Problems for the fourth seminar

ECON4260 Behavioral Economics — Fall semester 2014

Solutions to the problems will be presented Tue 14 and Wed 15 Oct 2014.

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Problem 1

Consider three types: standard exponential discounters, naive hyperbolic discounters, and sophisticated hyperbolic discounters. For each of the statements below, for which of these types is the statement true? No explanations required.

(a) Plans made in period $t$ correspond to the future behavior that they desire in period $t$.

(b) They never deviate from their plans.

Problem 2 (Adapted from a problem due to Ted O’Donoghue.)

Suppose that a person will live for 3 periods. The person earns labor income $Y_1$ in period 1, $Y_2$ in period 2, and $Y_3$ in period 3. Assume throughout this problem that $\sum_{t=1}^{3} Y_t = $1200. The person must allocate this income across consumption in periods 1, 2, and 3, which we denote by $c_1$, $c_2$, and $c_3$. Suppose she has $(\beta, \delta)$-intertemporal preferences, with (for simplicity) $\delta = 1$. Suppose further that the person’s instantaneous utility function is $u(c) = \ln c$. Finally, assume that the market interest rate at which the person can borrow or save is $r = 0\%$.

(a) Suppose $\beta = 1$. Solve for $c_1$, $c_2$, and $c_3$.

(b) Suppose $\beta = \frac{1}{2}$, and assume that the person is completely sophisticated. Solve for $c_1$, $c_2$, and $c_3$.

(c) Suppose $\beta = \frac{1}{2}$, and assume that the person is completely naïve. Solve for $c_1$, $c_2$, and $c_3$. 
(d) Who saves more in period 1, sophisticates or naifs?

Now let’s introduce an illiquid asset. Specifically, if in period 1 the person invest $z$ in this asset, then in period 3 the person receives $z(1+\hat{r})^2$ (and cannot touch these funds in period 2). Suppose further that the person cannot borrow. Assume $\beta = \frac{1}{2}$ and (for simplicity) $\hat{r} = r = 0\%$. Finally, assume that naifs do not use the illiquid asset when indifferent.

(e) Suppose $Y_1 = $1200 and $Y_2 = Y_3 = 0$. How will sophisticates behave? How will naifs behave?

(f) Suppose $Y_1 = $780 and $Y_2 = $420 and $Y_3 = 0$. How will sophisticates behave?

[For parts (e) and (f), describe (i) the period-1 asset decisions and (ii) the realized consumption path.]

**Problem 3**

Thaler and Sherfin introduce a model where a planner can control the doer only at a cost. Consider the following formal description of this idea, based on Fudenberg and Levine (2006): The doers have immediate utility

$$u_t(c_t) = \ln(c_t)$$

The doer at time $t$ will choose as high consumption as possible, denote the maximum feasible consumption $\bar{c}_t$. The planner can overrule this choice and induce the doer to choose $c_t \neq \bar{c}_t$ but only at a cost proportional to the utility loss to the doer.

$$C(c_t) = \gamma [\ln(\bar{c}_t) - \ln(c_t)]$$

The planner is maximizing discounted utility with discount factor equal to one.

$$U(c_1, c_2, \ldots c_T) = \sum_{t=1}^{T} \left[\ln(c_t) - \gamma \left[\ln(\bar{c}_t) - \ln(c_t)\right]\right]$$

$$= \sum_{t=1}^{T} \left[(1 + \gamma) \ln(c_t) - \gamma \ln(\bar{c}_t)\right]$$
In the following let $\gamma = 0.5$.

Consider first the allocation of consumption over 3 periods. Assume that the person earn a fixed income $y_t = 10$ in all periods. The person can save but not borrow. In addition to this income, the person has to choose between two alternatives. A) An additional income of 1 in period 1 or B) and additional income of 1.5 in period 2.

(a) Suppose first that option B) was given to the person without choice. What would be the optimal consumption plan? What consumption plan will the planner choose, taking the cost of self control into account?

(b) Similarly, if A) is given without choice, what consumption stream will the planner choose?

(c) Which of the two option would the doer in period 1 prefer? Given the choices available at time 1, show that $\bar{c}_1 = 11$. What is the self control cost of choosing option B)? Will the planner instruct the doer to choose A or B?

Now consider the choice between C) An additional income of 1 in period 2 or D) and additional income of 1.5 in period 3. The choice has to be made in period 1.

(d) Which of the two options will the doer in period 1 prefer? What option will the planner choose, taking the cost of self-control into account.