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Optimizing social learning about agricultural technology: Experiments in India and Bangladesh

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Overview

There is a broad view that agricultural extension services in developing countries have under-performed. This signals a need for research into how extension can be improved – or overhauled – in order to improve learning and ultimately increase adoption of proven technologies. Ongoing research outlined here seeks to test innovations to the extension system that are meant to drive adoption. Broadly, the main questions being addressed are who should carry out demonstrations, how should they be carried out, and to what extent should private sector seed dealers be engaged as recipients of extension services.

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There are some possible modifications to the extension system that are hypothesized to drive faster adoption of improved technology

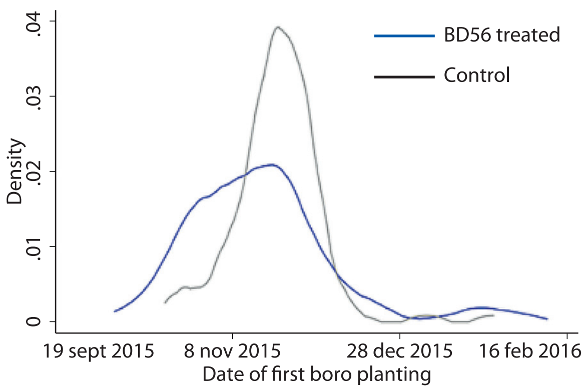
- Improved selection of the farmers that cultivate demonstration plots. The importance of social network data for finding demonstrators has been established (Beamen et al, 2015). The outstanding question for policy is whether there are easily measurable proxies that can be used to identify the most suitable demonstrators?
- The returns to new technology are often heterogeneous and this influences learning (Munshi, 2004; Tjernstrom 2015). Can conducting demonstration plots with explicit counterfactuals increase adoption in this environment? Are counterfactual plots more impactful when demonstrators are influential in a network sense, but perhaps harder to learn from?
- Will adoption proceed faster when extension services are delivered to the private sector via seed dealers?

Figure 1. Demonstration plot w/out counterfactual

In Bangladesh the study considers BD56, an improved rice variety with three key features:

1. Requires less water, allowing farmers to save on supplemental irrigation fees and preserving groundwater resources. Evidence from a small-scale pilot randomized control trial in 2015 found that BD56 farmers relied significantly less on irrigation during the wet season.
2. By maturing in only 110 days, BD56 allows farmers to take part in early sowing of dry season crops (Figure 2), potentially increasing revenue by allowing early harvesting.
3. As a consequence of its early maturity, yields of BD56 are lower than longer duration seed varieties.

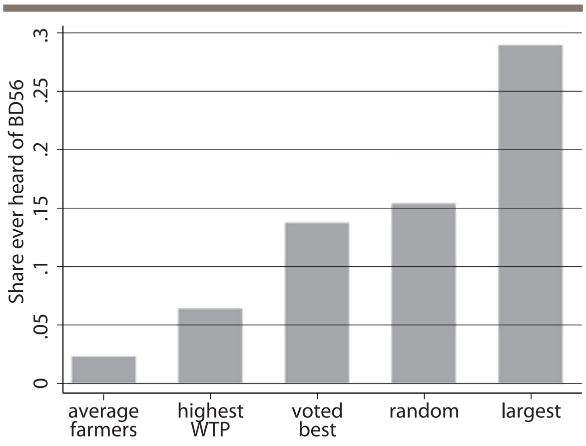
Figure 2. Density of first dry season planting dates. Data are from a pilot RCT in 35 villages of Rajshahi division in Bangladesh



Early piloting suggests that farm size is a useful proxy for how impactful a demonstrator is for spreading information

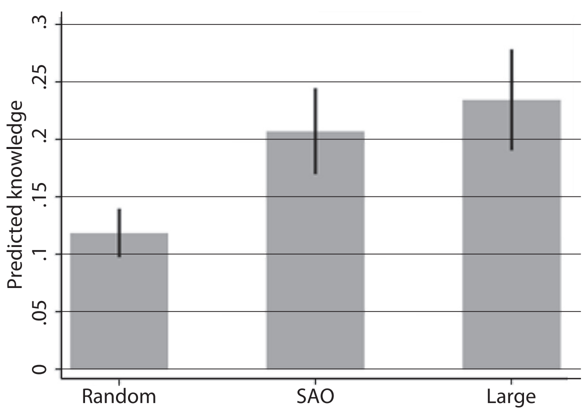
We found in the pilot RCT that almost 30 percent of villagers had knowledge of BD56 in villages where the five largest farmers were chosen as demonstrators. This contrasts with only 15 percent of farmers having knowledge in villages where demonstrators were chosen randomly (Figure 3).

Figure 3. Share of farmers with knowledge of BD56 as a function of how demonstrators chosen. Data are from a pilot RCT in 35 villages of Rajshahi division in Bangladesh



As part of the full study, social network information was collected for 256 villages during April-May 2016. These network data point to large farmers as being better connected to other villagers – rationalizing the pilot finding that information flow was improved with large-farmer demonstrators. A simulation exercise where demonstrators pass information to their social contacts with some probability shows the importance of large-farmer demonstrators. Interestingly, local extension officers (SAO's) also have private knowledge of more influential farmers (Figure 4).

Figure 4. Simulated rates of knowledge on BD56. Simulation based on network data collected for 192 BD56 treatment villages in April-May 2016. Model assumes that each demonstrator passes information to each of their social contacts with probability of 0.5.



The ongoing larger scale RCT will:

- Measure impact of using large-farmer demonstrators more rigorously in a larger number of villages and during a different season.
- Test whether farmers only pay attention to outcomes of demonstrators that are similar to them in terms of observable characteristics.
- Establish whether counterfactual plots are an effective new extension technique, particularly when farmers have a harder time extrapolating outcomes to their own plots.

Ongoing research in India will address the second question on the importance of dealers in the extension process

A randomized trial is being carried out across 10 districts of coastal Odisha India starting in the summer of 2016. The experiment will compare business-as-usual extension with an entirely new approach where information and seeds for testing are delivered to seed dealers rather than farmers. The current business-as-usual model in Odisha involves on-farm demonstrations in "clusters" where the new seed variety is given to many farmers and other farmers are expected to observe and more importantly, spread information. This will be taken as a benchmark in the experiment.

This benchmark will be compared with a new approach where an equal amount of seed is provided to dealers for testing and learning. In addition, dealers will be linked to private seed companies for obtaining seeds. The objective of this new approach is to deliver information directly to a population that has their own private incentive to spread that information. The study will also consider the relative targeting effectiveness of farmer-based versus dealer-based agricultural extension.

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