What is the Crowd Worth? The Role of Peer Effects in Crowdfunding

Historically, it has been hard for entrepreneurs to attract external financing for their ideas and businesses in their infancy. The usual sources are bank loans and equity capital, where a small group of sophisticated investors provide a large percentage of the necessary capital. The result is that many new ventures remain unfunded. Recently, entrepreneurs have gone to the "crowd", which involves a large audience where each individual provides a very small amount. This is usually facilitated by online social networks and platforms such as Kickstarter and Indiegogo. One of the main differences between traditional funding and crowdfunding is the utilization of the social network, where ordinary individuals can provide financing to entrepreneurs. This is in contrast to the previous model of angel investors and venture capitalists, in which only accredited investors can participate in this financing. Partially to allow for this new model, recent regulation such as the JOBS Act has made exceptions to this accreditation requirement to allow for ordinary individuals to provide financing to startups in return for equity.

Since the social network is very important in crowdfunding and success of these entrepreneurial ventures, I propose to study how peer effects affect crowdfunding. The main issue in crowdfunding is as with any new project or product, quality is difficult to determine prior to consumption. Funders hold a prior on quality, which they can update with information from their peers. This information can be purely about the existence of a project but it can also be about the peer's funding decisions and hence signals of the project's quality. This peer effect may be an important driver of demand because the crowdfunding market is a large market with many choices where the consumers (funders) have very little knowledge about the quality of the good and learning is costly. Thus, it is important to know how peer effects influence an individual's decision to fund a project. This will affect how project creators target their fundraising efforts and inform how these crowdfunding platforms should best utilize the social network.

The causal estimation of peer influence has always been plagued with the "reflection" problem. There are numerous studies documenting this clustering of behavior among peers, but few studies document the causal effect of peer influence while separating it from simultaneity, unobserved heterogeneity, homophily, and other correlated effects. In addition to identifying the causal effect, I am interested in distinguishing between the mechanism(s) through which peer effect is acting. To achieve this, I will run a set of field experiments on an online crowdfunding platform to measure the causal impact of peer effects and its mechanisms.

First, I will try to disentangle pure information transfer from the peer effect, both in terms of stated preference and revealed preference endorsement. One can think of stated preference endorsement as an expression of like akin to what occurs on platforms such as Facebook. On the other hand, revealed preference endorsement is the communication of previous purchase. Within each type of endorsement, the information can come from a stranger or a friend (peer). Where the information comes from distinguishes between pure information transfer vs. information transfer plus peer effect. Using a canonical model of cheap talk to model stated preference vs. revealed preference endorsement, the first hypothesis I will test is potential funders will be more likely to fund a project when given a revealed preference endorsement vs. a stated preference endorsement. This hypothesis is expected to hold for both stranger and friend endorsements. Now using a model of signaling, each type of endorsement from a friend is much less noisy than that from a stranger, so the second hypothesis is that endorsement from a friend results in higher likelihood of funding a project than endorsement from a stranger. This hypothesis is expected to hold for both stated preference endorsement and revealed preference endorsement. However, the comparison between the effect of different types of endorsement and the effect of varying friendship ties is unknown.

In my field experiment, I will divide the members of a funder's social network into four random groups and randomly change the message that is shared by the funder. I will vary the originator of the message between stranger and friend to capture the effect of a peer. I will also vary the content of the message between liked and funded to measure the effect of stated preference vs. revealed preference endorsement. In addition, I can speak to how revealed preference endorsement from a stranger (signaling) compares to stated preference endorsement from a peer (cheap talk). This two-by-two characterization of the causal impact of peer effects has never been studied in the literature and I hope to shed light on this in the context of crowdfunding in order to better understand crowdfunding success.

Second, I will try to open the black box that is peer effects and explore the reasons why a peer's funding decision would affect one's own choices. Broadly, there are two reasons why peer effects may matter: social learning vs. social utility. I define social learning as a consumer inferring the projects funded by peers are of higher quality. Social utility can then be thought of as a consumer's utility from funding a project depending directly on the fact a peer has funded that project. One prominent example of this effect is imitation, or "keeping up with the Joneses", where the consumer gets utility from funding the same project as the peer. To model social learning, I use the canonical social learning model where a peer makes a funding action based on a private signal, and this action can be used by a potential funder to make an informational inference before making his own funding decision. Then social utility can be modeled as an increase in the utility of a potential funder from funding a project his peer already funded that is separate from any learning. To separately identify the two channels, I turn off the informational inference component of a peer's funding decision so that there is no social learning in order to measure the effect of social utility. Then I turn the informational inference component back on to measure the full peer effect. The difference between just social utility and the full peer effect is social learning.

In terms of the field experiment, I will use a sample of potential funders each of whom is given a list of six projects that can be funded. Suppose first a project is randomly chosen for this potential funder to fund (such as with the rolling of a six-sided die) and that information is conveyed to his peers. Then if peer effects operate through the social utility (imitation) channel, his peers would fund the same project. But if peer effects operate through the social learning channel, his peers would gather no information from this random funding decision and would fund these projects with the same probability as a control group of peers who were not told of the random funding decision. Now suppose a project is actually chosen by this potential funder to fund and that information is conveyed to his peers. Then no matter what channel peer effects operate through, social utility (imitation) or social learning, his peers would fund the same project. Using this setup, I can separate a sample of potential funders into two groups, one gets the random charity treatment and the other one gets the chosen charity treatment as described above. Comparing the funding decisions of the peers, I can measure how much of the total effect of peer endorsement is due to the social learning channel vs. the social utility (imitation) channel and speak to the importance of each channel in this setting.

Peer effects are an important driver of the funding action on crowdfunding platforms. Crowdfunding is about harnessing the power of the crowd to achieve entrepreneurial success. Identifying not only how much a funder's decisions are affected by his peers' decisions but also *why* the funder's choices are affected is extremely important. It informs both entrepreneurs and crowdfunding platforms on better ways to harness the social network to increase crowdfunding success. In addition, this understanding of peer effects has broader appeal given the increasing reliance of social media on peer endorsement, such as Facebook "likes", sales on deal-of-the-day sites such as Groupon, giveaways that rely on friend referrals, etc. In all of these settings, a better understanding of how peer effects play into consumer decisions and the various mechanisms through which it acts helps to evaluate the effectiveness of these strategies and informs better utilization of the social network.

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▬▬▬▬ Education

2015 (expected) **PhD in Business Administration**, *University of California–Berkeley, Haas School of Business*, Berkeley, CA.
Business and Public Policy
Dissertation Title: *Essays on Crowdfunding and Peer Effects*
Committee: Noam Yuchtman, Ernesto Dal Bo, Lee Fleming, Ulrike Malmendier, Ben Handel

2012 **MS in Business Administration**, *University of California–Berkeley, Haas School of Business*, Berkeley, CA.

2006 **BA in Economics and BA in Biology**, *Bryn Mawr College*, Bryn Mawr, PA.
Honors, *Magna Cum Laude*

▬▬▬▬ Research Interests

Entrepreneurship, Innovation, Strategy, Social Networks, Industrial Organization

▬▬▬▬ Completed Courses

Microeconomic Theory, Econometrics, Applied Econometrics, Corporate Strategy and Technology, Political Economy, Contract Theory, Economics of Institutions, Psychology and Economics, Labor Economics, Industrial Organization, Corporate Finance

▬▬▬▬ Works in Progress

"Check This Out!" Referrals in Crowdfunding Success (with Andreea Gorbatai)

Overconfidence and Entrepreneurial Success

My "Like" for Your Dollar? Revealed Preference vs. Stated Preference in Peer Endorsement (with Leslie John)

Keeping up with the Joneses? Imitation vs. Social Learning in Peer Effects

Do Mergers Increase Innovation?

Working Papers

What is the "Crowd" Worth? The Role of Social Influence in Crowdfunding, with Andreea Gorbatai.

We provide causal evidence that social influence affects funding patterns in crowdfunding. In other words, the size of previous contributions affects subsequent funding decisions. The canonical model of social learning suggests that individuals learn from the actions of previous agents and actions converge over time. However, this has been difficult to establish empirically. The study of social influence is plagued with identification problems such as homophily and correlated shocks. In order to causally estimate the effect of previous contributions, we use a feature of the Indiegogo platform where only a set number of previous funders can be easily seen and every new funder displaces the oldest one in the set. We find that larger previous contributions significantly increase subsequent contributions. However, this only applies if the previous contribution is not "too large". If the previous contribution is more than 2.5 times the running mean, this effect is insignificant. For smaller previous contributions, it significantly decreases subsequent contributions but this only applies if the previous contribution is "quite a bit smaller". More specifically, the previous contribution has to be about a quarter of the running mean to have a significant effect. This causal effect of previous contributions on subsequent funding decisions suggest that both entrepreneurs and crowdfunding platforms can better take advantage of the effects of social influence to harness the power of the crowd.

Market Power in Merger Announcement Returns, with Ben Handel, Ulrike Malmendier, and Xinxin Wang.

In the IO literature on mergers and acquisitions, there is a fundamental tension between increases in market power and consumer welfare. A horizontal merger increases the combined company's pricing power, allows them to capture more consumer surplus, and thus increases profits. We integrate this insight of the importance of market power in mergers into the finance M&A literature on merger announcement returns. We look at horizontal mergers and examine how expected and actual changes in market power affect both short run and long run stock returns of the merging companies. Using changes in HHI as measure of changes in market power, we hypothesize a larger increase in the HHI of an industry due to a merger is associated with higher abnormal announcement returns. First looking at an expected measure of changes in HHI, we find that it is indeed associated with higher abnormal announcement returns for the acquiror in the short run. However, when we look at the change in actual HHI from the quarter preceding the merger to the quarter after the effective date, we find no statistically significant effect of changes in HHI on abnormal announcement returns in the short run. This implies that the market, right around merger announcement, is not correctly predicting what will actually happen to market power changes within the industry. However, after the merger takes place, higher actual changes in HHI is assoiated with positive abnormal returns, implying that the market does react to market power changes as they happen. We are seeking to better understand why the market is not correctly predicting actual changes in market power after a merger and how to correct for this bias.

The Effect of Emotion on Judicial Decision Making.
This paper studies whether emotion affects judicial decision making through changing judges' moods. Our data consists of judicial decisions throughout Wisconsin and use weather and wins/losses by the Green Bay Packers as emotion shifters. Specifically, we test the hypothesis that worse weather and losses by the Packers depress the judges' moods and lead to the harsher choice of a cash bond versus a signature bond. Results show that weather does have a significant but small effect on the decision making of judges. It suggests that lower temperature and higher precipitation increases the probability that judge imposes the harsher type of bond. In addition, the effects of temperature and precipitation seem to be additive and are robust to the addition of month and day of week fixed effects. Losses by the Packers in general do not have a significant effect on the probability of judges choosing the harsher bond. However, an unexpected loss does significantly increase the probability of judges choosing the harsher bond. This effect of emotion implies that choices at all levels are prone to subjective influence, and suggests a reexamination of how the power to make decisions are organized in settings such as the corporate world and the political system.

Experience

2014–2015 **Graduate Student Researcher**, *IEOR*, Berkeley, CA.
Prof. Lee Fleming

Summer 2013 **Graduate Student Instructor**, *Haas School of Business*, Berkeley, CA.
Executive MBA Microeconomics with Prof. Catherine Wolfram

Fall 2012 **Graduate Student Instructor**, *Haas School of Business*, Berkeley, CA.
MBA Microeconomics with Prof. Carl Shapiro

2010–2012 **Graduate Student Researcher**, *Haas School of Business*, Berkeley, CA.
Prof. Atif Mian

2006–2009 **Analyst**, *NERA Economic Consulting*, San Francisco, CA.
Conducted microeconomic and econometric analysis in the Antitrust, Intellectual Property, and Securities practices.

Conferences

January 2015 Kauffman Entrepreneurship Mentoring Workshop
September 2014 Berkeley Academic Symposium on Crowdfunding
October 2013 Berkeley Academic Symposium on Crowdfunding
July 2013 NBER Entrepreneurship Research Boot Camp
July 2013 CU-Kauffman Crowdfunding Conference
April 2013 Institute for New Economic Thinking Young Scholar
August 2012 Academy of Management BPS Doctoral Consortium
July 2011 Yale Summer School in Behavioral Finance

Fellowships and Awards

2014–2015 Kauffman Dissertation Fellow
2013–2014 UC–Berkeley Outstanding Graduate Student Instructor

2013–2014	Bradley Fellowship
2009–2014	Ryoichi Sasakawa Young Leaders Fellowship
2012–2013	UC–Berkeley Outstanding Graduate Student Instructor
2012–2013	White Research Fellowship
Summer 2012	Graduate Division Summer Grant
2011–2012	Crawford Research Fellowship
2010–2011	Sylvan C. and Pam Coleman Memorial Fellowship
2009–2010	Alvin and Norma Chan Fellowship