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CS 186 Final Project Proposal

Suggestion 1: Looking at revenue equivalence in practice.

The revenue equivalence theorem states that the truthful DSE of the second-price auction, the unique BNE of the first-price auction, and the unique BNE of the all-pay auction have the same expected revenue under certain assumptions (IPV settings). We wanted to study the different kinds of auctions in greater depth by studying the conditions in which revenue equivalence would fail. There are many reasons revenue equivalence would not hold true in practice. Some of the factors to consider are:

- Agents may not be risk neural. Intuitively, they may prefer to have a higher probability of winning an auction rather than try to maximize the expected utility he can gain from the auction.
- Private valuations may not be identically distributed.
- Bidders may collude, and different auctions may create different incentives for agents to collude).
- "Joy of winning" hypothesis: agents may be more likely to overbid in certain types of auctions.
- "Spite" hypothesis: agents may be more likely to overbid if they are more likely to set the price for others.

Our goals in this project would include:

- Reading the current literature studying revenue equivalence in depth, and understanding the various factors that make revenue equivalence deteriorate.
- Ranking the revenues of different auctions under varying assumptions (combining both theory and modelling).
- If possible, finding real data to support relevant theories.

Sources to get us started:
http://www.comlabgames.com/strategicplay/20_chapter/20_Violating_Equivalence_November_06.pdf
http://economics.sas.upenn.edu/~hfang/publication/spaoverbidding/EJ-final.pdf

Suggestion 2: Studying market makers in a continuous double auction.

In a continuous double auction, the exchange takes on no risk, but liquidity in the market may be limited and transaction costs may be high. In class, we looked at automated market makers, which

are provided by the exchange (e.g. prediction market) and has an attractive property of a bounded loss.

Many stock exchanges in practice do not provide a market maker itself but instead select Designated Market Makers (DMMs) responsible for supplying baseline liquidity. These market makers seek to gain profit by collecting the bid-ask spread while providing liquidity to other traders, never holding position in any stock for too long. Market makers may have informational advantage over average traders since they see a greater magnitude of orders.

We are interested in reading in depth about how such market makers maximize profits while managing risk appropriately. Some goals for the project would include:

- Studying various profit-maximizing strategies for market makers and their performances.
    - E.g. spike dampening, relative smoothing, and information gathering
- Studying market makers' effects on various markets, and whether they provide liquidity where it is needed.
- Studying policy implications: regulations and restrictions that need to be in place so that market makers do not have an unfair advantage.

Sources to get us started:
https://www.cis.upenn.edu/~mkearns/papers/marketmaking.pdf
http://www.cs.ucr.edu/~cshelton/papers/docs/orderflow_emm.pdf
http://www.princeton.edu/~rcarmona/download/fe/CW1.pdf
https://www.cs.utexas.edu/~pstone/Papers/bib2html-links/AMEC03.pdf
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