NBER Innovation Policy Research Grant Proposal

Title: Technological Opportunity and the Locus of Innovation: Airmail, Aircraft, and Inventors

Name: Robert Seamans, NYU Stern School of Businesses, rseamans@stern.nyu.edu (co-authors: Eunhee Sohn, Assistant Professor, Georgia Tech and Daniel Sands, PhD Student, NYU Stern School of Business)

Brief Summary: This project studies how early U.S. airmail routes affected both the level and quality of aircraft-related innovations. This proposal seeks an NBER grant to fund research assistance and conference travel.

Grant Proposal Description:

Overview

Our project examines how government procurement influences private sector innovation. Extensive research explores how innovation helps determine economic growth, and extensive attention has been paid to the direct effect on innovation of public policies including R&D tax credits, patent boxes, standards and direct government spending on R&D (e.g., Bloom et al., 2013, Griffith et al., 2014, Simcoe, 2012). However, public policies can also indirectly affect innovation, in positive and negative ways. For example, Acharya and Subramanian (2009) identify how debtor-friendly bankruptcy codes encourage innovation.

An area that remains relatively underexplored is how government procurement affects the amount and type of innovation (see Cohen (2010) for some notable exceptions). This oversight in the literature is somewhat surprising given the number of high profile examples of government procurement leading to innovation, and given the size of government procurement—for example, U.S. federal government procurement totaled almost $500B in 2007, accounting for 3.5% of GDP, whereas federal spending on R&D totaled about $55B.[1] Research analyzing technological developments derived from government R&D includes the internet, semiconductors, hardware, and software, and the major technological components of smartphones. Despite the numerous innovations spurred by government procurement—notable recent examples include tourniquet design and use, drones and robots, and shelf-stable foods—relatively little academic research has attended to this space.

For this project we construct a novel dataset of U.S. patents and use it to study how U.S. Airmail Service impacts aircraft technology. During 1918-1930, the U.S. Airmail Service expanded from nothing to a network of over 40 routes serving numerous locations across the United States. We study how the entry of airmail into a county during this time period affected the amount and type of aircraft-related innovations in that county. Aircraft in this time period were relatively crude, with much room for improvement of the functionality and operation of aircraft. The opening of an airmail route into a county provided opportunities for local inventors in those counties to interact with this new and evolving technology, and to innovate on its design and features.

Our initial findings suggest that aircraft-related patents increase by about 40% in counties that

[1] Available at https://www.fpds.gov/downloads/FPR_Reports/Fiscal%20Year%202007/Total%20Federal%20View.pdf,

are served by airmail ("treated counties"). However, these patents appear to be relatively incremental, based on various measures of forward citations. Most of these patents appear to be created by individual inventors who are not associated with an aircraft manufacturer. Thus, our study builds on existing literature to develop an understanding of how government procurement can indirectly increase innovation and shift the locus of innovation away from manufacturers onto independent inventors, thereby democratizing innovation (e.g., Von Hippel, 1988). These findings also help build an understanding of how shifting the locus of innovation outside the firm may affect the trajectory of innovation in positive and negative ways.

Why we are requesting NBER grant funding

Our initial results are derived from analyses using a unique dataset of patents that we created for this project, that we will make publicly available upon completion. This dataset was created by downloading PDFs of patents granted between 1900-1940 from the USPTO website, scraping the PDFs for relevant content, and then aggregating the content to appropriate levels (in most cases to the county level for year of patent application). However, additional cleaning of the data is necessary, particularly to inventor and assignee names to create a history of inventors and assignees during this time period. We therefore request additional funding for research assistants to help further clean and complete the dataset.

We also request funding for the three authors to travel to and present at the Strategic Management Society (SMS) conference in Houston, TX in October 2017. Our project has been nominated for "best paper" for the conference (SMS requests extended abstracts for the annual conference, with the expectation that a draft of the paper will be ready in July 2017).

We are therefore requesting NBER grant funding of $20,000 which includes:

1. $6,000 for conference travel
2. $14,000 for research assistance

References

Acharya, Viral V., and Krishnamurthy V. Subramanian. 2009. "Bankruptcy codes and innovation." *Review of Financial Studies*, 22(12): 4949-4988.

Bloom, Nicholas, Mark Schankerman, and John Van Reenen. 2013. "Identifying technology spillovers and product market rivalry." *Econometrica,* 81(4): 1347-1393.

Cohen, Wesley M. 2010. "Fifty years of empirical studies of innovative activity and performance." *Handbook of the Economics of Innovation*, 1: 129-213.

Griffith, Rachel, Helen Miller, and Martin O'Connell. 2014. "Ownership of intellectual property and corporate taxation." *Journal of Public Economics*, 112: 12-23.

Simcoe, Tim. 2012. "Standard Setting Committees: Consensus Governance for Shared Technology Platforms." *American Economic Review*, 102(1): 305-336.

Von Hippel, Eric. 1988. *The Sources of Innovation*. Oxford University Press, UK.

Robert Seamans

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APPOINTMENTS

New York University, Stern School of Business 2009 – present
Associate Professor, 2015 -
On leave academic year 2015 – 2016
Assistant Professor, 2009 - 2015

White House Council of Economic Advisers 2015 – 2016
Senior Economist for Technology and Innovation

RESEARCH FOCUS

My research studies how technology and governance structures affect strategic interactions between firms, affect incentives to innovate, and shape market outcomes. Most of my research settings are industries characterized by multi-sided markets, including cable TV, credit cards, Internet, newspapers, telecommunications, and other technology-focused industries.

PUBLICATIONS (Authors Listed in Alphabetical Order)

[1] Robert Seamans. 2012. Fighting City Hall: Entry Deterrence and Technology Deployment in the Cable TV Industry. ***Management Science.*** 58(3): 461-475. [Lead Article]

[2] Aaron Chatterji and Robert Seamans. 2012. Entrepreneurship, Credit Cards and Race. ***Journal of Financial Economics*.** 106(1): 182-195.

[3] Robert Seamans. 2013. Threat of Entry, Asymmetric Information and Pricing. ***Strategic Management Journal*.** 34(4): 426-444.

[4] Robert Seamans and Feng Zhu. 2014. Responses to Entry in Multi-Sided Markets: The Impact of Craigslist on Local Newspapers. ***Management Science.*** 60(2): 476-493.

- *Runner-up for Best Paper Published in Management Science, 2015*

[5] Alicia Robb and Robert Seamans. 2014. The Role of R&D in Entrepreneurial Finance. ***Advances in Strategic Management (Special Issue on Finance and Strategy).*** 31: 341-373.

- *Winner of Kauffman Firm Survey Best Paper Award, Strategic Management Society 2011*
- *Winner of Kauffman Foundation Promising Paper Award, 2011*

[6] Victor Bennett, Robert Seamans and Feng Zhu. 2015. Cannibalization and Option Value Effects of Secondary Markets: Evidence from the US Concert Industry. ***Strategic Management Journal.*** 36(11): 1599-1614. [Lead Article]

- *Winner of Best Paper for Practice Implications, Strategic Management Society 2013*
- *Runner-up for Best Paper Award, Strategic Management Society 2013*
- *Winner, BPS Distinguished Paper Award, Academy of Management 2013*
- *Academy of Management Best Paper Proceedings, 2013*

[7] Jason Chan, Anindya Ghose and Robert Seamans. 2016. Internet and Hate Crime: Offline Spillovers from Online Access. ***MIS Quarterly.*** 4(2): 381-403.

[8] Geraldo Cerqueiro, Deepak Hegde, María Fabiana Penas and Robert Seamans. Forthcoming. Debtor Rights, Credit Supply, and Innovation. ***Management Science***. (Accepted March 17, 2016).

[9] Robert Seamans and Feng Zhu. Forthcoming. Repositioning and Cost Cutting: The Impact of Competition on Platform Strategies. ***Strategy Science.*** (Accepted January 14, 2017).

Selected press for published papers:
ABC, Ars Technica, The Atlantic, Boston Globe, CBS, Daily Beast, Economic Times, Forbes, Harvard Business Review, MSN, The Nation, The New York Times, TheStreet.com, Wall Street Journal, others.

SELECTED WORKING PAPERS

[10] Competition between Organizational Forms: Banks vs. Credit Unions after the Financial Crisis (with Aaron Chatterji and Jiao Luo), *under review.*

- *Academy of Management Best Paper Proceedings, 2015*

[11] Intra-firm Spillovers? The Stock and Flow Effects of Collocation (with Evan Rawley) *US Census Bureau working paper # CES-WP-15-01, revisions requested.*

[12] Entrepreneurship, Innovation, and Political Competition: How the Public Sector Helps the Sharing Economy Create Value (with Yongwook Paik and Sukhun Kang), *under review*.

[13] Strategy in the Context of Digital Innovation and Big Data (with Xavier Martin), *under review*

[14] The Effect of the Internet on Newspaper Readability (with Abdallah Salami), *Net Institute working paper #14-13*

SELECTED WORK IN PROGRESS AND OTHER WRITING

Technological Opportunity and the Locus of Innovation: Airmail, Aircraft, and Inventors (w/ Eunhee Sohn and Daniel Sands)

Bankruptcy Law, Political Economy, Entrepreneurship (w/ Geraldo Cerqueiro and M. Fabiana Penas)

Complements or Substitutes? Firm-Level Management of Robotics and Automation (w/ Sue Helper)

Transaction Cost Economics in the Digital Economy: A Research Agenda (w/ Steve Tadelis and Frank Nagle)

OTHER WRITING

"We Won't Even Know If A Robot Takes Your Job" *Forbes*, January 11, 2017
https://www.forbes.com/sites/washingtonbytes/2017/01/11/we-wont-even-know-if-a-robot-takes-your-

job/

"No, Robots Should Not Be Taxed" *Forbes*, March 3, 2017
https://www.forbes.com/sites/washingtonbytes/2017/03/03/no-robots-should-not-be-taxed

"Immigrants Can Help Boost American Innovation and Economic Growth" (with Petra Moser) *Forbes*, April 25, 2017
https://www.forbes.com/sites/washingtonbytes/2017/04/25/immigrants-can-help-boost-american-innovation-and-economic-growth/

SEMINARS, PRESENTATIONS, DISCUSSIONS

Seminars (*scheduled)
*Bocconi, Boston University, Columbia, CUNY-Graduate Center, Duke, Emory, Federal Trade Commission, *Frankfurt School of Finance and Management, George Washington University, Harvard, Imperial College London, London Business School, MIT, National University Singapore, *Pomona, Purdue, Rutgers, Seoul National University, Stanford, Temple, UCLA, University of British Columbia, University of Illinois, University of Michigan, University of Minnesota, UNC-Chapel Hill, University of Southern California, University of Toronto, *University of Western Ontario, Washington University St. Louis

Conference Presentations and Discussions (*scheduled)
2016: NSF Workshop on Innovation, Darden Cambridge Conference, National Conference on Business Development in Underserved Communities, Tuck Junior Faculty Summer Camp, Kauffman Foundation Minority Entrepreneurship Workshop at AOM, SMS, INFORMS-Strategy Science

2015: Kauffman Dissertation Workshop at AEA, Atlanta Competitive Advantage Conference, SRF, National Conference on Business Development in Underserved Communities, AOM, SMS

2014: Institutions & Innovations Conference, Kauffman Emerging Scholar Conference, SMS, SIFR Conference on the Financial Economics of Entrepreneurship and Innovation, AOM, Tuck Junior Faculty Summer Camp, NBER Entrepreneurship Boot Camp Alumni Panel, Queen's University Economics of Entrepreneurship & Innovation Conference

2013: Institutions & Innovations Conference, SMS, AOM, Tuck Junior Faculty Summer Camp, SRF, HBS Institutional Analysis Conference, UMD Smith Entrepreneurship Conference, Utah-BYU Winter Strategy Conference

2012: SMS, AOM, Northwestern University Conference on Internet Search and Innovation, SRF

2011: Columbia Strategy Conference, Institutions & Innovations Conference, Fox-Kauffman Workshop on Empirical Entrepreneurship, SMS, NBER Summer Institute, ISNIE, ACAC, IIOC

2010 & earlier: NET Institute Conference, ICT Conference-LMU, Institutions & Innovations Conference, Atlanta Fed Small Business Conference, AOM, NBER Summer Institute, Industry Studies Conference, UVA Darden Entrepreneurship and Innovation Research Conference, Telecom Policy Research Conference, AEA, ISNIE, IIOC, CCC

GRANTS AND FELLOWSHIPS

Kauffman Foundation Grant for CCC Doctoral Conference at NYU (2015) ($25,000)
Kauffman Foundation Junior Faculty Fellowship Grant (2013-14) ($40,000)
NBER Grant for Summer Entrepreneurship Boot Camp (2009) ($1,000)
NET Institute Summer Research Grants (2008, 2010, 2013, 2014) ($4,500 - $6,000)
American Public Power Association Student Research Grant (2006) ($2,000)
UC Berkeley Haas School of Business Schwabacher Dissertation Fellowship (2008-09)
California Management Review Doctoral Student Fellowship (2007-08)
Kauffman Foundation Fellowship for Summer Entrepreneurship Studies (2007)
UC Berkeley Haas School of Business Graduate Fellowships (2004-06)

TEACHING

Professor
MBA Strategy, NYU Stern (2017)
MBA Competitive Strategy, NYU Stern (2017)
MBA Corporate Strategy, NYU Stern (2009, 2010, 2011, 2012, 2013, 2014, 2017)

- *Mini-cases developed: 5-Hour Energy Drink, Franchising, Disney+Marvel, J&J's Credo*

MBA Game Theory, NYU Stern (2014, 2015, 2017)
EMBA Game Theory, NYU Stern (2017)
Undergraduate Game Theory, NYU Stern (2010, 2011, 2012, 2014, 2015, 2017)

Graduate Student Instructor
MBA Strategy, UC Berkeley Haas (2007, 2008)
MBA Microeconomics, UC Berkeley Haas (2006, 2007)

- *UC Berkeley Outstanding GSI Award (awarded to <10% of UC Berkeley GSIs)*
- *Earl F. Cheit Outstanding GSI Award for EWMBA program (awarded to one GSI/yr)*

DISSERTATION COMMITTEES

Hong Luo (NYU Stern Economics, 2011; First job: Harvard Business School)
Selvin Akkus (NYU Stern Economics, 2013; First job: Bates-White)
Jason Chan (NYU Stern Information Systems, 2014; First job: University of Minnesota)
Sandy Yu (NYU Stern Economics, 2015; First job: post-doc at UC Berkeley)
Francis Park (NYU Stern Management)

PROFESSIONAL SERVICE

Reviewing

- Editorial Review Board: *Strategic Management Journal* (2013-)
- Editorial Review Board: *Strategic Science* (2017-)
- Meritorious and Distinguished Service Awards: *Management Science* (2012, 2013, 2014)
- Special Issue Editor: *Small Business Economics* (2016)
- Ad Hoc Reviewer: AOM and SMS meetings, Kauffman Foundation grants, SMS Strategy Research Foundation grants, *Organization Science* dissertation award, and multiple journals

including: *California Management Review*, *Information Economics & Policy*, *Information Systems Research*, *Journal of Economics & Management Strategy*, *Journal of Industrial Economics*, *Journal of Law and Economics*, *Journal of Law, Economics & Organization*, *Management Science*, *Organization Science*, *Strategic Management Journal* and *Strategy Science*.

Conference Organization

- Organizer, Co-Organizer or Steering Committee: CCC (2014, 2015, 2018), Kauffman Emerging Scholar Conference (2014), NYU Stern Economics of Strategy Workshop (2011, 2014), Institutions & Innovations (UC Berkeley alumni) Conference (2012, 2013, 2014, 2016)
- AOM BPS Division Research Committee (2013-2015)
- AOM Presenter Symposia and Panels (2008, 2011, 2014, 2017)
- SMS Panel on Sharing Economy (2016)
- Discussant: Multiple conferences including: AOM, IIOC, NETI, SIRF, SMS, SRF

Mentoring

- Intel Mentorship, Bronx High School of Science (2013-2015)
- NYU Stern Undergraduate Honors Thesis Advisor (2011, 2012)
- Peer Advisor: UC Berkeley (Haas) Business & Public Policy PhD Students (2006-2007)

NYU Service

- NYU representative to US Census Bureau's NYCRDC Advisory Board and Executive Committee (2014-)
- NYU Stern Annual Venture Competition Judge (2013, 2014)
- NYU Stern Management Department Research Committee (2013-2014)

Membership

- Academy of Management, American Economic Association, INFORMS, Strategic Management Society, Strategy Research Forum

EDUCATION

University of California, Berkeley, Haas School of Business 2009
Ph.D. in Business Administration; Concentration: Business and Public Policy
Dissertation: "Strategic and Structural Barriers to Entry"; Committee: David Mowery (co-chair), Steven Tadelis (co-chair), Howard Shelanski, Catherine Wolfram

- *Best Dissertation in Competition Policy, UC Berkeley (2010)*
- *Hayase Award for Service to PhD Students (2007)*

Boston University, Graduate School of Arts and Sciences 2004
M.A. in Economics

Yale School of Management 2001
M.B.A. with Strategy Concentration

Reed College 1996
B.A. in English; Senior Thesis on Chaucer's *Canterbury Tales*

INDUSTRY EXPERIENCE

Analysis Group (Boston, MA), Associate	2004
Massachusetts Dept of Economic Development (Boston, MA), Consultant	2001
Corillian Corp (Portland, OR), Strategic Initiatives	2000
US International Trading Corp (Portland, OR), Project Manager	1997 – 1999
English Teacher; Various Acting Roles (Fuzhou, China)	1996

PERSONAL

- Married to Georgia Silvera Seamans, PhD (Landscape Architecture and Environmental Planning, UC Berkeley) since August 9, 2003
- Two children: son Robert (b. 2010) and daughter Colette (b. 2014)
- Other interests include skiing, running, and rooting for Boston sports teams

Last updated: April 25, 2017

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Scheller College of Business
Atlanta, GA 30308, USA

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Homepage: https://scheller.gatech.edu/sohn

Employment

Scheller College of Business, Georgia Institute of Technology

- Assistant Professor of Strategic Management, Sep 2015-

Education

Ph.D., Management, Massachusetts Institute of Technology, 2015

- Affiliation: Technological Innovation, Entrepreneurship and Strategic Management
- Advisors: Scott Stern (Chair), Christian Catalini, Matt Marx, James Utterback

B.S., International Business/Strategy, Seoul National University, Korea, 2009

B.A., Business Administration, Seoul National University, Korea, 2007

Research Interests

Innovation Strategy, Academic Entrepreneurship, Regional Clusters, Economics of Science, Industry Evolution

Research

Working Papers

Reverse Knowledge Spillovers from Industry to Academia: Evidence from the Agricultural Biotechnology Revolution

- Revise & Resubmit at *Management Science*
- Earlier version in *Academy of Management Best Paper Proceedings 2014*

Opportunities and Incentives: How Academic Scientists Respond to the Rise of Industry R&D

The Effect of Cultural Tightness on Mathematical Performance among Talented Students (with Brian Park, HeeJung Jung and Roderick Swaab)

The Endogeneity of Science (with Scott Stern and Nate Rosenberg (Deceased))

Work in Progress

Technology Opportunities and Local Innovation: Early Airmail and Aircraft Inventors (with Robert Seamans and Daniel Sands)

- Nominated for 2017 SMS Annual Conference Best Paper Prize
- Presented at Stanford, UCLA, NYU, UNC (by coauthor)

Reverse Knowledge Spillovers and Academic Entrepreneurship

- Data collection stage

Others

Research service to MIT Regional Entrepreneurial Acceleration Program / U.S. Cluster Mapping Project (2011-2014)

Invited Presentations & Conferences

Strategic Management Society 37th Annual Conference, Oct 2017, Houston, TX

The 13th Smith Entrepreneurship Research Conference, Apr 2017, College Park, MD

Georgia Institute of Technology (Strategic Management), Feb 2015, Atlanta, GA

Washington University in St. Louis (Strategy), Jan 2015, St. Louis, MO

University of Southern California (Management & Organization), Jan 2015, Los Angeles, CA

INFORMS/Organizational Science Dissertation Proposal Competition, Nov 2014, San Francisco, CA

Roundtable for Engineering Entrepreneurship Research, Nov 2014, Georgia Tech, Atlanta, GA

MIT-TIES seminar, Sep 2014, MIT Sloan, Cambridge, MA

Academy of Management Annual Meeting, Aug 2014, Philadelphia, PA

DRUID Society Conference, Jun 2014, Copenhagen Business School, Denmark

Charles River Conference & Doctoral Workshop, May 2014, Harvard Business School, Boston MA

Consortium on Competitiveness and Cooperation, March 2013, Kansas City, MO

Honors & Awards

INFORMS/Organization Science Dissertation Proposal Finalist, 2014

REER (Roundtable for Engineering Entrepreneurship Research), Best Student Paper Finalist, 2014

AOM TIM Division's Best Student Paper Award Finalist, 2014

Best Paper Proceedings of the Academy of Management Meeting, 2014

MIT Sloan Doctoral Fellowship, 2009-2014

Korea Foundation for Advanced Studies Fellowship for Overseas Doctoral Studies, 2009-2014

Teaching

Instructor

- Strategic Management, Scheller Undergraduate Core, Georgia Institute of Technology, Spring 2016

Teaching Assistant

- Entrepreneurial Strategy, MIT Sloan MBA, Spring 2015
- Regional Entrepreneurial Acceleration Lab, MIT Sloan Fellows, Fall 2012
- Competitive Strategy, MIT Sloan Executive MBA, Spring 2012
- Corporate Strategy, Seoul National University, Spring 2008
- Strategy Formulation & Implementation, Seoul National University, Fall 2007

Professional Services & Activities

Co-organizer for Georgia Tech Strategy Seminar Series Fall 2015-Spring 2016

Ad-hoc reviewer for Academy of Management Annual Meeting (TIM, BPS, ENT), *Organization Science, Journal of International Business, Industry and Innovation, Urban Studies*

Dissertation Committee Member for Mayank Jaiswal

Other Activities & Skills

Internship for United Nations High Commissioner for Refugees (Seoul, Korea, 2005)

Languages: English, Korean, Chinese (Mandarin)

Last updated: April 30, 2017