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Applied Microeconomics
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**Desired Teaching:**
Applied Econometrics
International Trade
Economic History

**Comprehensive Examinations Completed:**
2014 (Oral):    International Trade, Economic History
2013 (Written):Microeconomics, Macroeconomics

**Dissertation Title:** *Applications of Network Theory in Economics*

**Committee:**
Professor Timothy Guinnane
Professor Naomi Lamoreaux
Professor Michael Boozer

**Completion Date:** May 2019

**Degrees:**
Ph.D., Economics, Yale University, 2019
M.Phil., Economics, Yale University, 2015
M.A., Economics, Yale University, 2014
M.Sc., Economics, London School of Economics and Political Science, 2013
M.A., International and Development Economics, Yale University, 2012
B.Sc., Geography w/ Economics, London School of Economics and Political Science, 2011

**Fellowships, Honors and Awards:**
      Ethel Boies Morgan Fellowship, 2018-2019
      Ardon L Judd Fellowship, 2017-2018
      Finalist of the Yale 3 Minute Thesis Competition 2018
      MacMillan International Dissertation Research Fellowship, 2017
      Fraizer Jelke Fellowship of Yale University (International Trade), 2014-2017
      Yale University Teaching Fellowship, 2014-2017
      Cowles Foundation Fellowship, Yale University, 2013-2017
      Yale University Graduate Fellowship, 2013, 2017-2019
      Best Performance in Master Level Industrial Organisation, (LSE), 2013
      G. and H. Ormsby Prize for best performance in the undergraduate exams, LSE, 2011
      Award for Outstanding Contribution to the LSE and to the Student Body, 2011

**Teaching Experience:**
      *Yale University*
      *Certificate for College Teaching Preparation*
      International Trade – Master Level (Prof. Andrea Bubula), 2015
      Econometrics and Statistics – Master Level (Prof. Michael Boozer), 2014, 2015
      Development Econometrics – Master Level (Prof. Michael Boozer), 2016, 2018

**Research and Work Experience:**
      Research Assistant to Profs. Naomi Lamoreaux and Ian Shapiro, 2017

**Committee Experience:**
      Yale Graduate School disciplinary committee, 2017-2019
      Yale Graduate School and GSA steering committee, 2017-2019

**Working Papers:**
      "Trade, Networks and Innovations: Evidence from German Patent Data" *Job Market Paper*

**Work In Progress:**
      "New insights from patterns of information flow in Germany in the early 20th century"

      "Collaborating and Signalling: A Linked-In Experiment", with D Gupta

**Seminar and Conference Presentations:**
      Economic History Association Annual Meeting, 2018 in Montréal, Poster Presentation

**Languages:**
      German (native), English (fluent), French (B2)

**Interview Availability:**
      I am available at the EEA Meeting in Rotterdam

**References:**

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**Dissertation Abstract**

My dissertation analyses the importance of network effects for the field of economics in three different settings. For each of the three settings, using an empirical approach, I analyse the conditions in which the network structure as a whole provides significantly more information than first degree interactions alone.

**Trade, Networks, and Innovations: Evidence from German Patent Data [Job Market Paper]**
This paper investigates the relationship between trade and innovation using newly digitised German patent and transport data from the late 19th and early 20th centuries. Germany was highly innovative during this period of time. Innovative activity was more spread out geographically within Germany than other countries. The reasons for this geographic pattern remain an open question. The literature on this question focusses on estimating the effect of market access (measured as the distance-weighted sum of economic activity in a particular location) on innovation. The German data demonstrate the limitations of this popular approach. Many large German cities with high market access were indeed centres of innovation, but many were not. My data allow me to consider network effects not captured by standard notions of market access. I find that network measures such as betweenness and eigenvector centrality are essential to a more complete understanding of the determinants of innovation. In particular, these network measures matter for innovative activity, even controlling for market access and local fixed effects.

Constructing the network measures requires comprehensive information on interactions among economic agents - data that are rarely observable today because of privacy concerns. My data much better approximate the interactions among agents in the German economy because of the limited number of communication mechanisms at that time.

Because market access is potentially endogenous, I follow prior literature, such as Donaldson and Hornbeck (2016), in using instrumental variables to eliminate such concerns. As an alternative method of identification, I also use the Chamberlain (1983) panel-data approach to static and dynamic fixed-effect models and test the overidentifying restrictions inherent in such models. All of these approaches yield similar results.

My main finding is that the estimated effects of these network measures are heterogeneous across many dimensions, most notably the sector's degree of product differentiation. When I disaggregate the patent data by sector, the results show the importance of product differentiation increasing the network effects for many of the sectors. Market access only affects innovation in

sectors with low degrees of product differentiation. In contrast, innovations of highly differentiated products take place in locations with high betweenness centrality. This disaggregation also yields new insights on the role of individual inventors (as opposed to those employed by a firm), who were very important in the US, but not in Germany: individual German inventors were mainly operating in sectors where the estimated effect of market access is relatively unimportant. However, controlling for the sector of the innovation, I find that individual inventors tend to concentrate in locations that have easy market access.

**New insights from patterns of information flow in Germany in the early 20th century**
This paper presents details of newly digitised data from German railroads and illustrates their potential use in the economics literature. I focus in particular on how, when combined with network measures, these data can provide new perspectives on many areas of interest to economic historians. I begin by showing how one can construct, from these (or similar) data, full interaction networks where the edges (connections between individuals) are economically meaningful. I then discuss topics and contexts for the use of these data. First, this paper shows how these panel data may be used to infer migration patterns of people and presents those patterns in Germany. Secondly, these data provide insights also on information flows more generally in Germany. I also suggest areas for further study, in particular by political economic historians. Finally, these data serve as proxies for economically important quantities that are generally unavailable when using only commonly available data sources.

**Collaborating and Signalling: An online Experiment (with D Gupta)**
The previous papers look at how the network structure might affect economic outcomes. In this chapter we investigate why networks form. Employers fill the majority of job openings without advertising them and hence involve some kind of professional networking. We use a randomised online experiment to identify why people decide to connect to one another in a professional networking setting. Specifically, we study a large professional networking website. There are different reasons for one person to connect to another on this website: to benefit from the connection's qualifications (such as knowledge or position in a reputable company); to benefit from a signalling effect of being connected to a certain person; or to benefit from second degree connections (the people that a direct connection is connected to). Our work can differentiate between these channels. Connections between two agents in a professional network are only formed if both sides find the connection beneficial. To overcome the resulting endogeneity problem, we use a randomised study. We focus on a set of professions where we can easily identify good measures of agents' qualifications (such as professions where there is a clear ranking of companies in terms of reputation). In our experiment, we randomise profile pages and the information on the profile pages that are displayed to a set of test persons. The test person can choose whether to network with the displayed person or not to. This randomisation allows us to separately identify both the qualifications and the network effect. To identify the signalling effect, we use the fact that LinkedIn caps the displayed size of the user's professional network at 500, as well as other specificities of the site, which create a discontinuity that we exploit in our estimation.