University of California, Davis -- Department of Economics

ECON 106 : DECISION MAKING   Professor Giacomo Bonanno

PRACTICE SECOND MIDTERM EXAM

1. Jennifer has the following vonNeumann-Morgenstern utility function:

$$U(x) = 200 - \left(12 - \frac{x}{1,000}\right)^2$$

where x denotes wealth measured in dollars. Jennifer's friend, Bob, is convinced that tomorrow it will rain while Jennifer thinks that there is a 75% probability that it will **not** rain. Bob is willing to take any bet and lets Jennifer name the stake. If the stake is, say, $3000, then Bob will pay $3000 to Jennifer if it does not rain and Jennifer will pay $3000 to Bob if it rains. Jennifer's wealth is $6000, and therefore she can bet any amount up to $6000.

(a) According to her beliefs, what is Jennifer's expected utility if she bets $2,000?

(b) According to her beliefs, what is her utility if she doesn't bet?

(c) How much would she bet if she thought there were a 50% probability of rain?

2. Consider the following lotteries (the numbers in the top row are sums of money, measured in dollars, and the numbers in the bottom row are the respective probabilities):

$$A = \begin{pmatrix} 1000 \\ 1 \end{pmatrix} \quad B = \begin{pmatrix} 5000 & 1000 & 0 \\ 0.1 & 0.89 & 0.01 \end{pmatrix} \quad C = \begin{pmatrix} 1000 & 0 \\ 0.11 & 0.89 \end{pmatrix} \quad D = \begin{pmatrix} 5000 & 0 \\ 0.1 & 0.9 \end{pmatrix}$$

(thus, for example, B says that with probability 0.1 you win $5000, with probability 0.89 you win $1000 and with probability 0.01 you win nothing). Peter's preferences are such that, between A and B he strictly prefers A, and between C and D he strictly prefers D. Does Peter satisfy the axioms of expected utility theory? (Assume that Peter prefers more money to less).

3. You are a tax lawyer advising a client about a tax matter and don't know whether a particular tax deduction - one that would save her $80,000 - is allowable (it's a judgment call that involves no ethical issues). If she takes the deduction, she'll be audited with probability 75% (she's in a group that's often audited for such deductions). Being audited involves legal expenses in the amount of $10,000. If she's audited, the odds that the deduction will be found to be allowable are 50%. If she's audited and the deduction is disallowed, she won't obtain the $80,000 benefit, and she'll have to pay a penalty of $30,000.

(a) . Draw a decision tree to represent your client's decision problem.

(b) Assuming that all your client cares about is her wealth (and prefers more wealth to less) and that she is risk neutral, should you advise her to claim the deduction?