How developed countries can learn from developing countries to tackle climate change

How developed countries can learn from developing countries to tackle climate change[1]

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Abstract

Climate change and global poverty are the most pressing issues of this century. If insufficiently addressed, climate change will exacerbate poverty and inequality within and across nations. Addressing it requires that people in developed and developing countries adopt new behaviors and technologies to reduce their greenhouse gas emissions and to adapt to a changing climate. A major contribution of the 2019 Nobel Laureates consists in providing new tools to advance knowledge on the mechanisms driving the diffusion of non-normative behaviors, by combining social network analysis with field experiments. To inform climate policy, we encourage research that applies this methodological innovation to understand the extent to which diffusion mechanisms may be crucial to accelerate the transition toward greener economies. Scholars working in developed countries have much to learn from recent advances in development economics. We identify fruitful areas for research in the global North.

Keywords
Pro-environmental behavior; Diffusion; Social networks; Social contagion; Field experiments

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In October 2019, Abhijit Banerjee, Esther Duflo, and Michael Kremer received the Nobel Prize in Economics "for their experimental approach to alleviating global poverty", one of the most pressing issues of this century. We highlight one specific contribution with largely untapped potential for addressing global challenges: the use of social network analysis in combination with field experiments to understand and facilitate the diffusion of social welfare-improving practices. The Laureates' innovation could be especially helpful in addressing an equally pressing and related global challenge: climate change. The discipline-wide recognition of the 2019 Laureates' groundbreaking work in developing countries presents an opportunity for grappling with other issues holding immense intra- and inter-generational equity implications in both the global North and South, among which climate-relevant behaviors stand out.

A Nobel Laureate's vision: Leveraging social network analysis in field experimental development research

Social network analysis prominently entered development economics in 2013 with the publication in *Science* of Banerjee et al. (2013), which develops and tests a model of information diffusion through a social network in the domain of microfinance. The authors collect survey information about social ties and leverage the social network data to find that a microfinance participant—who directly receives the relevant information—is more likely to inform another household than a non-participant. Non-participants, who outnumber participants, do however transmit valuable information.

Field experiments leveraging social network analysis followed naturally. For instance, utilizing the network mapping from their *Science* paper, Banerjee et al. (2019) implemented a field experiment in 521 villages in India, providing immunization information to randomly-selected individuals in some villages and to peer-identified 'gossips' in others. The treatment worked: vaccination was over 20% higher in the latter compared to the former. The same paper includes a similar field experiment that provided information on a non-rival lottery to 213 villages. Again, the treatment led to substantially more lottery participation when the information was delivered to "gossips" rather than to randomly selected or authority-wielding individuals. These studies demonstrate the potential of a powerful methodology pairing.

Untapped potential: Lessons for climate change research

Climate change requires that people in developed and developing countries alike adopt new behaviors and technologies, both to reduce their greenhouse gas emissions and to adapt to a changing climate. Behavioral change is costly and receiving information about a given behavior, including others' adoption, can overcome potential resistance. In economics, the role of social spillovers in the adoption of new technologies has been acknowledged for decades (e.g. the seminal 1969 Bass model), and many empirical studies have analyzed the role of social spillovers in savings, health, and agricultural technology adoption behaviors (e.g., Foster and Rosenzweig 1995; Duflo and Saez 2003; Kremer and Miguel 2007).

Social spillovers have also proven relevant for the adoption of climate-friendly technologies such as solar panels and hybrid cars via learning and imitation (see Carattini, Levin and Tavoni 2019 for a review). For instance, a more visible solar installation is more likely to induce positive "contagion" spillovers. Likewise, Toyota Prius ownership has been shown to spur local contagion, whereas the same has not been shown for car models that are largely indistinguishable from their non-hybrid counterparts. The "green halo" of Toyota Priuses also implies that people can get social rewards for driving them, thus making them willing to pay a premium over comparable hybrid cars. Visible local social norms therefore drive globally-relevant behavior.

Despite the above evidence, little research has combined social network analysis with field experiments to foster the adoption of climate-friendly behaviors and ultimately address the climate challenge. This gap cannot be attributed to lack of interest nor limited resources for such research. For instance, a large body of

recent work uses social interventions to 'nudge' consumers toward energy conservation, usually leading to conservation on the order of a few percentage points. We know much less, however, about how to bring behaviors from non-normative to normative, except that the standard approach using a combination of descriptive and injunctive norms may backfire (Cialdini 2003). Yet, many one-off adoption decisions—such as switching from a default energy plan to one supplying 100% renewable energy —would provide a much better environmental return than most energy conservation studies. The 2019 Laureates' novel research methodologies that combine social network analysis with field experiments may well pose a solution in this context. The method may be particularly effective when individuals care about others' decisions and are more likely to adopt a green behavior when enough of their peers have adopted, so that the speed of diffusion depends on both the network structure and the social ties of early adopters (Spencer, Carattini, and Howarth 2019).

Social network experiments in practice

Breza (2016) provides some useful tips to run social network experiments. Mapping the full network may require starting with a community-level census, collecting data on the identities of all network nodes, and subsequently surveying respondents' connections and their direction. An alternative for denser networks is sampling, accounting for biases, and adjusting standard errors. Note that in some contexts treatments may not only cause spillovers, but also change the structure of the network (Banerjee et al. 2018). In such circumstances, researchers need to account for endogeneity in the formation of the network.

Lessons readily applicable to the climate context can be drawn from existing research. For instance, Banerjee et al. (2012) examine information diffusion within a village, leveraging the network data from Banerjee et al. (2013). Randomly selected villagers are invited to participate in an incentivized trust game. Slots are limited, making participation in the game rival, but the trust game creates an incentive to invite and play with peers. The most important finding for climate research is how quickly information can circulate: being connected to one of the individuals who received the information about the game significantly increases the likelihood of attending the game, even for relatively socially distant people.

Access to information is crucial for behavior change. However, behavior change may also occur when others know about one's own behavior. Alatas et al. (2016) study how network structure influences the information that people have about others, which could be very relevant for behaviors such as the use of green energy tariffs, carbon offsetting, electricity storage, or other invisible actions such as avoiding carbon-intensive transport. Breza and Chandrasekhar (2018) assess whether people are more likely to achieve a goal if shared with another village member (the "monitor") and how the monitor's effectiveness is network-dependent. Chandrasekhar, Kinnan, and Larreguy (2018) show that cooperative behavior among villagers can substitute for formal contract enforcement if it involves socially close pairs or "central" individuals, to whom people are more reticent to defect.

Leveraging centrality, and socially close pairs, may also lead to more cooperation in the climate commons. One promising example relating to climate change pertains to contracting insurance against weather anomalies. Cai, De Janvry, and Sadoulet (2015) show that social ties accelerate learning about insurance. Network effects positively depend on centrality, and less central people are more influenced by other villagers.

Applications to the developed world: Opportunities and challenges

The 2019 Nobel Prize in Economics demonstrates the integral role of randomized controlled trials in the pursuit of causal inference in development economics and policymaking. Field experiments have come to

play a ubiquitous role in development matters, yielding immense advances both in understanding key behavioral mechanisms and deriving sound policy evaluation in a range of contexts.

Looking ahead, we envision another form of beneficial contagion—one from development research to climate change research—in which climate researchers identify and exploit the many opportunities for conducting social network experiments in developed countries. Benefits for researchers may include potentially better quality and greater granularity of data (e.g., secondary data about the population of interest, such as information about energy use or transport mode choice). Online social networks offer a rich and fruitful opportunity to understand information diffusion in well-established and oftentimes geographically or socially distant networks. While online social networks are much more widespread in developed countries, research in developing countries has much to teach. For instance, evidence from Indonesia suggests that celebrity endorsements on Twitter dramatically increased awareness of an immunization campaign (Alatas et al. 2019).

In terms of policy impact, the stakes are also large in the global North: fostering the just transition to a carbon-neutral society puts enormous pressure on governments, and policymakers and practitioners are eager to identify solutions with small economic and political costs to accelerate the diffusion of climate-friendly innovations. Field experiments could track treatment-induced social contagion along network nodes, allowing policymakers and practitioners to identify the best strategies to facilitate information diffusion and to create social rewards for climate-friendly behavior.

As always, there may also be downsides related to importing this methodological innovation into a new context. First, field experiments in wealthier countries tend to be more expensive, given the costs resulting from higher wages and the need to sample from vaster networks, among others. Second, social networks may be more complex and harder to monitor in industrialized economies, since complete coverage of the social networks is arguably more difficult to come by in developed countries than for less socially mobile rural villagers in developing countries. Finally, researchers may encounter steeper data protection barriers (e.g., relatively new difficulties in complying with the European Union's General Data Protection Regulation, GDPR, which can threaten the soundness of experimental protocols without necessarily achieving its protection goals). For instance, in an ongoing field experiment in the United Kingdom, we offer utility customers in some neighborhoods the opportunity to publicize their otherwise invisible adoption of renewable energy tariffs so as to generate social rewards for early adopters and measure resulting contagion.[7] While this setting would have been very promising for combining a field experiment with social network analysis, the recent instating of GDPR posed barriers to the use of non-anonymized data for surveying the network.

In our view, combining field experiments with social network analysis in developed countries has real and underexploited potential to deliver climate change research projects with potentially game-changing returns. Given recent emphasis on the urgency of climate action, our hope is that the 2019 Nobel Prize in Economics inspires researchers studying climate-related behavior change to expand in this direction.

[7] See https://www.socialscienceregistry.org/trials/3951. In the field experiment we test whether people are willing to make their climate-friendly behavior visible both with and without financial incentives. Further, we test whether increased green energy visibility would lead to social contagion, notwithstanding the initially low descriptive norm.

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