1. [(20 points) Nonstandard decision making]

1.1 [(10 points) Heuristics and flood insurance] Some empirical evidences found that, after a recent major flood, there was an increase in flood insurance purchase. How can "heuristics" help explain this empirical evidence ? Give brief explanation to support your answer.

Represetativeness Heuristic can explain that people draw inference base on similarity of sample feature and population feature. So, when a recent major flood occurs, after a while that the flood does not come, they will think that there is high probability that we will face a flood.

For availability heuristic, a major flood will raise mind awareness of such a disaster. Therefore, people will think that it might happen again. They don't want to face a huge loss. So, they go buy insurance to prevent the loss.

People are biased, sometime they might overweight the probability of flood.

10

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There are three basic types of heuristics: representativeness, availability, and a heuristic that has to do with starting from an initial point and making adjustments (adjustment heuristic). The scenario here can best be explained by the availability and representative heuristics. The availability heuristic explains that people find it easier to bring up thoughts that are more available to them due to certain circumstances. In this case, a major flood had just occurred and people found the concern over flooding very easily brought to mind. Since flooding had just happened, people were more inclined to worry about it happening to them and bought flood insurance as a result. Depending on where people live, the representativeness heuristic could also have been used. For example, if people live in areas that have been subject to flooding in the past, they may be inclined to purchase flood insurance after witnessing a major flood occur, even if it was not in their specific area.

10

10

1.2 [(10 points) Framing effect and Risk communication] Imagine that Thailand is preparing for the outbreak of an unusual airborne disease, which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed. Assume that the exact scientific estimates of the consequences of the programs are as follows:

If Program A is adopted, 200 people will be saved.
If Program B is adopted, there is a 50% probability that 600 people will be saved and a 50% probability that no people will be saved.

1.2.1 (2 points) Which program has higher expected value of number of people saved?

From A EV = 200 (1) = 200 EV = People save (Probability of people will be save)

From B EV = 0.5 (600) = 300

Thus in Program B has higher expected value of number of people saved.

2

1.2.2 (8 points) Based on the shape of value function of Prospect theory, how would you present the scientific estimates of the consequences of the programs to the public, so that the program with higher expected value is chosen? Provide brief explanation to support your answer.

We choose Present by

If Program A is adopted, 400 people will be killed

If Program B is adopted, there is 50% probability that 600 people will be saved and 50% probability that people will be killed

Because Present in this way suggested we are in the loss part of graph and in the loss part people tend to be risk loving and will pick the

8

2.1) (5 points) Given wealth w and housing price p, derive the condition under which sellers who were endowed with a house will be willing to sell the house.

$U(c,m|r)_{sell} > U(c,m|r)_{not\ sell}$

$U(0|1) + w + p > U(1,1) + w$

$-\lambda\phi + w + p > \mu + w$

$p > \mu + \lambda\phi \equiv p_s \equiv WTA$

5

2.2) (5 points) Given wealth w and housing price p, derive the condition under which buyers who were not endowed with a house will be willing to buy a house.

$U(c,m|r)_{buy} > U(c,m|r)_{not\ buy}$

$U(1,0) + w - p > U(0|0) + w$

$\mu + \phi + w - p > w$

$p < \mu + \phi \equiv p_B \equiv WTB$

5

2.3) (5 points) Since house sellers might be attached to their houses to some extent, what must the restriction on the value of λ be, to ensure that there is loss aversion? What is the reason for such restriction?

To ensure that there is loss aversion for sellers, λ should be greater than 1. When $\lambda > 1$, $p_s > p_B$. In other words, $WTA > WTP$ when $\lambda > 1$. Since the trade will occur when $WTA \leq WTP$, there is no trade occurs when $\lambda > 1$.

5

2.4) (5 points) How does loss aversion help explain the illiquidity of property transaction?

Loss aversion helps explaining endowment effect. The endowment effect occurs when the disutility from losing something is greater than the utility of receiving the same item. Similar to the mug experiment, the sellers with loss aversion ($\lambda > 1$) have endowment effect and therefore refuse to trade (WTA > WTP).

5

2.5) (5 points) In a situation in which there is bubble in housing market, properties become more liquid, compared to the normal situation with no bubble. How can the restriction on the value of λ be changed, so that we can still use this model to help explain the liquidity in housing transactions? Give a brief explanation to support your answer.

In 2.4), we discussed how loss aversion, i.e., $\lambda > 1$, explain illiquidity of property transaction. Now, the housing market becomes more liquid. It implies that transactions are easier to occur. Recall that a transaction will occur if WTA $\leq$ WTP. This situation implies that there are two possible cases: i) WTA is lower than before or ii) WTP is higher than before. Note that λ can be calculated or be written as $\frac{WTA}{WTP}$, the ratio between willingness to accept and willingness to buy. Whether one case occurs or both of them occur at the same time, the ratio will be $\boxed{\text{lower}}$. Since the ratio is lower, λ will also be lower. Lower λ implies lower loss aversion and hence increase liquidity in the housing market.

5

3. [(20 points) The purchase of lottery ticket and insurance policy]

(20)

3.1) Can expected utility theory help explain why an individual buys both a lottery ticket and an insurance policy? Provide explanation to support your answer.

The expected utility theory cannot explain this act of individual. This theory assumes that there are mainly 3 types of individuals – risk-averse, risk-loving, and risk-neutral. Each individual owns one extinctive characteristic with one unique utility function. The act of buying lottery is considered to be risk-loving, while buying insurance policy is risk-averse. The expected utility theory cannot explain since one individual cannot be both risk-averse and risk-loving at the same time.

5

3.2) Can Prospect theory help explain why an individual buys both a lottery ticket and an insurance policy? Provide explanation to support your answer.

On the contrary, the Prospect theory can explain this phenomenon. This theory can be segregated into two parts – value function and probability weighting. For the evaluation of the value, people has risk-averse over gains and risk-loving over loss. However, in the case that the incident has low true probability, people tend to overweigh this probability. For example, people hope for gain in low-occurance winning the lottery, while fear for loss in the bad event that rarely occurre'd – thus buying an insurance policy. This means that for low-probability events, the overweighting of probability weighting might outforce the difference in risk preferences over two incidents. Thus, people can act like both risk-averse and risk-loving.

15

4.1) (7 points) Assume $\beta = \frac{1}{4}$ and future health benefit $h = 10$, if Eddie decides when to work out by thinking like a Naif, when does Eddie work out? That is, what is τ_{naif}? 7

Hint: Fill in the following table.

	$\tau = 1$	$\tau = 2$	$\tau = 3$
At $t = 1$: $U^1(\tau)$	$\beta h - 4$ $= \frac{h}{4} - 4$	$\beta h - \beta(8) = \frac{h}{4} - 2$ = [illegible]	$\beta h - \beta 12 = \frac{h}{4} - 3$ = [illegible]
At $t = 2$: $U^2(\tau)$		$\beta h - 8 = \frac{h}{4} - 8$ = [illegible]	$\beta h - \beta(12) = \frac{h}{4} - 3$ = [illegible]
At $t = 3$: $U^3(\tau)$			$\beta h - [illegible](12) = \frac{h}{4} - 12$ = [illegible]

4

On day 1, write out $U^1(\tau = 1)$, $U^1(\tau = 2)$, $U^1(\tau = 3)$ and compare.

On day 2, write out $U^2(\tau = 2)$, $U^2(\tau = 3)$ and compare.

On day 1, $U^1(\tau=2) > U^1(\tau=3) > U^1(\tau=1)$ so, he will do a work out on day 2

On day 2, $U^2(\tau=3) > U^2(\tau=2)$ so, he will do a work out on Day 3. 3

This suggest that τ_{naif} have a Problem of Procrastination.

4.2) (7 points) Assume $\beta = \frac{1}{4}$ and future health benefit $h = 10$, if Eddie decides when to work out by thinking like a sophisticate, when does Eddie work out? That is, what is $\tau_{sophisticate}$?

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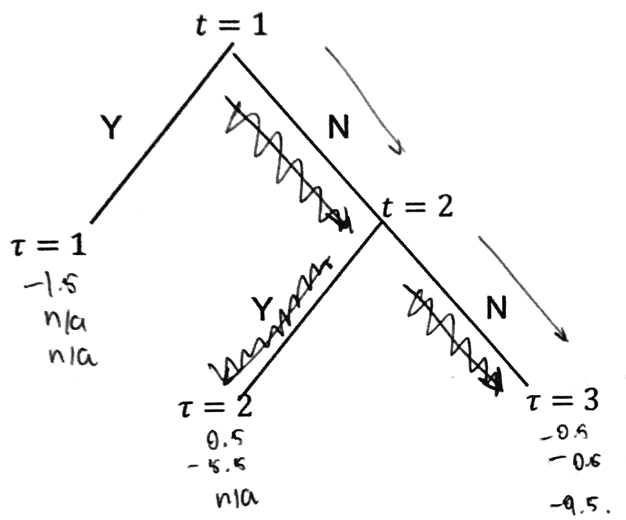
mr

Hint: Write out game tree, and figure out what Eddie would decide if Eddie was at day 2. Incorporate Eddie's day-2 behavior into his day-1 decision.



	$\tau = 1$	$\tau = 2$	$\tau = 3$
At $t=1$: $U^1(\tau)$	$\frac{10}{4} - 4 = -1.5$	$\frac{10}{4} - \frac{8}{4} = 0.5$	$\frac{10}{4} - \frac{12}{4} = -0.5$
At $t=2$: $U^2(\tau)$		$\frac{10}{4} - 8 = -5.5$	$\frac{10}{4} - \frac{12}{4} = -0.5$
At $t=3$: $U^3(\tau)$			$\frac{10}{4} - 12 = -9.5$

① $\tau_{sophisticate}$ in Day 2: Eddie will weight his cost on doing a work out on Day 2 and his cost of Doing work out on Day 3. We will get $U^2(\tau=3) > U^2(\tau=2)$ so, In day 2 he will work out on Day 3

② $\tau_{sophisticate}$ in Day 1: Eddie will weight his cost at Day 1 and cost at Day 3 since he know if you going to Day 2, he Probably do a work out on Day 3 anyway so, $U^1(\tau=1) < U^1(\tau=3)$, Thus eddie will work out on Day 3.

40
2.5
1.5

8.0
2.5
6.5

12.5
2.5
9.5

4.3) (5 points) Does sophistication help with procrastination in this case? Provide brief intuition why it helps or why it doesn't help.

5

In this situation Sophisticate wouldn't help the procrastination in this case since all the outcome from the Trait is working out on Day and Tsophisticate is working out on day 23 This may be because of this Person (Eddie) have a very low β meaning he like a consume now as much as possible or super impatient and the reward in future is not large enough to keep his sophisticate ~~self~~ motive to work out earlier

4.4) (11 points) Now, let's consider the case when Eddie is a partial naivete with $(\beta, \hat{\beta}, \delta)$ preferences. Let $\delta = 1, \beta = \frac{1}{4}, \hat{\beta} = \frac{3}{4}$. That is, Eddie gives weight equal to 25% for his future payoff, for his current decision. But, he thinks that he will weigh his payoff at ~~50%~~ 75% of the actual payoff for his decisions in the future.

11

4.4.1) On day 1, what is his belief about day-2 behavior?

On day 1, His belief about Day-2 behavior assume $V = (10, 10, 10)$

$U^2(2|\hat{\beta}) = \frac{3}{4}(10) - C_t = 7.5 - 8 = -0.5$

$U^2(3|\hat{\beta}) = \frac{3}{4}(10 - 12) = -1.5$

So, $U^2(2|\hat{\beta}) > U^2(3|\hat{\beta})$ This means on day 2 base on Day 1 perspective, he will work out on Day 2.

4

4.4.2) What is his day-1 preferences?

His Day-1 Preferences will be.

$U^1(1|\beta) = \frac{1}{4}(10) - c_1 = 2.5 - 4 = -1.5$

$U^1(2|\beta) = \frac{1}{4}(10) - c_2(\frac{1}{4}) = (\frac{2}{4}) = 0.5$ 2

$U^1(3|\beta) = \frac{1}{4}(10) - c_3(\frac{1}{4}) = (-\frac{2}{4}) = -0.5$

Thus, if you are T naif on Day 1, you will prefer working out on Day 2.

4.4.3) On day 1, when does he plan to do the task?

We have to incoporate Day 2 Decision: On Day 2 she think that she will excercise on Day 2 since $U^2(2|\hat{\beta}) > U^2(3|\hat{\beta})$ 1

But you have to value By Day 1 Preference too. From $U^1(2|\beta) > U^1(1|\beta)$

This means on Day 1, he plan to work out on Day 2.

4.4.4) When does he actually work out?

On Day 2: $U^2(2|\beta) = \frac{1}{4}(10) - 8 = -5.5 < U^2(3|\beta) = -0.5$

This mean he will actually work out on Day 3. 2

4.4.5) Briefly explain the time inconsistency problem found in this case.

Time inconsistency problem on this case found because Eddie have a partial naivitate problem. he aware of his present bias problem and tried to be sophisticate however his miscalculate or misweight β to be $\hat{\beta}$ which is more than β. This suggest he wow procastination problem smaller than it could be. $\hat{\beta} > \beta$. 2

4.5) (5 points) If there happens to have a new health policy which tries to provide information on health benefit of exercising. This policy changes future health benefit h that Eddie uses when he is trying to decide when to work out. Will this policy change Eddie's behaviors ?

5

Hint: Write out all payoffs as function of h.

	$\tau=1$	$\tau=2$	$\tau=3$	$V=(h,h,h)$
At $t=1$ $U(\tau)$	$\frac{h}{4}-4$	$\frac{h}{4}-2$	$\frac{h}{4}-3$	$C=(4,8,12)$
At $t=2$ $U(\tau)$		$\frac{h}{4}-8$	$\frac{h}{4}-3$	
At $t=3$ $U(\tau)$			$\frac{h}{4}-12$	

This is in case of Eddie are sophisticate and Naif Pay off. you could notice that if we change h to be higher or lower this will not affect the end result of τ sophisticate or τ naive.

- τ partical naif.

Perspective of Day 1	$\tau=1$	$\tau=2$	$\tau=3$
At $t=1$ $U(\tau)$	$\frac{h}{4}-4$	$\frac{h}{4}-2$	$\frac{h}{4}-3$
At $t=2$ $U(\tau)$		$\frac{3h}{4}-8$	$\frac{3h}{4}-9$
At $t=3$ $U(\tau)$			$\frac{3h}{4}-12$.

On Day2 : $\frac{3}{4}h-8 > \frac{3h}{4}-9$ so, In Perspective of Day 1, Eddie will think On Day 2 he will excercise.

On Day 1 : He compares $U'(2|\beta) > U'(1|\beta)$ so, the will exercise on Day 2 (Actually) his Preferences will be $U^2(2|\beta) = \frac{h}{4}-8$ and $U^2(3|\beta) = \frac{h}{4}-3$ so, $U^2(2|\beta) < U^2(3|\beta)$ Thus, he will do exercise on Day 3 anyway. Thus what matter is not the value of reward but what is matter is β and $\hat{\beta}$ that Eddie use when he make decision so, policy should try to fixed β or $\hat{\beta}$. The more β is near to 1 The less reward is discount and more likely eddied will excercise.