University of St Andrews

School of Economics and Finance
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EC4506 Candlemas Semester 2005

1. John wants to set up an internet based market place to sell garden plants. He is wondering whether he should choose a first-price or a second-price auction to sell his plants. Assume that John wants to maximise his expected revenue.

   (a) What does theory say regarding expected revenue in these two types of auctions. (20%)

   (b) What does the experimental literature say regarding expected revenue in these two types of auctions. (20%)

   (c) John wants to run an experiment to find out more about bidding and revenue in these two types of auctions. To do that, he recruits 100 students from St Andrews University as participants. The experiment is conducted in groups of five participants. The first five participants who arrive are the first group, the next five in the next experiment are the next group, etc.. Members of each group bid in a first-price auction for a geranium plant which has a market price of £3. Then, in a second stage of the experiment, members of each group bid in a second-price auction for a rosemary bush which also has a market price of £3.

   Which elements of John's experiment would you change? (30%)

   (d) John's competitor, Mike, also runs an experiment. He also recruits 100 students from St Andrews University as participants. The first 50 participants who arrive for his experiment are divided into groups of five. Each group participates in a first-price auction for a geranium. After this part of the experiment is completed, Mike continues with the next 50 participants. Again, they are divided into groups of five. Each group participates in a second-price auction for a geranium.

   Which elements of Mike's experiment would you change? (30%)

2. Mary is a stock broker and wants to better understand investor preferences for risky investments.

   (a) A standard approach in economic theory is to structure preferences over risky choices with the axioms of von Neumann and Morgenstern. How can this approach be described formally? (20%)

   (b) Experimental economists use the Marschak-Machina triangle to describe preferences over risky choices. Draw two such triangles, one with preferences for a risk-averse and one with preferences for a risk-loving person. Label your diagrams carefully and explain how one can see attitudes towards risk in these diagrams. (30%)

   (c) What properties have preferences that fulfil the axioms of von Neumann and Morgenstern in the Marschak-Machina triangle? (20%)

(d) To find out whether the preferences of her clients follow the axioms of von Neumann and Morgenstern Mary has asked all of them to complete a questionnaire. The questionnaire contains questions like the following:

> • Lottery $\mathcal{A}$ is an investment that gives you a return of £200 with probability 1. Lottery $\mathcal{B}$ is an investment that gives you a return of £450 with probability $\frac{1}{2}$. Do you prefer $\mathcal{A}$ or $\mathcal{B}$?

i. What can one say about a person who is just indifferent between $\mathcal{A}$ and $\mathcal{B}$. Is this a risk-averse, risk-loving, or risk-neutral person? (10%)

ii. Mary has found out that about 50% of her clients choose $\mathcal{A}$ and another 50% choose $\mathcal{B}$. To test the axioms of von Neumann and Morgenstern, Mary introduces another question:

> • Lottery $\mathcal{A}$ is an investment that gives you a return of £200 with probability $\frac{3}{4}$. Lottery $\mathcal{B}$ is an investment that gives you a return of £450 with probability x. Do you prefer $\mathcal{A}$ or $\mathcal{B}$?

How should Mary choose the value of x to be able to test the validity of the axioms of von Neumann and Morgenstern? (10%)

iii. Is it possible to compare answers to the following question with answers to the first question above and learn anything about the axioms of von Neumann and Morgenstern?

> • Lottery $\mathcal{A}$ is an investment that gives you a return of £2000 with probability 1. Lottery $\mathcal{B}$ is an investment that gives you a return of £4500 with probability $\frac{1}{2}$. Do you prefer $\mathcal{A}$ or $\mathcal{B}$?

Explain your answer? (10%)

3. In the lecture we have discussed various ways to implement competitive markets. One standard model to study competitive markets is the Walras equilibrium.

(a) Compare the assumptions of Walras equilibria in competitive markets with the market design in Vernon Smith's (1962) experiment. (20%)

(b) In Vernon Smith's market many assumptions of a Walrasian market are not fulfilled. Does this mean that we can not compare the two? (20%)

(c) Compare the implementation and results of Vernon Smith's (1962) experiment with the implementation and results of Edward Chamberlin's (1948) experiment. Can we learn something from a comparison of the two experiments? (20%)

(d) To test the stability of cartels, John plans to run the following experiment: Groups of eight participants are recruited from a population of students for each session of the experiment. Upon arrival each group is split in two groups of four. Each group is led into a separate room. In their written instructions participants learn that they are in a group of four sellers, and that each seller can sell up to ten units of a good. Marginal production cost of the good is zero. Since John is interested in seller behaviour only each group is told that

the other group is a group of buyers. John plans that in the experiment buyer behaviour will be simulated by a computer. Having read the instructions, each group can negotiate a non-binding trade agreement within the group. After that, sellers trade on a computerised market.

i. What result do you expect in this experiment? (20%)

ii. What could be problematic in this experiment? (20%)