Using a geographic regression discontinuity to evaluate large-scale irrigation in Eastern Rwanda

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Background

 The Howard G. Buffett Foundation and the Government of Rwanda installed 63 center irrigation pivots

Solution

Laterite's impact evaluation leverages a geographic discontinuity: plots inside the pivots' radius receive access to irrigation, while plots just outside the pivots do not. Our sampling strategy was as follows: 1. Using GIS data, we sampled 600 treatment plots from within the pivots' radii (green circles in Fig. 1).

on 1,173 hectares belonging to about 2,000 farmers in the droughtprone area by Lake Nasho.

 The project aims to reduce farmers' dependency on rainfall and increase production, productivity, income, and food security.

Challenge

 Pivot placement was based on proximity to a lake and flat terrain, so areas that received the new infrastructure were not comparable

- 2. To generate the comparison group, we created 5 "control" bands located 0-300m, 300-600m, 600-900m, 900-1,200m, and 1,200-1,500m outside the edge of the treatment area (Fig. 1).
- In each of these bands, we restricted the eligible control area to cropland and randomly sprawled GIS points to sample plots. Enumerators equipped with GPS trackers successfully listed 956 control plots.
- 4. During the household survey, we conducted interviews on 1,215 plots, 607 of which were outside and 608 were inside the pivots.
- 5. The distance of the plots to the edge of the treatment area is used as the running variable in the impact analysis.



- to those that did not.
- Baseline data was not available, preventing a difference-indifferences design.
- Complementary services provided by the program, like roads, electrical grid improvements, and a farmer cooperative, made isolating the irrigation's impact challenging.

Fig 1. Map of buffer zones outside of the treatment area

Results

- Balance tables show significant differences between plots inside and outside the pivots in terms of soil type and slope, but regression results remain robust when controlling for these exogenous factors.
- Being inside a pivot significantly increased maize harvests by 3,204 kg per hectare (p<0.001,



Fig. 2).

- Farmers were significantly more likely to practice conservation agriculture on plots inside than on plots outside the pivots (34% vs. 15%, p<0.001).
- Farmers spent significantly more on agricultural inputs such as organic and inorganic fertilizers, pesticides, and hired labor per hectare on plots inside than outside the pivots. E.g., they spent 148,167 RWF / 114 USD (p<0.001) more on inorganic fertilizer for plots inside.

Fig 2. Effect of the Nasho Irrigation Project on maize harvest





DATA RESEARCH ANALYTICS



