NBER Productivity, Innovation and Entrepreneurship Program – Digitization
Fellowship Proposal
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I am af PhD candidate in Economics at the University of Wisconsin-Madison and specialize in Industrial Organization, Applied Microeconometrics and Computational Economics. My primary research interests are in the study of digital markets, platform competition and two-sided networks. I seek to understand how the advent of the Internet and information technologies have introduced new markets and transformed existing ones, and believe that the NBER Productivity, Innovation and Entrepreneurship Program fellowship in Digitization would provide an outstanding opportunity for me to begin my research program in these areas.

What fascinates me the most about digital markets is the degree to which many prominent products and business processes are firmly rooted in economic theory. These include the use of auctions to set advertising rates in search markets (Google.com), dynamic pricing to resolve supply shortages (Uber, Lyft), reputation systems to address imperfect information between buyers and sellers (Airbnb.com, eBay.com), and matching algorithms to coordinate exchanges in centralized markets (Handy.com, Match.com). Many of these markets offer scholars new opportunities to study age-old questions in economics by providing novel sources of data.

With a NBER Digitization fellowship, I plan to pursue research on three topics in digital markets that have recently garnered a great deal of attention from academics, business leaders, and policy makers alike: crowdfunding, online tournaments, and digital currencies. With the fellowship support, I believe I can make considerable progress on answering a number of key questions central to understanding these markets.

Crowdfunding
Crowdfunding markets are Internet platforms that have revolutionized fundraising. An interesting feature of crowdfunding markets is the emergence of two competing fundraising mechanisms. In my job market paper I explore how these different mechanisms affect donors' and fundraisers' incentives. In the All-or-Nothing mechanism (AoN), fundraisers keep the money they raise only if they reach or exceed their funding goal. In contrast, under the Keep-it-All mechanism (KiA) fundraisers keep the money they raise regardless if they reach their funding goal. This first funding model is similar to the provision point mechanism studied in a number of classic papers on public goods games (Bagnoli & Lipman (1989), Admati & Perry (1991), Andreoni (1998)).

In order to study how fundraisers choose which mechanism to use -- and in turn how these different mechanisms affect donors' incentives to make contributions -- I developed an empirical model of donors preferences for crowdfunding. I then estimated my model on a unique dataset I collected from two of the most popular crowdfunding platforms, using webscrapers. My dataset includes over quarter million fundraisers and is the first to provide extensive data on both types of funding mechanisms. An important contribution of my paper is the development of an algorithm that allows me to compute the distribution of donations to each fundraiser that would otherwise be computationally infeasible. I then use modern cluster-computing methods to estimate my model.

In addition to this project, I have also recently received proprietary data directly from a different crowdfunding platform that includes both individual-level donations and web traffic data. With this more detailed data, I am interested in exploring how the allocation of donations would change in different information environments. For example, when donors arrive to a fundraiser on a crowdfunding platform they can typically observe how much previous donors have contributed to

campaign. I am currently working on extending my model to incorporate this new, more detailed data in a way that will allow me to investigate how donors' contribution behavior would change if they no longer have access to this information.

Online Tournaments

In 2006, the Internet film rental company Netflix made headlines by launching a tournament with a million dollar prize to help improve the efficiency of their movie recommendation algorithm. Since then, online tournaments have become a popular tool to help firms and governments solve difficult problems.

There are two defining characteristics of these tournaments. First, they are open to the public and allow anyone to participate. Second, they usually include a leaderboard, where contestants can observe in real time how their performances compare to their competitors. The presence of these two features creates an interesting competitive environment, and I am interested in understanding whether there are alternative ways to design these tournaments that may lead to improved outcomes.

In particular, I want to study whether the presence of the leaderboard increases or decreases competition between contestants. On the one hand, for the highest ranked contestants at the top of the leaderboard it seems plausible that the knowledge of being close to winning the tournament may lead to an "arms race," where contestants increase their effort since they have a reasonable chance of winning the tournament. On the other hand, for the lower ranked contestants at the bottom of the leaderboard it may be the case that being far away from the top contestants causes them to reduce their effort or drop out of the tournament. For example, Brown 2011 finds that average performances decrease when high achieving or "superstar" competitors compete in tournaments. Further, observing a large number of contestants at the top of leaderboard my also discourage potential entrants from participating at all if they believe there is only a small chance of outperforming the best contestants. Hence, it is unclear ex ante whether the presence of the leader board has *pro* or *anti* competitive effects.

To answer this question, I have obtained data from one of the most popular online tournament platforms used by firms seeking improvements to algorithms used in an array of business settings, such has product recommendation algorithms and sales forecasting. The data includes every submission (including the timestamp of when the submission was made) by all teams that participated in the universe of tournaments over a three-year span. There are a number of interesting features of the data, including rich heterogeneity in size of the monetary award offered to the winners and the length of time the participants have to compete.

With the data, I plan modeling the tournaments as a dynamic game where the contestants can observe each other's performance through the leaderboard. I plan on solving the game and then simulate how the contestants' behavior would change if they could not observe leaderboard. My hope is that the results of this exercise will improve our understanding how to design these tournaments to produce the most efficient outcomes.

Digital Currencies

Perhaps no aspect of the digital economy has lead to as much interest (and controversy) as digital currencies, and in particular Bitcoin. Bitcoin has been heralded as the "future of money and global finance[1]," and there is a small but growing literature devoted to studying it (Yermack 2013)

[1] http://www.wsj.com/articles/bitcoin-frenzy-back-as-epic-bust-fades-1446682772

There are two research questions on Bitcoin I am interested in studying. First, I am interesting in understanding what drives individuals to purchase and sell Bitcoins. To answer this question I plan on leveraging a unique dataset that consists of every trade individuals made on one the of the most popular Bitcoin platforms -- Mt. Gox. In February 2014, a database of all trades made on the platform was leaked to the public. This database did not contain any identifiable information for the users on the platform, but did include data on every Bitcoin purchase and sale by every user over a two-year period. Since the data tracks individual purchases and sales of Bitcoin over time, I can see how internal (i.e. past purchases and sales) and external (i.e. current prices levels and volatility) forces affect individuals' decisions to purchase or sell Bitcoins.

The second question I am interested in exploring focuses on competition between Bitcoin exchanges. There are currently dozens of exchanges that trade Bitcoins, and interestingly there is a great deal of heterogeneity in how these exchanges price transactions. Some exchanges charge a flat fee per trade, some charge different fees for buyers and sellers, and some offer tiered pricing, with discounts for larger transactions. I am interested in understanding how these different fee structures affect the demand and supply of Bitcoins, and further how competition between platforms affect platforms pricing decisions.

References

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