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Auctions and Markets 73-440  
Second Semester 2007-2008

## **FIRST PROJECT**

### **AUCTIONS**

The three projects required for this course will add to your experience gained from 73-440 in designing and analyzing the results of your own experiments. You may do the project by yourself, pairs or in groups of three (in which case all students will be awarded the same grade), but no more than three in a group is permitted.

The first project is organized around designing, running, and reporting on, two auction experiments. Parts A and D together essentially consist of a short paper. Part A should motivate the experiments with a model, explain the most important features of the model and, if possible, its solution. Part D should describe how the experiments were conducted, and compare the experimental outcomes with your theoretical predictions.

You will be graded on the nature of the issues (such as whether the questions you pose are interesting to business people, and why your experiments might shed light on them), as well as the analysis itself. Part A of this project is due Tuesday, February 5 and worth one third of the points. Parts B and C will be conducted in class at that time (and also continuing through to February 7 if necessary) and together are also worth one third. Part D is Thursday, February 14. Parts A and D are reports of your analysis. The points in Part B are allocated to how well your group runs your own experiment. (Typically students score full marks on this, so I will only subtract marks from part C if things are done really badly.) Part C is based on how well you perform as an individual subject in experiments designed by the others.

#### **Part A**

Design two auctions. In the description of each auction clearly specify the distribution of valuations throughout the bidding population, the information that different types of players have, and the bidding rules. They should not all have the same information sets as well as the same bidding rules. There should be some common features between the experiments so that you can attempt to show what happens as you change the parameters that describe your environment. For example how are the results of an auction likely to be affected by the number of bidders, the distribution of their valuations, whether they are differentially informed or not, the method of bidding, the price paid by the winning bidder? You are not expected to analyze all the possibilities, but I would like you to focus on some questions that are of interest to you. You should also explain why they are interesting questions to address. Discuss whether it is possible to find game theoretic solutions to your auctions, and if so derive them.

## **Part B**

Run the two auctions and send the teaching assistants and myself the output files from your experiments. Students who do a poor job of running their own experiments will also be penalized up to 50 percent of this portion of the project because it may compromise their results. This session will probably be very busy, so everyone should know exactly how to run their own experiments on both modules, and save their results before the sessions begin. I urge you to conduct some trials with your study partners and thoroughly familiarize yourself with the process of running experiments and saving the results. Please make a brief oral presentation (maximum 2 minutes) to the class that motivates your two auctions using a power point presentation (maximum three slides). You should treat the class as future business colleagues who have not taken this course. Please bring a flash drive to run the power point presentation off my computer, but you should conduct the experiment off your own computer.

## **Part C**

Participate as a player in the other experiments. During the session you may use a proxy name rather than your real one to hide your true identity. If you did not use your real name, please send me email at the end of the session divulging your proxy name. Your grade in this portion of the project will be a strictly monotone increasing function of how well you play the games designed and run by the other students (where you are one of their subjects).

## **Part D**

Write a report on your findings. Please send me a consolidated copy of your report (including Part A as well), and also an attached file of the output from your experiments. (Also include your power point presentation as an appendix.) The second part of the report should include two sections.

1. Your report will provide the basis for determining how the other students performed on your project for the purposes of grading Part B. Make an Excel table showing how each experimental subject performed in each auction. There should be a row for each player. There should be a column to indicate which player type was assigned to each subject, a column recording the valuation assigned to them, their final bid, and how their final bid was ranked. If a known solution to the auction exists, then a subject's actual bid should be compared with his or her optimal bid. If your auction has a known solution, compare the results with what would have happened if everyone had played the solution strategy, by redoing the last two columns in your table. If there is no known solution to the auction, then subjects are evaluated more directly on their play. In this case the subject making the winning bid is evaluated according to the difference between their valuations the amount they pay the auctioneer.

2. The second part of the report should also explain the main features of the sample population of subjects, using statistics and econometrics to help summarize the data from your experiment. Explain the main features in your data that summarize the behavior of the class as whole, by looking over the bidding distribution within the experimental population. Regress bids on valuation and player type, summarize the results and provide an interpretation in your report. You should use bar charts, pie diagrams and other relevant graphical devices to illustrate your points. When arguing how well the theory works you should know how to adjust for sampling error with t statistics, confidence intervals and so on. By all means, estimate some parameters of interest to your research questions, provide some confidence intervals, and test some hypotheses of interest to your project. Be sure to focus on the extent of deviations in the experimental outcomes from the theory, seeking to explain why. (Did some subjects fail to optimize in all the rounds, or did people learn? Do subjects individually mix or does the population simply divide into proportions that give the appearance of mixing to any individual player facing an anonymous opponent?)