

## Notes for cover letter and research statement.

### Research Statement Intro

- Overall, Markets
  - To better understand how markets have emerged and how they operate. This is intentionally a little vague, but it at least touches on all my research.
  - Touches on a diverse set of fields in micro and macro. Experimental methods, virtual economies, IO. .... International finance and trade(?).
  - Allows for novel applications of experimental methods.
  - New datasets (virtual economies) and computational methods (the ability to deal with large datasets) permit contributions never before feasible.

### Organization

- For job positions that appear more interested in experimental, I'll lead with my experiments. For positions that appear like they'll be more interested in my valve work, I'll lead with that.

### My Areas and Methods

- Experiments
  - There are numerous situations in which theory offer complicated or conflicting guidance. For example, where multiple equilibrium are possible, which, if any, should we expect? How shall we distinguish between two competing theories? How do we explain the departure of real world phenomena from theory when empirical methods are limited? How do we explore economic concepts for which theory struggles to represent in a realistic way?
  - At leeps lab, I've been at the center of a team of faculty and programmers to develop advanced software for conducting economics experiments. We've developed ConG and Redwood, software systems for running experiments in continuous time and action spaces. These allow for real-time and graphics intensive interaction. Real-time in the sense that subjects are able to take asynchronous actions that affect the strategic environment and payoffs with a delay no human is able to detect. Graphics intensive games allow for higher information densities that improve subject understanding of the game and speed up learning.
- Hotelling model
  - The Hotelling model is the preminent model of spatial competition, with theoretical extensions applied throughout economics, for example in industrial organization to analyze geographic competition and product differentiation, and in political economy as a tool to analyze voting dynamics.
  - However, with theoretical results subtly sensitive to the model setup, and with empirical examinations of important facets of the model difficult and rare, experimental investigations like the one I am conducting offers a way forward for testing a range of theories based on Hotelling.
  - Much of my experimental work is built around several projects investigating the Hotelling model extensions.
- Virtual Economies,

- A virtual economy is a largely self-contained marketplace of non-physical items and services. Somewhat akin to a small open economy. At this stage, virtual economies under study have been intentionally built around or emerged from an online video game.
- These economies have a number of characteristics that are valuable to researchers: large games have millions of users engaging in billions of economic transactions involving thousands of goods, the firms in charge of the game act as a near-omnipotent social planner able to create and destroy goods and implement policy at will. Many emerge and develop very quickly.
- In a similar way to how a biologist may use observations from a Petrie dish under controlled conditions to better a natural phenomena, virtual economies offer economists similar opportunities to better understand economic processes.
- I have detailed logs of all marketplace interactions for a large virtual economy.... get into papers
- "Big data" and computational methods
  - Methods:
    - More and more economic phenomena are being documented with increased quality. These data may come from electronic marketplaces, scanner data, virtual economies, online user data, satellites, etc. -- all may offer economists new material to work with.
    - Because of the scale of this data - multi-terabyte datasets are common, observational data is often poorly structured requiring complex processing, observations may come in at very fast rates - economists benefit from using new computation methods to derive meaning from the phenomena they study.
    - Working with the video game data, I've had the pleasure of building an analysis platform able to make sense of the interesting dataset. Relying entirely on open source software (R, RStudio, MySQL, Python, Linux and supporting libraries) and technology grants (a 24-core, 4TB hard drive, 100GB ram Linux server). This hardware was built around a collaborative architecture allowing numerous people able to work simultaneously, sharing their results as they progressed.
    - All this allows me to bring to bear the full economists toolkit to my dataset and others of a similar scale.
  - Getting access to these data:
    - Though much of these new sources of data are proprietary or restricted by privacy policies and consumer laws, that doesn't mean that interesting datasets have been out of academic researchers' reach.
    - Along with my advisor and coauthor, I took the lead in convincing a large video game company to share very detailed data about their marketplace for virtual items, with the firm providing funding and technology grants and fairly liberal conditions to make this research process. We are currently the only economists we are aware they are working with.
    - These grants were built on an initial invitation to speak at the company's headquarters, (i.e. not from previous personal connections).