PUBLIC DISCOURSE AND THE EVOLUTION OF SCIENCE AND TECHNOLOGY: A *TEXT ANALYSIS* APPROACH

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Nicola Lacetera, University of Toronto and NBER[1]

Economic change in all periods depends, more than most economists think, on what people believe. (Mokyr, 2010)

Description of the project: The quality and success of scientific discoveries and technological advances does not only depend on the recognition of these advances by the scientific community through, for example, publications, citations, awards, and so on. An important measure of the impact of these discoveries is also their public perception, understanding and ultimately acceptance. Public perception is likely to influence the commercial success of certain technologies, as well as the diffusion of the underlying knowledge, for example in educational institutions. Public consensus is also a driver of political decisions regarding the promotion and regulation of science and technology. In turn, scientific and technological progress affects opinions, culture and behaviors (Jensen, 2007; Bloom et al., 2012).

Although a large literature in economics investigates the determinants of technology adoption and diffusion (Griliches, 1984; Grossman and Helpman, 1991; Eaton and Kortum, 2002; Griffith et al., 2003), there has been limited attention to role of public discourse on the rate, direction and diffusion of scientific and technological progress. Mokyr (2017), for example, argues that a pre-condition for the Industrial Revolution occurring in Europe was the Enlightenment. In current times, consider for instance public debates around the development and use of genetically modified organisms, cloning, vaccination, as well as ethical concerns about the safeguard of privacy as "threatened" by the development of information and communication technology, the development of artificial intelligence, or the "behavior" of self-driving cars (see for example http://moralmachine.mit.edu/). Furthermore, there has been only limited effort to measure the extent to which scientific and technological advances affected culture and the public discourse.

Investigating these issues is challenging. First, it is difficult to measure societal perceptions of science and technology. Second, one would need a long-time horizon to properly analyze the relationship between public perception and scientific and technological progress. Third, establishing causality is complicated by the two-way relationship between science and culture.

We believe that text analysis, made possible on large scale thanks to developments in information technology (such as computing power) and analytical and statistical techniques (such as machine learning), provides a promising approach to understanding the relationship between scientific and technological advances and their public perceptions. The increase availability of digitized text, in very large amounts especially from the past (e.g., the XIX century) in various databases, offers the empirical ground to perform these analyses. Although the use of "text as data" is now extensive is such fields as finance, marketing and the study of media (Gentzkow et al., 2017), economists of science and innovation have relied less on these sources of information and related techniques (Catalini-Lacetera-Oettl, 2015; Guzman-Stern, 2015). As such, our proposed project presents major elements of novelty not only in the questions asked, but also in the methodologies employed. We also claim originality in proposing to combine insights from numerous disciplines, including techniques from computer science, concepts and methods from economics, and underlying ideas from history and the humanities in general. In fact, fields such as linguistics and literature are increasingly relying on large scale, computerized text analysis in their inquiries. However, to our knowledge these analyses were not applied, so far, to study the public understanding of science and technology.[2]

We propose to focus on English and Italian literature from the XIX century, both fiction and non-fiction, and to investigate the relationship between the ideas emerging from these writings and the major technological

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[2] Initiatives such as the Literary Lab at Stanford University (https://litlab.stanford.edu/) and the Centre for Computational Linguistics at the University of Toronto (http://www.cs.utoronto.ca/compling/) are relevant examples of the application of computerized text analysis to the humanities. The Public Understanding of Science initiatives at the University of Pennsylvania (http://web.sas.upenn.edu/weisberg/public-understanding-of-science/), in turn, is an example of initiatives meant to analyze people's views of science. However, these studies do not employ large scale text analyses.

and scientific progress in that era, through text analysis and techniques such as natural language processing, topic modeling, content and sentiment analysis. These are our main research questions:

- *What was the relationship between technological and scientific progress in the XIX Century?*
- *How did fiction and non-fiction writing react to major scientific and technological events? For example, were some scientific discoveries incorporated into the literary and political discourse faster and more comprehensively than others? Was there more heterogeneity in initial reactions, followed by convergence?*
- *Conversely, were literary and political writings anticipating the type of scientific and technological change? In other words, were there "ideas in the air" that were then translated into scientific discoveries?*
- *Was there a convergence in themes, interests and topics in different literatures, following certain major scientific and technological discoveries? Or were reactions more localized culturally and geographically?*

We plan to rely on a number of digital databases for literary texts that include fictional writings as non-fiction such as book essays and newspaper articles. These databases include the Gutenberg project, the Chadwyck-Healey Databases, Google Books, the British National Corpus, and others.

Our focus on the XIX century is motivated by a number of reasons. First, as mentioned above, addressing our questions of interest requires data from a long-time span. Second, the XIX was arguably a period of fundamental changes in science and technology that led to the industrial revolution and to the modern society as we know it. Understanding the evolution in the social and cultural perception of these major changes through modern techniques and digital means offers a unique opportunity to gather the impact of those changes. Third, we will be able to rely on a massive library of digitized texts from that historical period.

As a first step toward addressing our research questions more comprehensively, we will focus on the major scientific and technological events of the XIX century. Major breakthroughs were iron and steel technology, electricity, the atomic theory, the discovery of radioactivity, and the theory of evolution. We will analyze text patterns in a variety of writings as they relate to these events, e.g. their nature, diffusion, tone and development.

In addition to providing a novel perspective into the (co)evolution of public discourse, science and technology in historical contexts, we expect our study to offer insights about how computer-based text analysis could help understanding the overall role of scientific and technological discoveries on society. In the current era of fast scientific and technological change, and of uncertainty as to the economic as well as cultural, societal and ethical implications of these changes, such an approach is particularly promising ad useful. In future research we plan to apply what learned from this proposed project to more current technological events.

Proposed Budget: The table below motivates and quantifies our funding request.

Item and explanation	Price	Qty/Unit	Total Cost
Research Assistantship: Student(s) with established ability in computer programming	USD/h 40.00	425h	USD 17,000
Travel to acquire archive material	USD 1,500	2	USD 3,000
TOTAL COSTS			**USD 20,000**

References

Bloom, N., Sadun, R. and Van Reenen, J. 2012. "Americans do I.T. better: US Multinationals and the Productivity Miracle", *The American Economic Review*, 102(1):167-201.

Catalini, C., Lacetera, N. and Oettl, A. 2015 "The Incidence and Role of Negative Citations in Science", *PNAS*, 112(45): 13823–26.

Eaton, J. and Kortum, S. 2002. "Technology, Geography, and Trade", *Econometrica*, 70(5): 1741–79.

Gentzkow, M. Kelly, B. and Taddy, M. 2017. "Text as Data." NBER Working Paper 23276.

Griffith, R., Redding, S. and Simpson, H. 2003. "Productivity Convergence and Foreign Ownership at the Establishment Level." *CEPR working paper*.

Griliches, Z. 1984. "R&D, Patents, and Productivity", U. Chicago for NBER.

Grossman, G. and Helpman, E. 1991. *Innovation and Growth in the World Economy*, Cambridge, MA: MIT Press.

Guzman, J., and Stern S. 2015. XXX, *Science*, 347(6222): 606-9.

Jensen, R. 2007. "The Digital Provide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector", *Quarterly Journal of Economics*, 122(3): 879-924.

Mokyr, J. 2010. *The Enlightened Economy: An Economic History of Britain 1700-1850*. Yale University Press.

Mokyr, J. 2017. *A Culture of Growth: The Origins of the Modern Economy*, Princeton University Press.

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CONTACT INFORMATION
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Skype: michela.giorcelli

EMPLOYMENT

Assistant Professor, Department of Economics, UCLA, 2016 - present

OTHER AFFILIATIONS

Research Associate, California Center for Population Research, 2016 - present
Graduate Student Fellow, Stanford Center for International Development, 2015 - 2016
Kauffman Dissertation Fellow, Ewing M. Kauffman Foundation, 2014 - 2016

EDUCATION

Ph.D. and *M.A. in Economics*, Stanford University, 2016

Dissertation: Economic Recovery and the Determinants of Productivity and Innovation: Evidence from post-WWII Italy
Committee: Ran Abramitzky (Chair), Nicholas Bloom, Pascaline Dupas, Melanie Morten

M. Sc. in Economics, Collegio Carlo Alberto (Italy), 2010 (with distinction)

M.A. in Economics, University of Torino (Italy), 2010 (Summa cum Laude and Dignity of Print)

B.A. in Economics and Commerce, University of Torino (Italy), 2008 (Summa cum Laude)

RESEARCH FILEDS

Primary: Economic History, Labor Economics, Applied Microeconomics
Secondary: Economics of Innovation, Entrepreneurship

I. RESEARCH

WORKING PAPERS

"The Long-Term Effects of Management and Technology Transfers," *SIEPR Discussion Paper No. 16-010*. May 2016. Revised April 2017. *Submitted*.

"Copyright and Creativity: Evidence from Italian Operas," with Petra Moser. *SCID Working Paper No. 523*. June 2015. Revised April 2017. *Submitted*.

"Scientific Education and Innovation: From Technical Diplomas to University STEM Degrees," with Nicola Bianchi. April 2017.

WORK IN PROGRESS

"Technology Transfer, Innovation, and Entrepreneurship," with Nicola Bianchi.

"The Role of the Marshall Plan on Italian Post-WWII Recovery."

RESEARCH GRANTS, FELLOWSHIP AND AWARDS

Arthur H. Cole Grant, Economic History Association, 2017 ($5,000 with Nicola Bianchi)
Claire and Ralph Landau Prize for the best SIEPR Discussion Paper, 2016
Leonard W. Ely and Shirley R. Ely Graduate Student Fund Fellowship (stipend and tuition), 2015-16
Recipient, 2015 Summer Research Fellowship, John M. Olin Program in Law and Economics, Stanford Law School, 2015
Alfred D. Chandler, Jr. Travel Grant, Business History Conference ($1,500), 2015
EHA Graduate Dissertation Fellowship, Economic History Association ($10,000), 2015
Kauffman Dissertation Fellowship Award, Ewing M. Kauffman Foundation ($15,000), 2015
Graduate Student Grant, The Europe Center, Stanford University ($3,000, and $5,000 with Nicola Bianchi), 2014
Exploratory Travel and Data Grant, Economic History Association ($2,500), 2014
Graduate Research Opportunities (GRO) Award, School of Humanities and Science, Stanford University ($2,500), 2014
Department of Economics Fellowship (stipend and tuition), Stanford University, 2012-14
Unicredit Scholarship "Giovanna Crivelli" (stipend and tuition), Unicredit and Universities Foundation, 2010-12
Unicredit Scholarship "Marco Fanno" (stipend and tuition), Marco Fanno Association (declined), 2010-12
Gold Medal for the Best Dissertation in Economics, University of Torino (Italy), 2012
Optime Prize for outstanding graduates of University of Torino, Unione Industriale Torino (Italy), 2011
Laureato dell'Anno Prize for the best graduate of Economics Department, University of Torino (Italy), 2011
Optime Menzione for outstanding graduates of University of Torino, Unione Industriale Torino (Italy), 2009
Allievi Scholarship for honour students, Fondazione Collegio Carlo Alberto, Italy, 2008-10

CONFERENCE PRESENTATIONS AND INVITED SEMINARS

2017 (including scheduled): UCLA, Caltech, NBER Education Program, 77th Economic History Association Annual Meeting (San Jose, CA), Economic History Society (Royal Holloway, University of London, UK), BRICK-Collegio Carlo Alberto, EUI, EIEF, Barcelona GSE Workshop on Economics of Science and Innovation, 8th International Workshop on Applied Economics of Education (Catanzaro, Italy), 32nd European Economic Association meeting (Lisbon, Portugal)

2016: Columbia GSB, Kellogg, Cornell Johnson, Harvard Business School, Yale SOM, UC-Berkeley Haas, UCLA Anderson, UCLA, Vanderbilt University, University of Toronto – Mississauga, Northwestern University, Collegio Carlo Alberto, Bocconi Finance, NYU Stern, UC-Irvine, Universitat Pompeu Fabra, Los Andes School of Management, Politecnico di Milano, NBER Productivity SI (Boston, MA), All-UC Labor Economics Conference (UC-Davis, CA)

2015: UC-Berkeley (2x), Scuola Superiore Sant'Anna Pisa, Stanford University, Kauffman Entrepreneurship Mentoring Workshop (Boston, MA), Italian Economic History Workshop (Scuola Superiore Sant'Anna Pisa), 1st Bay Area Labor and Public Graduate Student Conference (Stanford University), 15th Trans-Atlantic Doctoral Conference (London Business School), 2015 Cliometric Society Annual Conference (Ann Arbor, MI), BHC-EBHA Joint Meeting (Miami, FL), NBER Summer Institute (Boston, MA), Stanford Institute for Theoretical Economics (SITE, Stanford University), 75th Economic History Association Annual Meeting (Nashville, TN), All-UC Labor Economics Conference (UCLA, Poster Presentation), 1st Bay Area Economic History Graduate Student Conference (Stanford University), All-UC Graduate Workshop in Economic History (Caltech)

2014: 74th Economic History Association Annual Meeting (Columbus, OH, Poster Presentation)

II. TEACHING

Graduate: Economic History of Western Europe (ECON 241)
Undergraduate: Development of Economic Institutions in Western Europe (ECON 181)
Fiat Lux: The Americanization of Europe after WWII (ECON 19)

III. PROFESSIONAL ACTIVITIES

Referee for *Journal of Economic History*, *Explorations in Economic History*, *Economic History Review*

Departmental service: Organizer of the UCLA Applied Microeconomics Proseminar (2016-17); Co-organizer of the Berkeley-Stanford Graduate Economic History Seminar (2014-16)

Last update: April 2017

CURRICULUM VITAE

NICOLA LACETERA
University of Toronto
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PERSONAL DETAILS

Born on 20 September 1976 in Fano, Italy.
Italian Citizen; Canadian Permanent Resident.

EDUCATION

2000 *Laurea* in Economics, Universita' Bocconi, Milan, Italy. *Summa cum laude*.
2006 PhD, Behavioral and Policy Science Unit, MIT Sloan School, Cambridge, MA, USA.

ACADEMIC EXPERIENCE AND APPOINTMENTS

2015-present	Associate Professor of Management, University of Toronto - Mississauga (Institute of Management and Innovation, UT-Mississauga). Cross-appointed at the Department of Economics and the Rotman School of Management.
2010–2015	Assistant Professor of Management, University of Toronto - Mississauga (Institute of Management and Innovation, UT-Mississauga). Cross-appointed at the Rotman school of Management.
2006-2010	Assistant Professor of Economics - Case Western Reserve University, Cleveland, OH.
2017-Present	Faculty Associate, Centre for Ethics, University of Toronto.
2016-Present	Research Associate, National Bureau of Economic Research.
2016 present	Fellow, CESifo Research Network
2016-present	Behavioural Economics in Action @ Rotman (BEAR) fellow.
2014-present	Faculty Fellow, Canadian Centre for Health Economics. External Affiliate, Bureau of Research on Innovation, Knowledge and Complexity, Universita' di Torino, Italy. Faculty Lead, I-CUBE business accelerator, Institute for Management and Innovation, University of Toronto – Mississauga.
2011-2016	Faculty Research Fellow, National Bureau of Economic Research.

VISITING POSITIONS

July 2016	Center for Economic Studies, LMU Munich.
Feb-Mar 2017	UC Berkeley (Department of Economics), Stanford University (Department of Economics).
July 2017	EIEF, Rome.

JOURNAL ARTICLES

1. Elias, J.J., Lacetera, N., Macis, M. and Salardi, P.: Economic development and the Regulation of Morally Contentious Activities, ***American Economic Review Papers and Proceedings***, forthcoming.
2. Lacetera, N.: Incentives and Ethics in the Economics of Body Parts, ***Osgoode Hall Law Journal***, forthcoming.
3. Agrawal, A., Lacetera, N. and Lyons, E.: Does Information Help or Hinder Job Applicants from Less Developed Countries in Online Markets?, ***Journal of International Economics***, 103, 1-12, 2016.
4. Lacetera, N., Larsen, B., Pope, J. and Sydnor, J.: Bid Takers or Market Makers? The Effect of Auctioneers on Auction Outcomes ***American Economic Journal: Microeconomics***, 8, 4, 195-229, 2016.
5. Lacetera, N., Macis, M. and Mele, A.; Viral Altruism? Generosity and Social Contagion in Online Networks, ***Sociological Science***, 3, 202-238, 2016.
6. Catalini, C., Lacetera, N. and Oettl, A. The Incidence and Role of Negative Citations in Science, ***Proceedings of the National Academy of Science of the United States of America***, 112, 45, 13823–26, 2015.
7. Lacetera, N. and Sydnor, J.: Would You Buy a Honda Made in the U.S.? The Impact of Production Location on Manufacturing Quality, ***Review of Economics and Statistics***, 97, 4, 855-76, 2015.
8. Elias, J.J., Lacetera, N. and Macis, M.: Sacred Values? The Effect of Information on Attitudes toward Payments for Human Organs, ***American Economic Review Papers and Proceedings***, 105, 5, 361-65, 2015.
9. Elias, J.J., Lacetera, N. and Macis, M.: Markets and Morals: An Experimental Survey Study (with Julio Elias and Mario Macis), ***PLOS ONE***, 10, 6, 0127069.
10. Lacetera, N., Macis, M. and Slonim, R.: Rewarding Volunteers: A Field Experiment, ***Management Science***, 60, 5, 1107–29, 2014.
11. Lacetera, N., Macis, M. and Stith, S.: Removing Financial Barriers to Organ and Bone Marrow Donation: The Effect of Leave and Tax Legislation in the U.S., ***Journal of Health Economics***, 33, 43-56, 2014.
12. Lacetera, N. and Macis, M.: Time for Blood: The Effect of Paid Leave Legislation on Altruistic Behavior, ***Journal of Law, Economics and Organization***, 29, 6, 1384-1420, 2013.
13. Iajya, V., Lacetera, N., Macis, M. and Slonim, R.: Effects of Social and Economic Incentives and Information on Voluntary Undirected Blood Donations: Evidence from a Randomized Trial in Argentina, ***Social Science and Medicine***, 98, 214-23, 2013.
14. Busse, M., Lacetera, N., Pope, D., Silva-Risso, J. Sydnor, J: Estimating the Effect of Salience in Wholesale and Retail Car Markets, ***American Economic Review Papers and Proceedings***, 103, 3, 575-79, 2013.
15. Lacetera, N., Macis, M. and Slonim, R.: Economic Rewards to Motivate Blood Donations (with Mario Macis and Robert Slonim), ***Science***, 40, 6135, 927-28, 2013.
16. Lacetera, N., Pope, D. and Sydnor, J.: Heuristic Thinking and Limited Attention in the Car Market, ***American Economic Review***, 102, 5, 2206-36, 2012.
17. Lacetera, N. and Zirulia, L.: Individual Preferences, Organization, and Competition in a Model of R&D Incentive Provision, ***Journal of Economic Behavior and Organization***, 84, 550–70, 2012.
18. Lacetera, N., Macis, M. and Slonim, R.: Will There Be Blood? Incentives and Displacement Effects in Pro-Social Behavior, ***American Economic Journal: Economic Policy***, 4, 1, 186-223, 2012.
19. Boudreau, K. Lacetera, N. and Lakhani, K.: The Effects of Increasing Competition and Uncertainty on Incentives and Extreme-Value Outcomes in Innovation Contests, ***Management Science***, 57, 5, 843–63, 2011.
20. Lacetera, N. and Zirulia, L.: The Economics of Scientific Misconduct, ***Journal of Law, Economics and Organization***, 27, 3, 568-603, 2011.
21. Fini, R., Lacetera, N. and Shane, S.: Inside or Outside the IP System? Business Creation in Academia, ***Research Policy***, 39, 8, 1060-69, 2010.

22. Lacetera, N. and Macis, M.: Social Image Concerns and Prosocial Behavior: Field Evidence from a Nonlinear Incentive Scheme (with Mario Macis), ***Journal of Economic Behavior and Organization***, 76, 225-237, 2010.
23. Lacetera, N. and Macis, M.: Do All Material Incentives for Prosocial Activities Backfire? The Response to Cash and Non-Cash Incentives for Blood Donations, ***Journal of Economic Psychology***, 31, 4, 738–48, 2010.
24. Lacetera, N.: Different Missions and Commitment Power in R&D Organization: Theory and Evidence on Industry-University Relations, ***Organization Science***, 20, 3, 565-82, 2009.
25. Lacetera, N.: Academic Entrepreneurship, ***Managerial and Decision Economics***, 30, 7, 443-64, 2009.
26. Kaplan, D., Lacetera, N. and Kaplan, C.: Sample Size and Precision in NIH Peer Review, ***PLoS One***, July 23 2008.

OTHER PUBLICATIONS

1. Lacetera, N.: Incentives for Prosocial and Intrinsically Motivated Activities, ***IZA World of Labor***, 2016.
2. Lacetera, N. and Macis, M.: Paid vs Volunteer Donations: An Analysis of the Behavioral and Ethical Issues around Donor Incentives, In: Domen R, ed., ***Ethical Issues in Transfusion Medicine and Cellular Therapies***, Bethesda, MD: AABB Press, 2015.
3. Agrawal, A., Horton, J., Lacetera, N. and Lyons, E.: Digitization of Information and the Market for Contract Labor. Forthcoming in Goldfarb, A., Greenstein, S. & Tucker, C. (Eds.) ***Economics of Digitization: An Agenda***. National Bureau of Economic Research and University of Chicago Press, 2015.
4. Lacetera, N., Macis, M. and Slonim, R.: To the Editor: On the Importance of Unconditional Rewards for Blood Donations, ***Clinical Chemistry***, 2014.
5. Lacetera, N., Macis, M. and Slonim, R.: Letter to the Editor: A Critical Comment on Niza, Tung and Marteau's Incentivizing Blood Donation: Systematic Review and Meta-Analysis to Test Titmuss' Hypotheses, ***Health Psychology***, 2013.
6. Lacetera, N., Macis, M. and Slonim, R.: In Defense of WHO's Blood Donation Policy: Response, ***Science***, 342, 6159, 692, 2013.
7. Fini, R., Lacetera, N. and Shane, S.: Academic Entrepreneurship, in ***Palgrave MacMillan Encyclopedia of Strategic Management***, 2013.
8. Lacetera, N., Macis, M. and Slonim, R.: The Value of Incentives in Blood Donations: Response, ***Science***, 341, 6142, 129, 2013.
9. Fini, R. and Lacetera, N.: Different Yokes for Different Folks: Individual Preferences, Institutional Logics, and the Commercialization of Academic Research, ***Advances in the Study of Entrepreneurship, Innovation and Economic Growth, Vol 21: Spanning Boundaries and Disciplines: University Technology Commercialization in the Idea Age*** (eds. Gary Libecap and Marie Thursby), 1-25, 2010.

CURRENT PAPERS AND PROJECTS

.
1. Above a Swamp: A Theory of High-Quality Scientific Production, NBER Working paper 21143. (with Bralind Kiri and Lorenzo Zirulia).
2. Efficiency-Morality Trade-offs in Repugnant Transactions: A Choice Experiment (with Julio Elias and Mario Macis), NBER Working Paper 22632.
3. Motivating Cord Blood Donations (with Daniela Grieco and Mario Macis).
4. Stereotype Threats, Creativity, and Entrepreneurship (with Sonia Kang and Mario Macis).

5. Enhancing Organ Donor Registration Rates through Strengthening ServiceOntario Customer Representatives' Motivations: Observational Studies and Field Interventions (with Audrey Laporte, Mario Macis, Frank Markel and Nina Mazar).
6. Altruism, Ethics and Markets: A Behavioral and Neuroscientific Experimental Study (with Mario Macis, Vikram Chib and Jeffrey Kahn).

GRANTS, AWARDS AND FELLOWSHIPS

2001-2006
- MIT - Sloan School Fellowship.

2006
- Early Career Award, Atlanta Science & Technology Policy Conference, Georgia Tech.
- IRI Foundation Fellowship.

2008
- Russell Sage Foundation Grant for Young Scholars, Incentives for Blood Donation: Natural and Field Experiments (PI, with Mario Macis and Robert Slonim), US$5,000.
- International Motor Vehicle Program grant, Empirical Studies of Used-Car Auctions (Co-PI with Justin Sydnor), 2008-9, USD 50,000.
- Finalist, Weatherhead Undergraduate Teaching Award, Case Western Reserve University.

2009
- National Science Foundation Grant, Field Experiments on the Provision of Incentives for Blood Donation (Co-PI with Mario Macis [co-PI] and Robert Slonim), USD 325,000.
- Glennan Fellowship for excellence in scholarship and teaching, Case Western Reserve University.

2010
- Winner, Weatherhead Undergraduate Teaching Award, Case Western Reserve University.
- Nominated, Carl F. Wittke Award for Excellence in Undergraduate Teaching, Case Western Reserve University.

2011
- Social Sciences and Humanities Research Council of Canada (SSHRC) Grant, Field Experiments in Global Health: Motivating Voluntary Blood Donations in Argentina (PI, with Victor Iayja, Mario Macis and Robert Slonim), CAD 42,000.
- Dean's Excellence Award, University of Toronto-Mississauga.
- Meritorious Service Award, *Management Science*.

2012
- Social Sciences and Humanities Research Council of Canada (SSHRC) Grant for Conference: "Frontiers in the Economics of Markets and Organizations", University of Toronto (CO-PI with Alberto Galasso and Tanjim Hossain), CAD 12,500.
- NET Institute Grant for project "Viral Altruism" (with Mario Macis and Angelo Mele), USD 5,000
- Dean's Excellence Award, University of Toronto-Mississauga.
- Excellence in Refereeing Award, *American Economic Review*.

2013
- Social Sciences and Humanities Research Council of Canada Insight Development Grant (Collaborator, with Sonia Kang [PI] and Jacob Hirsch), "Stereotypes, Identity, and Task Decisions," CAD 74,346
- Dean's Excellence Award, University of Toronto-Mississauga.
- Excellence in Refereeing Award, *American Economic Review.*
- Distinguished Service Award, *Management Science*.

2014
- Science of Philanthropy Grant: "Giving Life and Saving Lives: A Natural Field Experiment on Motivating Cord Blood Donations" (Co-PI: Daniela Grieco and Mario Macis), US$36,340.
- Dean's Excellence Award, University of Toronto-Mississauga.
- Excellence in Refereeing Award, *American Economic Review.*
- Distinguished Service Award, *Management Science*.
- Research and Scholarly Activities Fund Grant, UT-Mississauga, CAD 5,500.

2015
- Sloan Foundation "Economics of Knowledge Contribution and Distribution" sub grant (CAD 10,000).
- Kauffman Foundation Grant for a workshop on the application of experimental economics methods in entrepreneurship research (with David Cooper), USD 50,000.
- Johns Hopkins Catalyst Grant, for "Economics and bioethics" (Co-PI with Mario Macis (PI) and Julio Elias (Co-PI)), USD 60,000.
- Excellence in Refereeing Award, *Journal of the European Economic Association.*
- Harold Crabtree Foundation Research Grant, "Enhancing organ donor registration rates through strengthening ServiceOntario customer representatives' motivations: Observational studies and field interventions" (PI; with Audrey Laporte, Mario Macis, Frank Markel and Nina Mazar).
- Johns Hopkins University "Exploration of Practical Ethics" Grant, "Altruism, Ethics and Markets: A Behavioral and Neuroscientific Experimental Study" (Co-PI; with Mario Macis, Vikram Chib and Jeffrey Kahn), USD 55,884.

2016
- Science Leadership Program Fellow, University of Toronto.
- Excellence in Refereeing Award, *American Economic Review.*

2017
- Animal Charity Evaluators grant: "An Experimental Analysis of Moral Aversion to the Consumption of Animal Products", USD11,640 (with Lisa Kramer).

TEACHING EXPERIENCE

Courses taught

2010-present University of Toronto
- Management of Technology (Master of Management of Innovation).
- Behavioral Economics of Strategy and Organizations (PhD)

- Introduction to Big Data Analysis (Master of Management of Innovation).
- Technology and Innovation: Historical, Social and Economic Perspectives (Undergraduate Program)
- Management of Technological Innovation (Master of Biotechnology).
- Entrepreneurial Strategy (Undergraduate Commerce and Management programs).
- Strategic Management Workshop (Rotman, 2014-15).

2006-2010 Case Western Reserve University
- Entrepreneurial Strategy (Undergraduate Management and Economics programs).
- Economic Analysis of Business Strategies (Undergraduate Management and Economics programs).
- New Venture Creation (MBA).

Research supervision

PhD Committee member
- Christian Catalini, PhD Rotman School, University of Toronto (Placement: Assistant Professor, MIT Sloan School of Management).
- Sacha Kapoor, PhD Economics, University of Toronto (Placement: Post Doc University of Chicago; Assistant Professor, Erasmus University Rotterdam).
- Elizabeth Lyons, PhD Rotman School, University of Toronto (Placement: Assistant Professor, University of California - San Diego).
- Jillian Chown. PhD Rotman School, University of Toronto (Placement: Assistant Professor, Kellogg School of Management, Northwestern University).
- Andrea Contigiani, Wharton School (4^{th} year).

SEMINARS AND CONFERENCES

Invited seminars (includes scheduled)
2017: Stanford University, UC-Berkeley, Wharton School, University of Uppsala, University of Rome "La Sapienza".
2016: LMU Munich, University of Bonn, Boston University, University of California San Diego, HEC Montreal.
2015: Harvard Business School (Entrepreneurial Management Unit and Strategy Unit), McMaster University, Wilfrid Laurier University.
2014: National Bureau of Economic Research, University of Toronto (Institute of Health Policy, Management and Evaluation), University of Waterloo, Queen's University.
2013: Washington University St. Louis – Olin School of Business, University of California – Berkeley, Cornell University, Colgate University, MIT (Department of Economics), Bank of Italy.
2012: Imperial College London, London Business School, University of Bologna, Iowa State University.
2011: Georgia Institute of Technology (College of Business).
2010: University of Viterbo, Cleveland State University, University of Toronto, Boston University.
2009: University of Texas – Dallas, University of California – San Diego, University of Michigan.
2008: University of Bologna, Kent State University, Boston University.
2006: Harvard Business School (Entrepreneurial Management Unit), University of Southern California, Florida International University, Case Western Reserve University, Nova University of Lisbon, Washington University St. Louis, London Business School, Duke University, NYU, HEC Paris, IESE

Barcelona, Catholic University of Leuven, Georgia Institute of Technology (School of Public Policy), Bocconi University.

Conference presentations (includes scheduled)
2017: Workshop on Moral reasoning in Economics (Briq-University of Bonn), University of Munich Workshop on Natural Experiments and Controlled Field Studies, Altruism, Community and Markets conference (American Enterprise Institute).
2016: Stanford Institute of Theoretical Economics (SITE) – Experimental Economics Workshop, University of Munich Workshop on Natural Experiments and Controlled Field Studies, Rotman School Research Roundtable on Morality.
2015: AEA Annual Meetings, University of Munich Workshop on Natural Experiments and Controlled Field Studies, Johns Hopkins University Workshop "Everything for Sale? The Ethics and Economics of Compensation for Body Parts", Annual Canadian Health Economists' Study Group Conference, Barcelona Graduate School of Economics Summer Forum (Applied Industrial Organization), Workshop on Experimental Economics and Entrepreneurship.
2014: AEA Annual Meetings, IIOC Conference, NBER Organizational Economics Conference, University of Munich Workshop on Natural Experiments and Controlled Field Studies
2013: AEA Annual Meetings, Canadian Institute for Advanced Research's program on "Social Interactions, Identity and Wellbeing" Meeting, University of Stirling Workshop "Monetary Incentives to Promote Socially Desirable Behaviours", Royal Society of Edinburgh "Organ Donation workshop" (University of Stirling), IZA Workshop on Behavioral Organizational Economics, NBER Summer Institute (Labor/Personnel Economics), FTC Microeconomics Conference
2012: AEA Annual Meetings, University of Munich Workshop on Natural Experiments and Controlled Field Studies, NBER Summer Institute (Development and Productivity; Public Economics), NYU Stern School of Business Economics of Strategy Conference, London Business School (Sumantra Goshal Conference – invited panelist), RCEF Conference, Workshop on Advances with Field Experiments (University of Chicago), EARIE Meetings
2011: University of Munich Workshop on Natural Experiments and Controlled Field Studies, Stanford Institute for Theoretical Economics (Experimental Economics Workshop), NBER Productivity Spring Meeting, Southern Ontario Behavioral Decision Research Conference
2010: University of Munich Workshop on Natural Experiments and Controlled Field Studies, Academy of Management Meetings, FTC Microeconomics Conference, HBS Strategy Conference
2009: AEA Annual Meetings, Academy of Management Meetings, Kauffman Workshop on Graduate Education in Technology Commercialization
2008: AEA Annual Meetings, EARIE Meetings
2007: REER Conference, London Business School Entrepreneurship Conference, ISNIE Annual Conference, EPFL Lausanne Conference on Science and Technology Policy
2006: AEA Annual Meetings, EARIE Meetings
2005: REER Conference

Invited discussant
CCC Doctoral Consortium, REER Conference, NBER Summer Institute (Innovation Policy, Economics of IT), IIOC Conference, Imperial College London Workshop on Industry-University Relationships, EPFL Lausanne Conference on Science and Technology Policy, Kauffman-Cleveland FED Conference on Entrepreneurial Finance, AEA Meetings, Canadian Economic Association Meetings, Canadian Centre for Health Economics, Kauffman Workshop on Entrepreneurship and Innovation.

Conference and session organization
Conferences
Conference on Frontiers in the Economics of Markets and Organizations, UTM, 2012, 2014 and 2016 (with Alberto Galasso and Tanjim Hossain).

Workshop on Experimental Economics and Entrepreneurship (Tampa, FL, 2015; with David Cooper).
2016 MIT Sloan Memorial Conference for Rafel Lucea: Sustainability challenges: Implications for companies, NGOs, and regulators" (with Rodrigo Canales and Ramana Nanda).

AEA sessions
Extrinsic Incentives and Pro-Social Behavior (San Francisco, 2009).
Exploring the Sources of Innovation: Recent Developments (San Francisco, 2009).
Experimenting with Organizations (Denver, 2011).
Field Experiments in Health Economics (Chicago, 2012).
Understanding the auction process: New theories and evidence (Philadelphia, 2014).
Institutions, Morals and Markets (Chicago, 2017)

AoM Professional Development Workshops
Research on university research commercialization: approaches, methodologies, and data sources (Montreal, 2010; with Riccardo Fini and Markus Perkmann)
Research on universities and commercialization: Contributions to management research (San Antonio, 2011; with Riccardo Fini, Andrew Nelson, Markus Perkmann and Henry Sauermann)
Research on universities and science: Geography, institutions, and disciplinary fields (Boston, 2012; with Riccardo Fini, Markus Perkmann and Henry Sauermann).
AoM Symposium: Do High-Powered Incentives for Creative and Knowledge Workers Work (Philadelpia, 2014)?

Keynotes
"Technology Needs Management, or What Social Media, Nasal Vaccines and an Ontario Forest Have in Common," Graduate Management Consulting Association, Toronto, 2015, 2016.
"Markets and Morals: How Ethics Shape the Economy," *UTM in Your Neighbourhood* alumni event, Brampton (ON), 2015.

Participation to public events
Behavioural Insights panel, Rotman school (with Mitchell Hoffman, Tanjim Hossain and Avni Shah).
Festival of Economics, Trento, Italy, 2017: Panelist on "Markets for the Human Body: Exploitation or Opportunity?" (with Alvin Roth, Cinzia Caporale and Ignazio Marino).

REVIEWING ACTIVITIES

Editorial Review Board member, *Strategic Management Journal*.
Selection Committee member, Rafel Lucea Sustainability and Social Impact Award, MIT.
Program Committee member, American Economic Association 2017 Annual Meetings.

Ad hoc Reviewer
- *Journals*: American Economic Review, Journal of Political Economy, Quarterly Journal of Economics, Review of Economic Studies, Science, AEJ: Applied Economics, AEJ: Economic Policy, RAND Journal of Economics, Review of Economics and Statistics, International Economic Review, Journal of Labor Economics, Management Science, Organization Science, Journal of the European Economic Association, Psychological Science, Journal of Law Economics and Organization, Economics Letters, Economic Development and Cultural Change, Economics of Education Review, Journal of Economic Behavior and Organization, Journal of Conflict Resolution, Strategic Management Journal, International Journal of Industrial Organization, Journal of Economics and

Management Strategy, Health Economics, Southern Economic Journal, Small Business Economics, Economica, Research Policy, Journal of Evolutionary Economics, Industrial and Corporate Change, Academy of Management Review, Journal of Management and Governance, European Management Review, Metroeconomica, Journal of Economics Surveys.

- *Publishers*: MIT Press, John Wiley & Sons, Oxford University Press.
- *Grant agencies*: National Science Foundation, Social Sciences and Humanities Research Council, German-Israeli Foundation, European Research Council, Bicentennial Program for Science and Technology (Chile), Israel Science Foundation, US Army Research Office, Italian Ministry for Research, German-Israeli Foundation.

SELECTED MEDIA MENTIONS

This Blog Post Costs $3.99, *National Public Radio*, 2011.
Little Difference on Odometer, Big Difference for Used Car Price, *The Christian Science Monitor*, 2011.
The Stigma against Cars Made in the US Has Finally Disappeared, *Business Insider*, 2012.
Does the altruism theory help anyone at all?, *Financial Times*, 2012.
Non-cash Incentives Could Boost Blood Donations without Risking Supply, *The Globe and Mail*, 2013
When Driving a Mile Can Cost You $448, *The Washington Post*, 2013.
Small Business, Joining a Parade of Outsourcing, *The New York Times*, 2014.
Need a Kidney? Not Iranian? You'll Wait, *The New York Times*, 2015.
How much can you get for selling your body (parts)?, *The Guardian*, 2015.
Is There a Moral Way to Fix America's Kidney Shortage?, *The Atlantic*, 2015.

OTHER PROFESSIONAL EXPERIENCE

Social worker in hospice for mentally challenged adults (in lieu of military service duties), ANFFAS, Milan, Italy, 2000-2001.
Summer intern at the Bureau of Trade and Economic Cooperation, Italian Embassy, Rabat, Morocco, 1999.

LANGUAGES: Italian (native), English, French. Reading knowledge of Latin and Classic Greek.