics - Fall 2017

Mark Dean

Homework 1

Due Weds 15th November

Question 1 Consider the data generated by the Sparsity model of Gabaix. Is it consistent with rational inattention (i.e. the NIAS and NIAC conditions?)

Question 2 Download the CSV file Data_for_HW_1.csv from the website (ask me if you would prefer the data in another format). This data contains the records from an experiment in which subjects each faced 50 repetitions of each of 4 questions. In each case there were four equally likely states (labeled 1, 2, 5 and 6), and the subject had to choose between two actions. The collection of acts used across the 4 questions is summarized in the following table

Action	Payoff in State 1	Payoff in State 2	Payoff in State 3	Payoff in State 4
10	1	0	10	0
11	0	1	0	10
12	10	0	1	0
13	0	10	0	1
14	1	0	1	0
15	0	1	0	1
16	10	0	10	0
17	0	10	0	10

And the following table summarizes the acts available in each question

Question ID	Act 1	Act 2
8	10	11
9	12	13
10	14	15
11	16	17

In the data file each line represents a single trial (i.e. a single repetition of a question asked to a particular subject). User ID the identifier of the subject, question ID is the question number, chosen action is the id number of the chosen action and state is the id of the state on that trial

1. Assume that the payoffs are in utility units. Derive necessary and sufficient conditions for behavior in this experiment to be consistent with rational inattention with any arbitrary cost function. Perform these tests using the aggregate data from the experiment. Describe what type of satistical tests you have used.
2. Repeat the above exercise for the rational inattention model with Shannon costs
3. Are the above tests valid it the payoffs are in monetary units, not utility units? What about if there is heterogeneity in costs across different individuals?

Question 3 Consider the following model of a parent trying to decide whether or not to seek care for their child. There are two possible states of the world - either the child is ill (I) or it is healthy (H). The prior probability of state I is μ_I. The parent must decide at the end of the day between two actions: either to take their child to the doctor (d) or not (n). The utilities of given state/action pairs are given by

$$\begin{aligned} u(d, I) &= -c_I \\ u(d, H) &= -c_H \\ u(n, I) &= -s \\ u(n, h) &= 0 \end{aligned}$$

c_I is the cost of receiving treatment if the child is ill. c_H is the cost of consulting the doctor if the child is healthy. s is the sickness cost of an untreated child. Assume that $c_I < s$ and $c_H > 0$, so a fully informed parent would rather take a sick child to the doctor, but not take a healthy child. However, we will assume that parents face information costs which may prevent them from ascertaining the true state of the child before deciding whether or not to going to the doctor. We wish to consider the effect of a subsidy to the cost of healthcare which will reduce the cost of healthcare to $\bar{c}_I < c_I$ and $\bar{c}_H < c_H$.

1. If we are not prepared to make any assumptions about the cost of information, what predictions can we make about the state dependent stochastic choice data before and after the subsidy (i.e. apply the NIAC and NIAS conditions to this problem).

2. What further can we say if we are prepared to assume that costs are based on Shannon mutual information? First, figure out what state dependant stochastic choice data looks like as a function of the primitives of the problem (note, there will be three distinct regions of the parameter space defined by which of the two actions the parent uses with positive probability).

3. In the case of the Shannon model what are the possible effects of providing information of the following form: a healthworker comes round and determines whether the child looks ill (in which case the prior probability of illness gets updated to μ_I^1), or that it does not (in which case the prior probability of illness becomes μ_I^2) with $\mu_I^1 > \mu_I > \mu_I^2$. The parent then chooses how much information to gather based on their new prior.