Research Supervision at R514 in NTU Management School
QUANTITATIVE BUSINESS SCIENCE

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Experience

• Career: Associate Professor (NTU, Soton, Oslo, Essex), Assistant Professor (UMel)

• Publication: POM, JR, EJOR, TR-E, JORS, IJPR, IJEBR, JGM, NTU-MR, etc.

• Qualification: PhD MGMT (AGSM, UNSW & USYD), APTS (Cambridge, Nottingham, Glasgow, Warwick)

Research

• Operations Strategy and Supply Chain Management

• Business Model Innovation and Entrepreneurship

• Data Analytics and Quantitative Marketing

Teaching

• Operations and Supply Chain Management

• Quantitative Marketing and Marketing Analytics

• Quantitative Business Science (QBS): Integration of Model, Computational, and Data Thinking
Supervision

- **Methods**
  - *Model Thinking*: regression, multilevel modeling, nonparametric smoothing, … (small world)
  - *Computational Thinking*: R programming, statistical simulation, … (tools)
  - *Data Thinking*: Quantitative data, organizing data using the matrix view, … (large world)

- **Topics**
  - Operations Strategy
  - Supply Chain Management
  - Business Model Innovation
  - Quantitative Marketing

- **Supports**
  - Two courses about Quantitative Business Science (QBS) taught in English at NTU
  - Relevant online training provided with the guidance
The Diffusion of Microfinance

Abhijit Banerjee, Arun G. Chandrasekhar, Esther Duflo, Matthew O. Jackson

Introduction: How do the network positions of the first individuals in a society to receive information about a new product affect its eventual diffusion? To answer this question, we develop a model of information diffusion through a social network that discriminates between information passing (individuals must be aware of the product before they can adopt it, and they can learn from their friends) and endorsement (the decisions of informed individuals to adopt the product might be influenced by their friends’ decisions). We apply it to the diffusion of microfinance loans, in a setting where the set of potentially first-informed individuals is known. We then propose two new measures of how “central” individuals are in their social network with regard to spreading information; the centrality of the first-informed individuals in a village helps significantly in predicting eventual adoption.

Methods: Six months before a microfinance institution entered 43 villages in India and began offering microfinance loans to villagers, we collected detailed network data by surveying households about a wide range of interactions. The microfinance institution began by inviting “leaders” (e.g., teachers, shopkeepers, savings group leaders) to an informational meeting and then asked them to spread information about the loans. Using the network data, the locations in the network of these first-informed villagers (as injection points), and data regarding the villagers’ subsequent participation, we estimate the parameters of our diffusion model using the method of simulated moments. The parameters of the model are validated by showing that the model correctly predicts the evolution of participation in each village over time. The model yields a new measure of the effectiveness of any given node as an injection point, which we call communication centrality. Finally, we develop an easily computed proxy for communication centrality, which we call diffusion centrality.

Results: We find that a microfinance participant is seven times as likely to inform another household as a nonparticipant; nonetheless, information transmitted by nonparticipants is important and accounts for about one-third of the eventual informedness and participation in the village because nonparticipants are much more numerous. Once information passing is accounted for, an informed household’s decision to participate is not significantly dependent on how many of its neighbors have participated. Communication centrality, when applied to the set of first-informed individuals in a village, substantially outperforms other standard network measures of centrality in predicting microfinance participation in this context. Finally, the simpler proxy measure—diffusion centrality—is strongly correlated with communication centrality and inherits its predictive properties.

Discussion: Our results suggest that a model of diffusion can distinguish information passing from endorsement effects, and that understanding the nature of transmission may be important in identifying the ideal places to inject information.

Diffusion of Information and Participation. (Left) First-informed households have decided whether to participate and stochastically pass information to their neighbors. (Right) Participation may affect the probability of passing information. Newly informed nodes make their decisions, possibly being influenced by the decisions of their neighbors. After newly informed nodes make their participation decisions, all informed nodes engage in another round of stochastic communication.