Artificial Intelligence, Human Judgment and Startup Success

Deepak Hegde and Manav Raj[1]

Research Summary

In this project, we seek to study factors that affect the evaluation of early stage startups, and compare the judgment of human experts to that of an artificial intelligence (AI) based tool trained to assess startups. To do so, we will rely on the data generated by the over 1,000 seed stage startups that apply to the Creative Destruction Lab (CDL) program each year and evaluations of the startups by human experts associated with the CDL, including investors, scientists and MBAs, during the course of the nine month program. The CDL program, described below, is designed to maximize the probability of success of university-based startups and will admit its first cohort of 25 ventures at New York University—Stern School of Business in September 2018. The program has been in operation at the University of Toronto, where it launched in 2012, and has created more than $2 billion in startup equity value so far. Seed stage startups are selected from a pool of over 500 applicants each year. The AI tool is provided by Aingel, a start-up company that utilizes machine learning principles to evaluate the potential of new ventures. The tool is now extensively used by VCs to evaluate potential portfolio companies. This study, when complete, will contribute to a better understanding of the following topics pertaining to the evaluation and financing of science and technology based startups.

1. How much do founders' characteristics versus their technology's characteristics influence the evaluation of experts and early-stage investors?
2. How does the background of human evaluators (e.g., scientists, MBA students, investors) influence evaluations?
3. How does the judgment of various human experts differ from that of an industry-leading AI evaluation tool?
4. Are human judgment and artificial intelligence substitutes or complements for each other?
5. What are the causal effects of entrepreneurship programs (in particular, the CDL) on the probability of startup success?

These questions are closely related to three of the four special interest areas specified by the Knowledge Challenge (Technology and the new nature of entrepreneurship, Barriers to entrepreneurship, and Causal research on entrepreneurship interventions at scale).

Empirical Approach

The CDL objective is to increase the probability of success for seed stage, university based, startups. Startup success is measured by the funding raised by the startups, and through long-term outcomes such as product launch and revenues. The nine month program utilizes an objectives-based mentoring process connecting startup founders with successful entrepreneurs, scientists and investors to scale their start-ups. The startups also receive business development support from NYU-Stern's

[1] dhegde@stern.nyu.edu (New York University) and mraj@stern.nyu.edu (New York University) respectively.

top MBA students. Launched at the University of Toronto in 2012, the CDL will launch its first cohort at NYU-Stern in September 2018. The two sites combined are expected to attract about 1,000 applicants, 200 final interviewees and 50 admits. This process generates a large volume of data on startup and founder characteristics, submitted by the startups and their human evaluators during the selection process. These data will serve as the main input into our empirical analyses.

We plan on processing data submitted by the startups through Aingel's patented AI algorithm. Aingel's approach relies on assembling all publically available data regarding founders and their ventures in conjunction with proprietary information on VCs and their portfolios to identify and select early stage start-ups from their deal flow and predict the success of their investments. Aingel's assessments of startups will provide the second critical input to our analyses.

Finally, the authors of this proposal will follow startups' outcomes (e.g., funds raised, customers acquired, products launched, etc) over two cohorts of the nine-month program, for both startups that were admitted to the program and those that were not. This will allow us to compare the evaluations of human experts versus AI, in terms of their ability to predict startup success, as well as effects of the program intervention.

Expected Contribution

Very little is known about the factors that influence the success of high-tech startups. The evaluation process of highly risky seed stage ventures is competitive and VCs are highly selective--anecdotally, VCs fund one in every 100 startups they see (Gompers and Lerner, 1998). Within the portfolios of even highly regarded VCs, only about one in twenty ventures generate the hits that offset the losses incurred by the majority of portfolio companies (Cochrane, 2005). Hence, understanding how different types of experts (e.g., scientists, VCs) weigh different factors in evaluating startups, and how their assessments correlate with actual success, can enrich research on the drivers of entrepreneurial success (e.g., Ewens and Marx, 2017; Lerner & Malmendier, 2013; Kerr, Nanda, and Rhodes-Kropf, 2014; Mollick, 2014; Hegde and Tumlinson, 2008).

In addition, as AI becomes a commonly used tool, there is rising interest in understanding how AI and machine learning technologies make predictions and how these differ from human judgment (e.g., Cowgill, 2018; Sharma, 2018). This research will contribute to the body of literature that provides an understanding of human biases relative to AI, and can help illustrate whether and how new technologies like AI can improve upon human judgment.

This research also has practical implications for VCs, program managers and policy makers seeking to accelerate or enhance startups' success. We expect to uncover characteristics associated with successful founders or ventures and show how AI -based tools can improve the entrepreneurial evaluation process. In addition, in generating a better understanding of the barriers to entrepreneurship, we hope to present findings that help policy makers create environments conducive to venture formation and success.

Estimated budget

Stipend for four graduate research assistants over two years (the assistants will help collect and code information on over a 1,000 startups who apply to the CDL program at New York University and the University of Toronto; this data is required as input to the AI algorithm and human evaluators) = $30K X 4 X 2 = $240K. The grant will be used to partially offset these costs.

References

Cochrane, John H., "The Risk and Return of Venture Capital," *Journal of Financial Economics*, 75(2005), pp. 33–52.

Ewens, Michael and Matt Marx, "Founder Replacement and Startup Performance," *Review of Financial Studies*, 31(2018), pp. 1532–1565.

Gompers, Paul A. and Josh Lerner, "What Drives Venture Capital Fundraising?" *Brookings Papers: Microeconomics*, (1998), pp. 149–204.

Hegde, Deepak and Justin Tumlinson, "Asymmetric Information and Entrepreneurship," 2018, *working paper*.

Kerr, William R., Ramana Nanda, and Matthew Rhodes-Kropf, "Entrepreneurship as Experimentation, *Journal of Economic Perspectives*, 28(2014), pp. 25–48.

Lerner, Josh and Ulrike Malmendier, "With a Little Help from My (Random) Friends: Success and Failure in Post-Business School Entrepreneurship," *Review of Financial Studies*, 2(2013), 2411–2452.

Mollick, Ethan, "The Dynamics of Crowdfunding: An Exploratory Study," *Journal of Business Venturing*, 29(2014), pp. 1–16.

Sharma, Kriti, "Can We Keep Our Biases from Creeping into AI?" *Harvard Business Review,* 2018.

DEEPAK HEGDE

40 West 4th Street, Suite 722, New York, NY 10012
Tel: +1 212 998 0674 Email: dhegde@stern.nyu.edu Web: www.dhegde.com

---

ACADEMIC APPOINTMENTS

New York University, Stern School of Business
- Associate Professor of Management and Organizations (with tenure), 2016 – present
- Founding Director, Creative Destruction Lab—New York City, 2017 - present
- Assistant Professor of Management and Organizations, 2010 – 2016

OTHER AFFILIATIONS

New York University School of Law, The Engelberg Center on Innovation Law & Policy
Faculty Affiliate, 2015-Present

United States Patent and Trademark Office
Thomas Alva Edison Research Fellow, 2014-2015; Visiting Scholar, May 2011 – Present

CESifo Research Network, University of Munich
Affiliate, August 2013 – Present

EDUCATION

University of California, Berkeley
Doctor of Philosophy, 2010 (Thesis committee: David Mowery, Bronwyn Hall, Steve Tadelis, Catherine Wolfram and Brian Wright)

University of California, Berkeley
Master of Science in Business Administration, 2008

Georgia Institute of Technology, Atlanta
Master of Science in Public Policy, 2005

The National Institute of Engineering, Mysore, India
Bachelor of Industrial Engineering, 2000 (with Distinction)

AWARDS & HONORS

Faculty Leadership Award (for exceptional leadership through service), NYU—Stern, 2018
Nominated for Professor of the Year, NYU—Stern MBA Program, 2016-2017
Nominated for Professor of the Year, NYU—Stern Langone Program, 2016-2017
The World's Best 40 Under 40 Business School Professors, Poets & Quants, 2015
G-Forum Entrepreneurship Research New Comer Award, 2014 (with coauthor)

Thomas Edison Innovation Fellowship, George Mason University School of Law, 2014-2015
Academy of Management, Technology and Innovation Management Division, Emerging Scholar Award First Runner Up, 2014
Thomas Alva Edison Research Fellow, US Patent and Trademark Office, 2014-2015
Kauffman Foundation Junior Faculty Fellow, 2012-2013
Management Science Meritorious Referee Award, 2013
Finalist, International Society for New Institutional Economics Dissertation Competition, 2010
Kauffman Dissertation Fellow, 2009
Regents Fellow, Sasakawa Young Leader, Bradley Fellow (UC Berkeley), 2005-10
International House Graduate Fellow, 2005-06
Outstanding Student (School of Public Policy, Georgia Tech), 2004
Statistics Guru (The Student Body of Ivan Allen College, Georgia Tech), 2003
1st prize in Technical Quiz (Society of Industrial & Production Engineers), 1998

PUBLICATIONS

SSRN profile: http://ssrn.com/author=1572429
Google Scholar profile: https://scholar.google.com/citations?hl=en&user=4ZvIfUMAAAAJ

[1] Patent publication and the market for ideas (with Hong Luo)
Management Science, published online in Articles in Advance on January 12, 2017

[2] Debtor rights, credit supply, and innovation (with Geraldo Cerqueiro, Fabiana Penas and Robert Seamans)
Management Science, published online in Articles in Advance August 12, 2016

[3] Can private money buy public science? Disease lobbying and federal funding for biomedical research (with Bhaven Sampat)
Management Science, 61(10) p.2281-2298 (Lead Article), Oct 2015
- Featured in *Nature* 515(19), Nov 2014

[4] What is the probability of receiving a US patent? (with Michael Carley and Alan Marco)
Yale Journal of Law & Technology, Volume 17, 203, 2015. pp 204-223

[5] Disclosing patents' secrets (with Stuart Graham)
Science, 347(6219) p.236-237, 16 Jan 2015
- Longer version available as "Who values secrecy in patenting? Evidence from the American Inventor's Protection Act of 1999" at http://ssrn.com/abstract=2170555

[6] An organizational perspective on patenting and open innovation (with Ajay Bhaskarabhatla)
Organization Science, 25(6) p.1744-1763, Nov 2014

[7] Does social proximity enhance business relationships? Theory and evidence from ethnicity's role in US venture capital (with Justin Tumlinson)
Management Science, 60(9) p.2355-2380, Oct 2014

[8] Tacit knowledge and the structure of license contracts: evidence from the biomedical industry
Journal of Economics & Management Strategy, 23(3), Fall 2014

[9] Funding and performance at the US Patent and Trademark Office
Nature Biotechnology, 30(2) p.148–150, Feb 2012

[10] Political influence behind the veil of peer review: an analysis of public biomedical research funding in the U.S.
Journal of Law & Economics, 52(4) p.665-690, Nov 2009

[11] Applicant citations, examiner citations, and the private value of patents (with Bhaven Sampat)
Economics Letters, 5(3) p.287-289, 2009

[12] Pioneering inventors or thicket-builders: which firms use continuations in patenting? (with David Mowery & Stuart Graham)
Management Science, 55(7) p.1214–1226, Jul 2009

[13] Politics and funding in the US public biomedical R&D system (with David Mowery)
Science, 322(5909) p.1797-98, Dec 2008

[14] Maturation of global corporate R&D: evidence from the activity of U.S. foreign subsidiaries (with Diana Hicks)
Research Policy, 37(3) p.390-406, Apr 2008

[15] Knowledge, technology trajectories and innovation in a developing country context: evidence from a survey of Malaysian firms (with Philip Shapira)
International Journal of Technology Management, 40(4) p.349-370, Dec 2007

[16] Public and private universities: Unequal sources of regional innovation?
Economic Development Quarterly, 19(4) p.373-386, Nov 2005

[17] Highly innovative small firms in the markets for technology (with Diana Hicks)
Research Policy, 34(5) p.703-716, Jun 2005

OTHER ARTICLES

[18] Reply to "A Replication of 'Political influence behind the veil of peer review' (Journal of Law & Economics, 2009)"
Public Finance Review, September 29, 2015

WORKING PAPERS

[19] What is a patent worth? Evidence from the U.S. patent 'lottery' (with Joan Farré Mensa and

Alexander Ljungqvist), latest version: http://ssrn.com/abstract=2704028
R&R at *Journal of Finance*

[20] Asymmetric information and entrepreneurship (with Justin Tumlinson), latest version: http://ssrn.com/abstract=2596846
R&R *at Management Science*

[21] Human Capital, Firm Capabilities and Innovation (with Ajay Bhaskarabhatla and Thomas Peeters) Latest version: http://ssrn.com/abstract=3084638
R&R *at Management Science*

[22] Patent disclosure (with Kyle Herkenhoff and Chenqi Zhu)
Latest version: https://ssrn.com/abstract=3158031

[23] What determines US patent allowance? (with Alan Marco), Available on request

WORK IN PROGRESS

[24] Patent disclosure and market reaction (with Chenqi Zhu)

[25] Market reaction to pharma product announcements (with Patrick Augustin, Gunnar Grass and Marti Subrahmanyam)

[26] Scientific inference in organizational research (with Zur Shapira)

[27] Patents: Speed v/s Scope (with Alexander Ljungqvist and Chenqi Zhu)

[28] Examiner culture and patent outcomes (with Alexander Ljungqvist and Manav Raj)

PRESENTATIONS

2018 (includes planned): Washington University—Olin Business School, NYU-Stern Management Department brownbag, Federal Reserve Bank of Dallas, Bocconi University, Academy of Management Meetings

2017: Antonin Scalia Law School (George Mason University), New York University—Stern School of Business (Finance Research Day), University of California, San Diego (School of Global Policy and Strategy), Empirical Patent Law Conference (Duke University), Searle Center Research Roundtable on Patents and Technology Standards (Northwestern Law), New York University—Langone Medical Center, Technical University of Munich, New York University School of Law, Purdue University (Krannert School of Management) , NYU-Stern Undergraduate Honors Seminar

2016: Ivey Business School—University of Western Ontario, Center for the Protection of Intellectual Property Thomas Edison Meeting (Florida), University of Colorado, Boulder, Columbia Business School, NYU—Stern Management Department Brownbag, London Business School, Wisconsin School of Business (Madison), Hoover IP2 conference (Stanford University), US Patent and Trademark Office (Alexandria), 2016 Wharton Technology Conference, Workshop on Innovation in a Global Economy (Harvard Business School), National Bureau of Economics Research Summer Meeting (Intellectual Property and Innovation Group), Congressional Inventions Caucus Briefing (Washington, DC), Conference on Intellectual Property & Global Prosperity (George Mason University), NYU-Stern Management Department brownbag, University of Michigan (Ann Arbor), Harvard Business School (Entrepreneurship Unit)

2015: Tata Consultancy Services (Bangalore), University of Maryland—Smith School of Business, Universidad de Piura—Economics Department (Lima), Hoover IP2 Conference (Stanford University), Hebrew University of Jerusalem (EMBA students on tour at New York), Center for Protection of Intellectual Property Meetings (San Diego), NYU Stern Faculty Lunch Seminar Series (New York), Sumantra Ghoshal Conference on Managerially-Relevant Research (London Business School), Innovation and International Business Conference (George Washington University), Hoover-United States Patent and Trademark Office Conference (Washington DC), US Patent and Trademark Office (Chief Economist's Office), University of California, Berkeley (via Skype), University of Chicago—Booth School of Business, Harvard Business School (Strategy unit)

2014: Indian Institute of Management (Bangalore), Georgia Institute of Technology (Scheller School of Business), 10th Smith Entrepreneurship Research Conference (University of Maryland), Entrepreneurship and Innovation Research Workshop (NYU-Stern) SRF Conference (Santa Fe), Academy of Management (Philadelphia), US Patent and Trademark Office (Chief Economist's Office), University of California, Berkeley (Fall Innovation Seminar), Kauffman Emerging Scholars Conference (Kansas City), University of California, Los Angeles (Anderson School of Management), National Bureau of Economics Research Winter Meeting (Entrepreneurship Group), U.S. Patent and Trademark Office (Webinar)

2013: University of California, Berkeley (Spring Innovation Seminar), Utah-BYU Winter Strategy Conference, 2013 Wharton Technology and Innovation Conference, Atlanta Competitive Advantage Conference, University of Oregon (Causal Inference Seminar, via Skype), Sixth Annual Conference on Innovation and Entrepreneurship, Northwestern University School of Law, 10th Annual International Industrial Organization Conference (Boston), Ludwig Maximilian University of Munich, 5th ZEW/MaCCI Conference on the Economics of Innovation and Patenting (Mannheim), Fourth Workshop for Junior Researchers on the Law & Economics of Intellectual Property and Competition Law (Munich), Ludwig Maximilians Universität—Microeconomics and Management Seminar (Munich), Erasmus School of Economics (Rotterdam), National Bureau of Economics Research Summer Meeting (Intellectual Property and Innovation Group), Academy of Management Meetings (Orlando, Florida), UK Intellectual Property Office—Patent Use Conference (London), Rutgers Business School (Newark, NJ), 4th HEC Workshop on Entrepreneurship (Paris), New York University (Stern Management Department Seminar, Fall)

2012: Duke University (Economics of Innovation Seminar), Ohio State University (Glen School of Public Affairs), Georgia Tech (School of Public Policy), New York University (Stern Management Department Seminar, Spring), Indian Institute of Management (Ahmedabad), Indian Institute of Management (Bangalore), New York University (Stern Economics of Strategy workshop), Academy of Management meetings (Boston), New York University (Wagner School of Public Affairs), Harvard Business School (Strategy Unit), University of Michigan, Ann Arbor (Ross School of Business), Roundtable on Engineering Entrepreneurship Research (Georgia Tech), The 5th Israel Strategy Conference (Tel Aviv), Columbia Business School 3rd Annual Strategy Conference (New York)

2011: University of California, Berkeley (Spring and Fall Innovation Seminars), NYU-Stern Management Department Seminar (Spring, Summer and Fall) NYU-Poly, National Bureau of Economics Research Summer Institute (IPE Group), The Strategy Research Initiative Workshop (Annapolis), Columbia University (Mailman School of Public Health), NYU(Department of Politics), Harvard University (Science-Based Business Initiative Seminar Series), Duke University (Fuqua Strategy Seminar), Harvard Business School (Institutions and Innovation Conference), National Bureau of Economics Research Winter Meeting (Entrepreneurship Group)

2010: Stern School of Business (New York University), Wharton School (University of Pennsylvania), Goizueta School of Management (Emory University), Rotman School of Management(University of Toronto), Sauder School of Business(University of British Columbia), School of Public Policy (George Mason University)

2009: Carey School (Johns Hopkins University), Copenhagen Business School, School of Management (Boston University), National Bureau of Economics Research (Productivity Seminar Series)

2008: Roundtable on Engineering Entrepreneurship Research (Georgia Tech)

2005: American Association for the Advancement of Science: Conference-3 (Washington D.C.)

SELECTED WORKSHOPS

- Roundtable on Empirical Methods in Intellectual Property, Cardozo Law School (May 2017)
- Strategy Junior Faculty Summer Camp, Tuck School of Business at Dartmouth (July 2013)
- Workshop for Junior Researchers on the Law & Economics of Intellectual Property and Competition Law, International Max Planck Research School for Competition and Innovation and the Center for Law & Economics at ETH Zurich (June 2013)
- Commercializing Technology through the Power of IP. Licensing Executives Society (October 2009)
- Entrepreneurship Research Boot Camp. National Bureau of Economics Research (July 2009)
- PhD Seminar in Entrepreneurship. Ewing Marion Kauffman Foundation, (June 2008) Cleveland, OH

TEACHING

Competitive Strategy. Langone MBA program. NYU-Stern; August 2010–present
Corporate Strategy. Langone MBA program. NYU-Stern; September 2011-present
Strategy. MBA program. NYU-Stern; August 2014 –present
Doctoral Course on Innovation. Spring 2016
Session on Innovation and Public Policy (2013, 2014, 2015)
Session on Entrepreneurial Strategy (2017)

GRANTS

National Bureau of Economics Research, Innovation Policy Grant, 2015-2016, $20,000
United States Patent and Trademark Office, 2014-2015, $108,503.7
United States Patent and Trademark Office, 2012-2013, $58,000
United States Patent and Trademark Office, 2011, $15,000
Kauffman Foundation Junior Faculty Fellow Award, 2012-2013, $40,000
Kauffman Foundation Grant #20110112, 2011, $8,145
National Bureau of Economic Research, Entrepreneurship Working Group Travel Grant, Summer 2008, $1,000
Institute of Business and Economic Research dissertation grant, 2009, $1,500

ACADEMIC SERVICE

Editorial and Refereeing

- Senior Editor, *Organization Science* (2015-)
- Guest Associate Editor, *Management Science* (2014, 2015, 2016)
- Refereed manuscripts for *Science*, *Management Science, Review of Economic Studies, Rand Journal of Economics, Review of Economics & Statistics, Journal of Law & Economics, Organization Science, Strategic Management Journal, Journal of Economics & Management Strategy, Research Policy, Industrial & Corporate Change, Journal of Technology Transfer, Minerva, Journal of Law, Economics & Organization, International Journal of Industrial Organization, IEEE Transactions on Engineering Management, Journal of the European Economic Association, Scientometrics, Labour Economics, California Management Review, Public Finance Review, Public Choice, Technovation, International Journal of Technology Management, Economic Inquiry, Economics & Politics*
- Invited to referee grant proposals for *National Science Foundation* and *Kauffman Foundation*
- Invited to referee book proposals for *Stanford University Press, Oxford University Press* and *Palgrave Macmillan*

Student Mentorship and Supervision

- PhD Supervision: Jin-Hyun Bae, Junghyun Suh, Daniel Keum, Francis Park, Chenqi Zhu, Wendy Bradley (HEC—Paris)
- Undergraduate Supervision: Khushali Upadhyay (Advisor, Honors Thesis)
- Mentor for Kauffman dissertation award recipients at the Kauffman Entrepreneurship Mentoring Workshop, January 6-7, 2013. San Diego, CA

Conference and Seminar Organization

- Co-chair, 22nd Annual Organization Science Winter Conference (2016)
- Organizer, NYU-Stern Economics of Strategy Conference (2012, 2015)
- Faculty Discussant, Columbia-Stern PhD Student Conference (2013, 2014)
- Organized presenters' session on intellectual property at AOM (2014)
- Organizer, Professional Development Workshop on Patents at AOM (2015)
- Organizer, NYU-Stern Creativity & Innovation Research Initiative (2014-)

External and Internal Committees

- Academy of Management—Technology, Innovation and Management Best Student Paper Awards Committee (2014)
- NYU-Stern Management Department Research Committee (2014-2015)
- NYU-Stern Management Department Annual Merit Review Committee (2014-2015)
- NYU-Stern Management Department Doctoral Program Committee (2016-)

Memberships

American Economic Association, Academy of Management, The Econometric Society, Strategic Management Society, Strategy Research Forum

MEDIA COVERAGE

Research featured in outlets such as *Nature*, *NPR Marketplace, Wall Street Journal, Chronicle of Higher Education, USNews, Inc. Magazine, ArsTechnica, Outlook India, Dawn, Harvard Business Review, Frankfurter Allgemeine Zeitung, Engineering.com,* and others

INDUSTRY EXPERIENCE

Abt Associates, Cambridge, MA. Intern, 2004
Robert Bosch, Stuttgart and Bangalore. Software Engineer, 1999 – 2002

PERSONAL

Born: November 05, 1977
U.S. Citizen
Married to Aparna Hegde née Padmanabhan with one child (Amogh, born on August 29, 2015)
Languages: English, Kannada (Native), Hindi (Conversational), Sanskrit (Basic), German (Basic)

Last Updated: May 2018

Manav Raj

Doctoral Candidate in Management and Organizations
New York University • Leonard Stern School of Business
40 West 4th Street • New York City, NY • 10012
Telephone: (512) 923-2945
mraj@stern.nyu.edu

April 2018

EDUCATION

New York University, Leonard Stern School of Business, New York City, NY
Ph.D., Management and Organizations (Specialization: Management Strategy)
Expected graduation: May 2022

Dartmouth College, Hanover, NH
A.B., *Cum Laude*, Economics Major with a Minor in Public Policy, 2015

RESEARCH INTERESTS

Primary: Drivers of entrepreneurial entry and factors determining entrepreneurial success

Secondary: Decision-making under uncertainty and the effect of technological change

PUBLICATIONS

1. Felten, E., **M. Raj**, & R. Seamans (2018) A Method to Link Advances in Artificial Intelligence to Occupational Abilities. *American Economic Association Papers & Proceedings.* (Forthcoming)

2. **Raj, M.** & R. Seamans (2018) AI, Labor, Productivity, and the Need for Firm-Level Data. In *The Economics of Artificial Intelligence: An Agenda*, eds. Ajay Agrawal, Joshua S. Gans and Avi Goldfarb, University of Chicago Press: Chicago. (Forthcoming)

WORK IN PROGRESS

1. Hegde. D, Ljungqvist, A. & **M. Raj**. Effect of Ethnicity on Patent Examination.

2. Felten, E., **M. Raj**, & R. Seamans. Linking Advances in Artificial Intelligence to Occupations and Industries.

3. **M. Raj** & J. Eggers. CEO Decision-Making Under Employment Threat

CONFERENCE PRESENTATIONS

*Denotes author who presented (or will present).

Felten, E., **M. Raj**, & *R. Seamans (2018) A Method to Link Advances in Artificial Intelligence to Occupational Abilities. Paper presented at the Wharton Technology & Innovation Conference, Philadelphia, PA. (*April*)

REVIEWING EXPERIENCE

Organization Science Review (*Ad Hoc Reviewer)* 2018 to present

MEMBERSHIPS AND AFFILIATIONS

Academy of Management 2018 to present

Strategic Management Society 2018 to present

Institute for Operations Research and the Management Sciences 2018 to present

PREVIOUS WORKING EXPERIENCE

Cornerstone Research Fall 2015 – Spring 2017
Analyst, Consulting Group

Dimensional Fund Advisors Summer 2014
Associate (Intern), Financial Advisors Services Group

J.P. Morgan Chase & Co. Winter 2014
Consultant (Intern), Consumer Bank & Credit Card Division