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FIELD EXPERIMENTS IN NETWORKS, INNOVATION AND
ENTREPRENEURSHIP:

EVIDENCE FROM A STARTUP BOOTCAMP

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This dissertation leverages two field experiments with entrepreneurs and startups to analyze how networks shape the process of innovation and entrepreneurship. The first and second essay use data from an entrepreneurship bootcamp to analyze how strategic network formation and peer spillovers lead to stable performance advantages and the generation of novel ideas. The third essay uses data from a corporate strategy retreat to analyze how network formation shapes the diffusion of management practices between firms in the Indian startup ecosystem.

Category: Teams and Networks, Entrepreneurial Strategy, Ecosystems,

Keywords: Field Experiment, Crowdfunding, Demographics, Creativity

- Connecting entrepreneurs leads to valuable spillovers that may improve the quality of the ideas and products they generate, the strategies they develop, and the management processes they put in place within their firms.
- Entrepreneurs often don't know who is useful to learn from and underinvest in searching for new network partners.
- Embedding field experiments and digitally enabled measurement in bootcamps, accelerators and incubators provide a fruitful way to test and develop our theories of entrepreneurship and innovation.

Policy-makers and scholars increasingly recognize that ecosystems are key drivers of innovation and economic growth. Underlying this insight is the idea that the networks that connect firms and people within an ecosystem magnify knowledge, talent, and competition. To illustrate the importance of our social networks on innovation and entrepreneurship, researchers are increasingly turning to detailed data and clever statistical analysis of existing data. While such analysis provides strong evidence that networks matter, it remains largely unknown if and how we can design networks and ecosystem connections that consistently improve the performance of individuals, firms, and ecosystems. Developing theories of network interventions and testing these theories using platform-enabled ecosystem-level field experiments is the goal of this dissertation.

To do so I co-founded Innovate Delhi Entrepreneurship Academy, a three-week long, full-time startup boot camp and pre-accelerator located in Delhi, India. Despite the prevalence of programs like entrepreneurship boot camps, accelerators and incubators in ecosystems around the world, relatively little is known about their effects on the process of entrepreneurship. Innovate Delhi was designed to examine the network processes that underlie these programs. How do the relationships in these organizations shape collaboration? What types of social ties lead to more novel ideas? Can the network between entrepreneurs be rewired to increase team performance? With my advisor Sharique Hasan, I designed the program around a series of experiments that varied who interacted with whom, allowing us to causally test the role of networks in very early stage entrepreneurship. Along with these randomizations, I developed an online learning

management platform that both orchestrated the day-to-day activities of the program and captured detailed data on the process of entrepreneurship. This platform allowed us to measure everything from idea generation to individual and team performance to social interaction.

The bootcamp trained 112 aspiring entrepreneurs from across India in idea generation, design thinking, prototype development, and business model validation. During the third week of the program the participants self-formed into teams of three. From this pool of nascent startup teams, the best teams won mentorship, the chance to pitch in front of angel investors, free co-working space, and prizes worth 35,000 Indian Rupees (\$5,500). Similar to other incubators, accelerators and bootcamps, admission into the bootcamp required the completion of an extensive online application⁴. Applicants had to provide a detailed overview of their work history, education, technology and business skills. The bootcamp received 508 fully completed applications. After a selective admission process, 116 aspiring entrepreneurs enrolled and attended at least the first day of the program. Four participants dropped out before the end of the bootcamp, leaving 112 individuals who participated over the entire three weeks.

The bootcamp was designed around three week-long modules. It was held six days a week, Monday through Saturday, from 9am until 5pm, but participants could work longer hours if desired. The first week focused on design thinking, feedback, and prototyping. Individuals worked in assigned teams of three to develop a software product concept for

the Indian wedding industry. During this week, teams and individuals received feedback about their ideas and prototypes from an assigned subset of their peers. The second week focused on developing a software product in the Indian health sector. The third week was much less regimented than the first two weeks. During the third week, the teams selected a problem to solve on their own, built a prototype of their product, developed a business plan, and composed a pitch deck to be presented to leading members of India's startup community the following Sunday. At the end of each week, individuals submitted their final prototype for peer evaluation. In order to simplify the deployment of our surveys, and to leverage our measurement strategy as a meaningful part of the program's curriculum, the majority of of the project evaluation, 360 feedback, and network surveys were bundled into a single "Full Circle" module that was deployed using our web-based learning management platform. Using this learning management platform, participants reflected on what they learned, evaluated how their team operated, and graded one another's projects.

In the first chapter of my dissertation, I investigate if networks plentiful in ideas provide early stage startups with performance advantages within this bootcamp. On the one hand, network connections that provide a team access to a multitude of ideas are thought to increase performance. Having access to more ideas enables a team to generate a novel recombination or discover one excellent business idea. On the other hand, research on network formation argues that such advantages should be fleeting as entrepreneurs both strategically compete for the most valuable network positions and form relationships with

others who have similar characteristics and abilities. If entrepreneurs are strategic in building their networks, then the policy maker, manager, or investor need not worry about helping the entrepreneur build their network since they will do it on their own. In order to test if entrepreneurs know how to build their own networks, I embed a peer effects experiment in a three-week-long startup bootcamp to test if teams that are randomly assigned to networks that are plentiful in ideas lead to performance advantages. Using detailed data from the bootcamp's custom-designed learning management platform, I find support for the idea that networks rich in ideas improve a team's performance in terms of angel interest on a equity crowdfunding platform and peer evaluated performance. Teams with connections to other people who provide more ideas receive better peer evaluations and more crowdfunding page views. Moreover, what appears to matter is the quantity of the ideas not the quality of the ideas nor the experience of the peer. This result points to the first order importance of creativity in entrepreneurship. However, I find little evidence that entrepreneurs actively build networks to others who could have provided a greater quantity of information and ideas. Instead, entrepreneurs seek feedback from those they have collaborated with in the past or who share similar personal characteristics. Entrepreneurs do not appear to be perfectly strategic in their networking behavior. This provides first order evidence that managers and policy makers have the ability to shape social networks to change outcomes like performance, innovation and perhaps even growth. This result also provides a potential explanation for the durability of idea and information-based network advantages.

In the second chapter of my dissertation, I delve deeper into the the process of social influence. I illustrate how the quantitative analysis of text data provides a fruitful way to explore how entrepreneurs share information and knowledge with one another. By capturing the unstructured language that a person generates on the online platform we used during the bootcamp, I test if peers shape how a person describes their thoughts, activities, and ideas. Furthermore, through formal statistical mediation analysis, I check if changes in the language induced by a peer serve as a channel by which peer effects shape outcomes. To do so, I use two sources of text data: work journal entries and the text of ideas generated during a half-day-long brainstorming session. I find that randomly assigned peers do affect the words people write and in turn the types of ideas they generate. This structure, of measuring text between the peer treatment and outcome, not only enriches studies of social networks by providing insight into the knowledge that is being transferred, but provides a template for future researchers who want to estimate causal effects and use text to capture socially complex constructs like culture, norms, and practices.

While the Innovate Delhi bootcamp allowed for the detailed examination of networks within a controlled setting, the bounded nature of the program limits the ability to draw macro-level conclusions. To overcome this limitation, for the third essay I include data from a field experiment that tests the macro-level implications of the micro-level network processes identified in my dissertation and papers with Sharique Hasan. In partnership with the Indian Software Product Round Table and an outstanding team of researchers

including Sharique Hasan, Aaron Chatterji and Solene Delecourt, I worked to enroll hundreds of Indian startups in a new executive training program called PNgrowth. PNgrowth was a 3 day-long executive training retreat with a year of follow ups to track progress and meet-ups for the participants to rekindle their connections from the retreat. The aim of the program was to accelerate the Indian startup ecosystem. Beyond training, the program also serves as a platform for the collection of longitudinal data on each startup's growth, strategy, technology, and personnel. Building on this detailed data and the research findings from Innovate Delhi, we are analyzing how firms learn from one another, how strategies are developed, and the best ways to connect firms in the future.

In the third chapter I analyze the some of the initial data we collected from this second field experiment. I connect the literature on organization learning and adaption to the peer effects and network-influence models explored in the first two chapters. To do so, I model inter-firm learning as a two-stage process of formation and influence. In the first stage, firms select from whom who they want to learn. Conditional on this first stage, influence either occurs or does not. This model helps explain when firms will naturally learn best practices, when policymakers need to filter inter-firm interactions to improve a business ecosystem, and when merely bringing companies together will result in improved ecosystem performance. The PNgrowth program allows me to check if founders prefer to get advice from other startups that have better management practices and if this advice changes the focal startup's strategy. I find evidence for the two-stage learning model. First, founders prefer to get advice from founders who are better

managers. Second, being randomly paired with a better manager results in the development of strategies that involve both more delegation and have potentially greater payoffs. The findings imply that policymakers need not filter how firms interact with one another, but merely need to create opportunities for firms to interact.