Economics 206 Exam 2 Vincent Crawford

This take-home mini-exam covers the second of the course, and consists of two questions taken verbatim from Problem Set 2 plus the essay question from the problem set. This exam was posted on the course website at approximately 4 p.m. Wednesday, March 14, and is due by email or in the course mailbox in Economics Student Services by 4 p.m. Friday, March 16. You must now work on these questions individually, without consulting anyone but me (and me only for clarification). The 48-hour time limit should not be binding. The numbering is the same as on Problem Set 2.

2. (expected utility theory and risk-taking) Consider a gamble to win \$200 with probability 0.50 and lose \$100 with probability 0.50. Consider an expected utility-maximizing consumer with initial wealth of \$10,000 and a constant relative risk aversion (CRRA) utility of wealth function $U(w) = w^{(1-\rho)}/(1-\rho)$, where $\rho > 0$.

(a) Show that for $\rho = 45$, the consumer would accept this gamble but that for $\rho = 55$, the consumer would reject it. Argue that ρ would have to be much, much larger for the consumer to reject the gamble if initial wealth were \$1 million.

(b) Now suppose the consumer has utility of wealth function $U(w) = w^{(1-\rho^*)}/(1-\rho^*)$, where $\rho^* = 55$. You offer the consumer a gamble to win z with probability 0.50 and lose \$1,000 with probability 0.50. What is the smallest value of *z* such that the consumer will accept your gamble? (Hint: This is a trick question, but try to answer it!) Does this seem like reasonable behavior?

(c) Explain intuitively why rejecting a small-stakes gamble that has positive expected value is qualitatively consistent with Expected Utility Theory but *quantitatively* inconsistent with it.

12. Consider the Kahneman & Tversky base-rate neglect experiment. In Problem A, subjects are told that Jack has been drawn from a population of 30% engineers and 70% lawyers and that Jack wears a pocket protector.

(a) Let p_1 denote the probability that Jack is an engineer, given that he wears a pocket protector. Using Bayes' Rule, show that the odds that Jack is an engineer as opposed to a lawyer is given by:

 $p_1/(1-p_1) = [0.30 \text{ Pr(pocket protector | Jack is engineer)}] / [0.70 \text{ Pr(pocket protector | Jack is lawyer)}].$

In Problem B, subjects are told that Jack has been drawn from a population of 70% engineers and 30% lawyers and that Jack wears a pocket protector.

(b) Let p_2 denote the probability that Jack is an engineer, given that he wears a pocket protector. Show that:

 $p_2/(1-p_2) = [0.70 \text{ Pr(pocket protector } | \text{ Jack is engineer})] / [0.30 \text{ Pr(pocket protector } | \text{ Jack is lawyer})].$

Conclude that, if subjects form beliefs according to the laws of probability, it must be the case that:

$$[p_1/(1-p_1)] / [p_2/(1-p_2)] = (3/7)^2.$$

(c) Explain intuitively why this ratio of odds does *not* depend on Pr(pocket protector | Jack is engineer).

(d) Explain why Kahneman & Tversky set up the experiment in this way.

(e) What values for $[p_1/(1-p_1)] / [p_2/(1-p_2)]$ imply that subjects exhibit base-rate neglect?

(f) Kahneman & Tversky ran this experiment as a *between-subjects* design – different groups of subjects responded to Problems A and B. How might their results have changed if they had run a *within-subjects* design – where each subject responded both problems? Why do you think Kahneman & Tversky chose a between-subjects design?

21. Essay question

Write a brief (one-page or less) essay on how research on how behavioral decision theory should change how we think about a non-trivial economic application of your choice. Full credit will be given for any answer that sketches a coherent and empirically plausible analysis of a non-trivial application.

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