**NRU HSE-2020, Microeconomics Class-05**

# Choice under uncertainty

**1.** Anna lives in town A, where there is no theft. She was offered a job in town B, where there is a 50% risk that her car will be stolen during a year. Suppose that her initial wealth is 36 (including the car that costs 24), and her utility function is .

**(a)** What is the minimum increase in the annual wage that is required for Anna to accept the offer and move to town B?

**(b)** Compare this minimum increase found in (a) with the value of expected loss and explain the result. Illustrate by wealth-utility graph.

**(c)** How would your answer to part (b) change for Boris who faces with the same problem as Anna but is a risk lover?

**2.** An investor with initial wealth $5 can invest in a risky project that will bring him a net profit of $3 with probability 2/3, and a net profit of $α, where -5≤α<0 (i.e. loss) with probability 1/3. His elementary utility function is u(x)=ln(1+x).

**(a)** Find all values of α under which this individual would not invest in this project.

**(b)** Suppose that this investor may share the risk with co-investors. Assuming that co-investors share the profits and loss equally, find the number of co-investors chosen by this individual for α=-4, ignoring the integer constraint. (Setup the optimization problem and solve it).

**(c)** Provide graphical solutions for (a) and (b) using one contingent commodities graph.

**(d)** Consider any arbitrary investment project with two outcomes, one of which brings positive net return b>0 and the other negative a<0 (loss). Show algebraically that for any risk-averse individual the optimal number of co-investors is non-diminishing in |a|.

**3.** Anna has a total income of 20. Her utility function is U(Y) = Y1/2, where Y is income. She has the following investment opportunity: invest 20 and receive 36 in good times, but receive only 16 if there are bad times. She estimates that good times happen with a 0.5 probability. Suppose that, before deciding to invest or not she can buy an investor newsletter at a price of X that tells whether good times or bad times will occur. Find the maximum sum that Anna is willing to pay for this newsletter.