

Codebook and Data Description

“How High are Rates of Return to Fertilizer? Evidence from Field Experiments in Kenya”

Esther Duflo, Michael Kremer, and Jonathan Robinson

June 2011

Data Sources

The data comes from surveys collected with farmers in Western Kenya by the organization International Child Support (ICS), in collaboration with the authors. In accordance with IRB protocols, all identifying information has been removed from this dataset.

The data we provide includes some key variables from several surveys:

- (1) Baseline surveys which include basic background demographic information, as well as previous usage of fertilizer.
- (2) Sampling information about the demonstration plot program (the season in which the farmer participated in the program, and the school from which she was sampled).
- (3) The estimated weight of output and cost of inputs for each of the treatment plots.

All data was input in Microsoft Access and was cleaned and merged in Stata. The data we provide here are key variables from the final, merged dataset which was used in the analysis. More detail on the data collection methods is included in the text of the paper.

Datasets

The name of the dataset is `profit_data_FINAL.dta`. The dataset was saved such that it should be readable in previous versions of Stata. This dataset was used to generate all the results in the paper “How High are Rates of Return to Fertilizer? Evidence from Field Experiments in Kenya,” *American Economic Review (Papers and Proceedings Issue)* 98 (2): 482-488. It was also used to generate some statistics for the Appendix on profitability in the paper “Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya,” which is forthcoming in the *American Economic Review*.

Do Files

The analysis was done in Stata 11 SE. The .do file to create both of these is called `profit_calculations_FINAL.do`. The program includes comments to make it easier to follow.

Description of Variables

All variables are labeled in the dataset, but we include a codebook here as well.

- `hid`: The household ID number
- `demo_season`: The season of the program. The program took place over 6 growing seasons, so this is labeled from 1-6.
- `plot_size`: The size of the demonstration plot (this varied between 30 m² and 60 m² across seasons).

- repeated_demo: An indicator for whether the farmer had previously participated in a demonstration plot trial. A small number of farmers participated in two seasons – this is equal to 1 for those farmers in the 2nd season of their participation.
- long_rains: An indicator equal to 1 if the demonstration took place during the long rains season (the longer, more productive season). This corresponds to seasons 2, 4, and 6.
- dryweight_c_m2, dryweight_t14_m2, dryweight_t12_m2, dryweight_t1_m2, dryweight_ft_m2: This is the estimated dry weight (in goro-goros, a volume measure in Western Kenya), for the control (c), ¼ teaspoon (t14), ½ teaspoon (t12), 1 teaspoon (t1), and full treatment (ft) plots. After maize is harvested, it must be dried and shelled before being sold or consumed. We measured how much weight was lost in the drying and shelling over a number of growing seasons, and estimated that the ratio of the weight of the dry kernels to that of the weight at harvest (the “wet weight”) was about 0.52. We also estimated that 1 goro-goro is equivalent to about 0.46 kilograms of maize. As the size of the plots varied from season to season, all these weights are standardized per m².
- inputcost_t14_m2, inputcost_t12_m2, inputcost_t1_m2, inputcost_ft_m2: These are the costs of inputs for each of the treatment plots. In most demonstrations, this was directly measured after applying treatment on an individual farmer’s plot (by weighing the amount of fertilizer or seeds used). Thus there is some variation between plots, and the input cost is not exactly proportional to the quantity used per plot (due to small differences in spacing across plots). During our study period, the price of hybrid seeds was about 150 Ksh per kg, the price of top dressing fertilizer (CAN) was about 30 Ksh per kg, and the price of planting fertilizer (DAP) was about 34 Ksh per kg (the exchange rate was roughly 70 Ksh / \$1 US during this time). Note that labor costs are not included as they were not collected in detail.
- house_ever_anyfert: An indicator equal to 1 if anyone in the household had ever used fertilizer before the program.
- educ: Years of education for primary respondent.
- acres_land: Acres of land owned.
- income: Income from all sources in the past month for primary respondent.
- animals: The total number of animals owned.
- kids: The number of children.
- mud_walls: Indicator equal to 1 if the household has mud walls.
- mud_floor: Indicator equal to 1 if the household has a mud floor.
- thatch_roof: Indicator equal to 1 if the household has a thatch roof.
- school1-school15: Indicator variables for the 15 schools that took part in the demonstration plot trials.

Other Information

In the analysis for the *Papers & Proceedings* article, an important issue is how maize is priced. We collected price data over several years in Busia, Kenya, and we found that maize reached a peak price of roughly 25 Ksh after the long rains season and 40 Ksh after the short rains season. It took about 7 months after the application of top dressing and 9 months after planting to reach these prices. We used these figures in the *Papers & Proceedings* article (and annualized the return to top dressing and full treatment assuming it took 7 and 9 months, respectively, to reach those prices).

In response to a referee comments for the “Nudging Farmers to Use Fertilizer,” we redid these calculations in the profitability Appendix to that paper (please see that Appendix for much more detail). We made three main changes. First, we included estimates of labor time. Since we did not collect detailed information on labor usage on the plots, we used estimates from the Appendix in Suri (2011) to impute labor time. Second, we value maize at the immediate post-harvest price. Third, we accordingly annualize over a shorter time period. Much more detail is provided in the Appendix itself.

If there is any confusion with any of these files, please contact Jonathan Robinson for more information (jmrtwo@ucsc.edu).

References

- Duflo, Esther, Michael Kremer, and Jonathan Robinson (2008). How High are Rates of Return to Fertilizer? Evidence from Field Experiments in Kenya,” *American Economic Review (Papers and Proceedings Issue)* 98 (2): 482-488
- Duflo, Esther, Michael Kremer, and Jonathan Robinson (2010). “Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya.” Forthcoming, *American Economic Review*.
- Suri, Tavneet (2011). “Selection and Comparative Advantage in Technology Adoption.” *Econometrica* 79 (1): 159-20.