Problem Set Vincent (2)

[Due in class on Thursday, March 30th.]

Question 1

Suppose we observe a person making the following pattern of choices:

$$\begin{aligned} \$45 \text{ Now} &\prec \$60 \text{ in 15 Days} \\ \$46 \text{ Now} &\prec \$60 \text{ in 15 Days} \\ \$47 \text{ Now} &\succ \$60 \text{ in 15 Days} \\ \$48 \text{ Now} &\succ \$60 \text{ in 15 Days} \end{aligned}$$

Under the "usual assumptions" (see Topic 3c), what can we infer about the person's $D(15 \text{ days})$? What can we infer about the person's average yearly discount rate applied to a 15-day delay?

Question 2

Suppose we observe that a person has the following indifference points:

$$\begin{aligned} \$235 \text{ Now} &\sim \$270 \text{ in 1 Year} \\ \$245 \text{ in 1 Year} &\sim \$270 \text{ in 2 Years} \\ \$250 \text{ in 2 Years} &\sim \$270 \text{ in 3 Years} \end{aligned}$$

(a) Under the "usual assumptions" (see Topic 3c), what can we infer about the person's $D(1 \text{ Year})$, $D(2 \text{ Years})$, $D(3 \text{ Years})$? Discuss whether, under the "usual assumptions", this data consistent with exponential discounting, hyperbolic discounting, and present bias.

(b) Instead of assuming that "utility" is linear in the amount, let's assume that the person evaluates gains according to a value function $v(x) = x^{0.8}$. Under this alternative, what can we infer about the person's $D(1 \text{ Year})$, $D(2 \text{ Years})$, $D(3 \text{ Years})$? Discuss whether, under this alternative, this data consistent with exponential discounting, hyperbolic discounting, and present bias.

(c) If a person actually values money according to a concave value function, but we incorrectly assume that her utility is linear in the amount, will we over-estimate or under-estimate how patient the person is?

Question 3:

This question asks you to reconsider the "doing-it-once" environment that we studied in class (Example 1 and Example 2 from Topic 3d), except that we now consider costs and rewards that do not rise monotonically. For both parts, suppose that you value rewards and costs linearly, and that you have β, δ preferences with $\beta = 1/2$ and $\delta = 1$.

(a) Suppose there is an onerous task that you must complete on one of the next 6 days. If you complete the task on day t, the cost is c_t, where $(c_1, c_2, c_3, c_4, c_5, c_6) = (14, 22, 36, 28, 30, 64)$. There is no reward.

(i) When is the best time to complete the task (given long-run preferences)?

(ii) When do naifs complete the task? When do sophisticates complete the task?

(iii) Discuss how the outcomes here compare to the outcomes in Example 1.

(b) Suppose there is a pleasurable task that you get to complete on one of the next 6 days. If you complete the task on day t, the reward is v_t, where $(v_1, v_2, v_3, v_4, v_5, v_6) = (14, 18, 30, 40, 26, 38)$. There is no cost.

(i) When is the best time to complete the task (given long-run preferences)?

(ii) When do naifs complete the task? When do sophisticates complete the task?

(iii) Discuss how the outcomes here compare to the outcomes in Example 2.

Question 4

This question also asks you to reconsider the "doing-it-once" environment, except that we now consider an activity that generates BOTH rewards and costs. Throughout, suppose that you value rewards and costs linearly, and that you have β, δ preferences with $\beta = 0.25$ and $\delta = 1$.

Suppose there is an activity that you will complete on one of the next 5 days. As a function of when you do the activity, your reward will be v_t and your cost will be c_t, where $(c_1, c_2, c_3, c_4, c_5) = (40, 40, 20, 25, 60)$ and $(v_1, v_2, v_3, v_4, v_5) = (30, 50, 20, 33, 66)$. However, there are two possible cases for **when** you receive these payoffs:

Immediate costs: you incur the cost when you do it, and receive the reward in the future.

Immediate rewards: you receive the reward when you do it, and incur the cost in the future.

For instance, if you do the activity in period 4, your cost is $c_4 = 62$ and your reward is $v_4 = 60$. For immediate costs, the cost $c_4 = 62$ is incurred in period 4 while the reward $v_4 = 60$ is received sometime later. For immediate rewards, the reward $v_4 = 60$ is received in period 4 while the cost $c_4 = 62$ is incurred sometime later. Since we are assuming $\delta = 1$, exactly when later is irrelevant.

(a) When is the best time to complete the task (given long-run preferences)? How does your answer depend on the timing of rewards and costs?

(b) Consider the case of immediate costs. When do naifs complete the task, and when do sophisticates complete the task?

(c) Consider the case of immediate rewards. When do naifs complete the task, and when do sophisticates complete the task?