USAID FROM THE AMERICAN PEOPLE

BILL & MELINDA GATES foundation

CSISA Research Note 2

Social Networks and Indian Farmers' Demand for Agricultural Custom Hire Services

Nicholas Magnan, David J. Spielman, Travis J. Lybbert and Kajal Gulati

September 2014

The Cereal Systems Initiative for South Asia (CSISA) is a research-for-development partnership implemented jointly by five CGIAR institutions – the International Maize and Wheat Improvement Center (CIMMYT), International Food Policy Research Institute (IFPRI), International Livestock Research Institute (ILRI), International Rice Research Institute (IRRI) and World Fish – in close partnership with public and private sector organizations across South Asia.

Introduction

Improvements in agricultural technology that increase agricultural production and profitability can lead to improvements in the livelihoods of and food security for the rural poor. But the dissemination of promising technologies can prove difficult in developing countries, where reaching many small, heterogeneous and isolated farmers directly with agricultural extension services is prohibitively costly.

Extension efforts typically assume that disseminating technology to a small set of farmers – typically progressive farmers – will result in other farmers learning about the benefits of the technology and eventually adopting it, if they think the technology will benefit them.

But, it is difficult to tell who influences farmers' adoption decisions, and whether farmers use the same technologies as others in their network because they learn from or mimic each other or because they share similar characteristics and circumstances.

This study[1] used a set of experimental auctions coupled with randomly deciding which winners of the auctions actually received the technology to assess whether having first-generation adopters of a new resource-conserving technology – in this case, laser land leveling (LLL) – in a farmer's network increases his or her exposure to and demand for the technology.

Intervention and Study Context

Farmers in the rice–wheat system of eastern Uttar Pradesh typically rely on rainfall or groundwater to flood-irrigate their fields several times each season. But an uneven field – an undulating, sloping or rutted field – makes for inefficient use of water and requires costly diesel to pump water onto the field. To minimize this inefficiency, farmers traditionally level their plots using rudimentary tools, such as a wooden beam dragged behind a tractor.

CIMMYT International Maize and Wheat Improvement Center

IFPRI

ILRI INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

IRRI

WorldFish

Laser land leveling uses a laser-guided drag scraper to achieve a similar result, but with greater precision. LLL can reduce the amount of water used for irrigation and improve crop establishment and growth, thereby improving fertilizer efficiency, reducing weed pressure and increasing yields[2]. These benefits may endure for several years before re-leveling is required, depending on the soil type and on cultivation and harvesting practices. LLL may also generate important public benefits in the form of reduced depletion of groundwater, use of chemical inputs, consumption of diesel fuel and emission of greenhouse gases.

The Research

This study set out to understand how farmers' networks – who they exchange information with, both generally and specifically related to agriculture – affect farmers' exposure to new technology and their demand for such technology. The study site included three districts in eastern Uttar Pradesh, India, and was conducted as a component of the work described in "Public Subsidies, Technology Targeting and Private Investment: Evidence from Laser Land Leveling in Uttar Pradesh, India" in this series.

The key to identifying the influence of social network effects on technology demand relies on several methodological mechanisms. First is the non-competitive auction to allow farmers to opt out of early adoption of LLL. Second is a simple lottery to randomly allocate LLL services on a pay-for-service basis to farmers who participated in the auction and opted-in for leveling by bidding above a threshold price.

This combination of auction and lottery resulted in three classes of sample farmers: (1) auction losers [i.e. those who did not bid high enough to obtain LLL services]; (2) auction winners but lottery losers; and (3) auction and lottery winners. For the purposes of the analyses, auction losers were defined as non-adopters. Both (2) and (3) were defined as would-be adopters, and the subset of auction and lottery winners was defined as adopters. Would-be adopters had 20 percent more years of schooling, 60 percent greater landholdings and were generally wealthier than non-adopters; importantly there was no significant difference between adopters and would-be adopters.

The whole point of the distinction among non-adopters, adopters and would-be adopters is that it helps address the 'reflection problem' that otherwise obscures the influence of social networks on technology adoption[3]. Consider two farmers – Farmer A and Farmer B – who are members of the same social network, and who use the same technology. It is possible that A uses the technology because B does, but it is also possible that A and B are just similar in nature or face similar constraints and shocks, thus causing them to use the same technology. Instruments that differentiate these two possibilities are critical in identifying social network effects and their role in information acquisition by farmers.

Willingness to Pay and the Influence of Social Networks

Results indicate that farmers with at least one adopting farmer in their social network were willing to pay an additional Rs. 74-91 (US$ 1.2–1.5)[4] per hour for LLL custom hire services than farmers without an adopting farmer in their network ($p < 0.05$). This is 24-28 percent of average willingness to pay in the second auction.

However, all adopting network contacts did not have an equal effect on demand. If the adopter benefited from adopting LLL (i.e. reduced his or her water use by at least 10 percent), the increase was Rs. 150 (US$ 2.47) or nearly 50 percent. If the adopter did not benefit from adopting LLL, the increase was zero. This suggests that farmers are influenced by learning about the benefits of the technology from their network of agricultural contacts rather than simply mimicking observed behavior.

Results also suggested that social networks were very limited in terms of reach. Only 8 percent of farmers in the entire sample knew a sample farmer from a nearby village, and only four discussed agriculture with a sample farmer from that village. Thus, while farmers had strong networks within their own village, they had very limited connections with farmers in similar villages only 5 kilometers away.

Policy Implications

These findings have important implications for extension programming. Many extension efforts focus on wealthier, more progressive farmers in the belief that they are more likely to adopt new technologies and are more likely to be successful if they do, and that what they do is likely to influence other members of their community. While the first two beliefs may be correct, these findings indicate that the third may not be true, particularly for poorer farmers. The results of this study suggest that focusing on so-called progressive farmers is not necessarily the most effective extension approach, particularly if the objective is to maximize the welfare of poorer segments of society. Poor farmers responded much more strongly to successful adoption of LLL by other poor farmers than they did to adoption by rich farmers.

The success of adoption was crucial – perhaps unsurprisingly, farmers who had a successful adopter in their network were willing to pay nearly 50 percent more for the technology than they were before they saw it in action, whereas those who had an unsuccessful adopter in their network were not willing to pay any more for the technology than they were previously. How much a farmer was willing to pay for LLL was largely influenced by visits to leveled fields belonging to other farmers in their agricultural information network, rather than conversations with adopters or seeing the leveling unit in action.

The results show that successful dissemination of a technology such as LLL depends on a combination of provision of information that is readily accessible and understood by the farmer, farmer-to-farmer networking and demonstrations that show farmers how the technology works and what its benefits are. This highlights the need for extension efforts that not only engage with many farmers, but also support 'demonstration' farmers, facilitate networking among farmers and encourage field visits by other interested farmers.

[1]Magnan, N., D. J. Spielman, T. J. Lybbert, and K. Gulati (2013), "Leveling with Friends: Social Networks and Indian Farmers' Demand for Agricultural Custom Hire Services." IFPRI Discussion Paper 01302 (Washington, DC: IFPRI).
[2]Jat, M.L., P. Chandna, R. Gupta, S. Sharma, and M. Gill (2006), "Laser Land Leveling: A Precursor Technology for Resource Conservation." Rice-Wheat Consortium Technical Bulletin Series 7 (New Delhi: Rice-Wheat Consortium for the Indo-Gangetic Plains); Jat, M.L., M.K. Gathala, J.K. Ladha, Y.S. Saharawat, A.S. Jat, V. Kumar, S.K. Sharma, V. Kumar, and R. Gupta (2009), "Evaluation of Precision Land Leveling and Double Zero-Till Systems in the Rice–Wheat Rotation: Water Use, Productivity, Profitability and Soil Physical Properties." Soil and Tillage Research 105: 112–121.
[3]Manski, C. (1993), "Identification of Endogenous Social Effects: The Reflection Problem." The Review of Economic Studies 60(3): 531–542.
[4]US$ 1 = Rs. 60.81.

Author Details

Nicholas Magnan was a research fellow in the Environment and Production Technology Division of the International Food Policy Research Institute, Washington, DC, when he conducted this research. He is currently an Assistant Professor in the Department of Agricultural and Applied Economics, University of Georgia, Athens. nmagnan@uga.edu

David J. Spielman is a Senior Research Fellow in the Environment and Production Technology division, International Food Policy Research Institute, Washington, DC.

Travis J. Lybbert is an Associate Professor in the Department of Agricultural and Resource Economics, University of California, Davis.

Kajal Gulati was a Senior Research Assistant in the Environment and Production Technology division, IFPRI, New Delhi, when she conducted this research. She is now a Ph.D. candidate in the Department of Agricultural and Resource Economics of University of California, Davis.