Behavioral Economics - Autumn 2019

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Homework 1

Due Monday 11th November

Question 1 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.

Question 2 Consider a set of N firms, each of which produces a product x_n. The firms face a consumer who behaves in line with the Manzini and Mariotti [2014] model of stochastic consideration sets. They will buy at most one of the products using the following procedure: each product has a probability $\gamma(x_n)$ of being in the consideration set, and the consumer will purchase the best alternative in the consideration set according to their preferences, which, for simplicity, we will assume are $x_1 \succ x_2 \succ ... \succ x_N \succ d$, where d is the default alternative that appears in each consideration set.

1. Assume that each product has the same probability of being considered, so $\gamma(x_n) = \bar{\gamma}\ \forall\ n$. Calculate the probability that each good will be chosen

2. Assume that each firm receives a fixed price p if their good is chosen. Assume also that they can now pay to advertise which changes their probability of being in the consideration set. If firm n chooses advertising level a_n then the probability of being considered is $a_n^{\frac{1}{2}}$. The cost of an amount a of advertising is a. Find the optimal level of advertising form the producer of x_1, and show this is independent of the strategy of any other firm

3. Using this insight, solve for the (Nash) equilibrium level of advertising for each firm and the associated probabilities that each good will be chosen (assume the problem is parameterized so firm x_1 has an interior optimum). Do producers of higher ranked goods spend more or less on advertising than those of lower ranked goods?

4. Is the answer to the last part of question 3 specific to the functional form we have

assumed for the 'production function' of advertising, or it would it hold for any concave function?

5. Compare the situation in section 3 to that in section 1, where $\bar{\gamma}$ is set so that the average probability of being considered in each case is the same. Is it possible to make welfare statements about which situation makes the consumer better off?

Question 3 [A mini research project - you can work in groups for this question if you like] In class we spent some time thinking about the consideration set model of Masatlioglou et al [2012]. The identifying assumption in that model was that if x was not in the consideration set in some choice set then its removal would not affect the consideration set. As we said, there are some good things and bad things about this assumption. Come up with an alternative assumption on how consideration sets work and get as far as you can in axiomatizing the resulting model. Generally, you will be able to make progress if you (a) identify what behavior means that an alternative was in the consideration set in some choice set A, (b) use this to derive revealed preference information and (c) write an axiom that either explicitly or implicitly guarantees that this revealed preference information is well behaved. Use your results to sketch out an experiment that would allow you to differentiate between your model and that of Masatlioglou et al.