Myra Mohnen 30/04/2016

NBER Productivity, Innovation and Entrepreneurship Program
Research Grant Proposal on Innovation Policy

"Brokers: the Creation and Diffusion of Knowledge"

Understanding the process of knowledge creation is important given the implications for innovation, technological progress, and ultimately economic growth. Scientists, at the source of knowledge creation, are embedded in a community of scientists within which knowledge is shared. If new knowledge is the combination of existing ideas (Romer, 1990; Weitzman, 1998; Jones, 2009), then the access to knowledge flows within this community of scientists therefore plays a crucial role in the productivity of scientists. Given that not all positions provide equal access to these knowledge flows, the aim of this project is to empirically assess the importance of network position and local network structure for the productivity of scientists. Specifically, I plan to examine the role played by scientists who act as "bridges", connecting scientists who would otherwise disconnected, on the productivity of their coauthors.

The disambiguated MedLine/PubMed Author-ity (Torvik and Smalheiser, 2009) and the IQSS Patent Network (Lai et al., 2011) databases allow us to trace the career of medical scientists through their publications and patents respectively, thereby enabling the construction of the time–varying coauthorship network. The main empirical challenge when studying peer effects is that scientists decide with whom to collaborate. Their position in the overall network is thus endogenous and likely to reflect their quality as a researcher. Following a well–known empirical strategy, I use the sudden and unexpected death of scientists as a natural experiment which exogenously breaks network links and changes the network structure for reasons unrelated to the network formation process (Azoulay et al., 2010, 2014; Oettl, 2012; Aizenman and Kletzer, 2008; Fracassi and Tate, 2012; Patnam, 2011; Jaravel et al., 2015). This allows to identify the causal effect of the death of a scientist on the productivity of his coauthors. Combining a matching and a differences–in–differences strategy, I quantify the change in annual publications following the death of a coauthor. I exploit the rich variation in the position of the deceased scientists relative to their surviving coauthors to characterise the heterogeneity in these peer effects by network position.

In addition to standard network position measures such as betweenness, closeness or eigenvector centrality, I examine a new measure called "brokerage degree" which describes the ease of access to knowledge flows. This pair–specific measure quantifies the share of links of a scientist that provides exclusive connections to *new* scientists

for his coauthor thereby offering exclusive access to non–redundant information they embody (Burt, 2004).

Preliminary results reveal heterogeneous peer effects: depending on the network position of the deceased scientist, the relative loss in annual publications can be up to 50% for the average coauthor. The decrease in productivity is permanent and mainly affects coauthors at the beginning of their career. The number of new coauthorship formed and new topics explored are also negatively affected.

These preliminary results support the hypothesis that the access to knowledge flows embodied in scientists further away plays a crucial role in scientific production. However, to better understand the mechanisms driving these results, further analysis is warranted. First, the characteristics of the deceased scientists may represent the intensity of the loss and provide insight into the channel through which the loss occurred. Gathering additional information on editors of journal, head of laboratories, and grant applicants would enable to disentangle competing mechanisms such as access to resources, power and/or influence. Second, the characteristics of the tie may be important for the transmission of knowledge. We can examine this by distinguishing between different types of ties in terms of strength, recency, and overlapping research interests. Finally, citations offer a paper trail of knowledge flows and have been used as a measure of knowledge spillover (Caballero and Jaffe, 1993; Trajtenberg, 1990; Hall et al., 2001). The overlap between the coauthorship network and the citation network would allow to trace knowledge flows stemming from brokers. Going forward, I would like to purchase the citation network available from Web of Science to examine how different elements of network structure (size, density, average path length...) can aid or hinder the creation and diffusion of knowledge.

I plan to write research papers for academic journals and for presentation at academic conferences. The funds would also be used for the acquisition of additional datasets. This project may provide insight into the mechanisms behind the creation and diffusion of knowledge. Uncovering the influence of network position and local network structure on productivity of scientists is important given the policy implications for the optimal allocation of public research and development funds, and the design of research incentives that foster creativity and greater social capital.

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Employment

2016 - present Assistant Professor of Economics, University of Essex

Education

since 2011 **Ph.D.** in Economics (expected Sept 2016), University College London
Supervisors : Uta Schönberg and Imran Rasul
2009-2011 **MPhil** in Economics, University College London
2008-2009 Mandarin Studies, Beijing Normal University
2006-2008 **M.A.** in Economics, Catholic University of Louvain
2003-2006 **B.A.** Economics and Management (Quantitative), Catholic University of Louvain

Research Fields

Labour Economics, Innovation, Applied Microeconomics

Teaching Experience

Winter 2012 TA **Development Economics**, MSc, UCL
Fall 2011 TA **Economics of Public Sector**, BSc, UCL
Fall 2010 TA **Economics of Law**, BSc, UCL
2010-2011 TA **Courses at the Centre for Microdata Methods and Practices**

Research

Stars and Brokers: Peer Effects among Medical Scientists [Job Market Paper]
Knowledge Spillovers from Clean and Dirty Technologies: A Patent Citation Analysis with Antoine Dechezleprêtre (LSE) and Ralf Martin (Imperial College)
International Patent Families: From Application Strategies to Statistical Indicators with Antoine Dechezleprêtre (LSE) and Yann Ménière (Mines ParisTech)
Nation-Building Through Compulsory Schooling During the Age of Mass Migration with Imran Rasul (UCL), Oriana Bandiera (LSE) and Martina Viarengo (Graduate Institute, Geneva)
Occupational Choice and Social Interaction: A Study of Victorian London with José Alberto Guerra (Universidad de los Andes)

Ongoing projects

The impact of knowledge spillovers from clean and dirty technologies on firms' productivity with Antoine Dechezleprêtre (LSE) and Ralf Martin (Imperial College)
Social Interactions and Intergenerational Mobility with José Alberto Guerra (Universidad de los Andes)

Policy papers

Evidence on Behavioural Change with Imran Rasul (UCL) prepared for and presented to the House of Lords Science and Technology Committee, October/November 2010.
Policy brief: Clean innovation and growth with Antoine Dechezleprêtre (LSE) and Ralf Martin (Imperial College), 2014
The competitiveness effects of the European Union Emissions Trading System with Raphael Calel (Georgetown University), Antoine Dechezleprêtre (LSE), and Frank Venmans (University Mons)

Conferences & Seminars

2016: CERGE-EI, Prague; University of Vienna; University of Edinburgh; University of Essex; UQAM; CEMFI; Uppsala University; INSEAD; University of Amsterdam; University of Sussex; University of Leicester, Universidad del Rosario, Barcelona GSE Summer Workshop
2015: European Winter Meeting of the Econometric Society, Milan
2013: EEA/ESEM Congress, Gothenburg; SPRU Sussex; AERE Summer Conference, Canada

Personal Information

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