

Can graduation programs be greener? Evidence from the BOMA program: analysis plan for midline

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Introduction

This document outlines the plan for analysis of a midline follow-up survey for an experiment with BOMA's Green REAP program. The survey follows up with a 50% randomized subsample of study participants recruited into the study during the baseline survey. Green REAP is a modified Graduation approach that aims to simultaneously move households out of extreme poverty and create positive environmental impacts through business choice and educational modules on climate change and environmental management. The study is a clustered randomized controlled trial with three arms: Standard REAP, Green REAP and a Control. The study aims to establish whether Green REAP is able to maintain (or increase) the poverty and welfare impacts of Standard REAP while achieving additional environmental benefits.

Empirical analysis

The analysis will be based on OLS regressions of outcomes of interest on treatment indicators for Standard and Green REAP and controls for geographic stratification fixed effects, baseline values of outcomes where available or their closest proxies, and re-randomization variables or proxies. In addition we will analyze heterogeneity of treatments effects using the ML techniques described in Chernozhukov et al (2020)¹ with a set of baseline variables that will include baseline values of primary outcomes or their proxies, household demographics, and others. Outcomes will be winsorized at the top and bottom 1% if the standard deviation of the unwinsorized outcome exceeds the winsorized version of the outcome by more than 50%.

Indices

For the construction of outcome group summary measures based on components with different scales, we will use the methodology detailed in by Kling, Liebman, and Katz (2007), unless the index is a specific index in the academic literature, in which case we will use the method employed in that literature to compute the index. Specifically, for those concepts without a

¹ Chernozhukov, Demirer, Duflo, Fernandez-Val (2020): "Generic machine learning inference on heterogeneous treatment effects in randomized experiments," ArXiv: 1712.04802.

preconceived index formula, our methodology consists in first signing all variables consistently such that higher is telling a consistent story for the index. Then, we standardize the individual components of the index, by subtracting the comparison group mean and dividing by its standard deviation. Then, we take the average of the now-standardized components into a single measure, and then again finally standardize the average (again to the comparison group mean and standard deviation). We will use the follow-up survey control group values for the standardization.

Primary outcomes of interest

We have two types of primary outcomes – environmental & economic ones. We list the outcomes and their components below.

Environmental outcomes

- Charcoal production index: average of z-scores from the two components below
 - Target household time spent on charcoal production past week: based on question 4.c.d., which can be aggregated to give a monthly total of hours spent producing charcoal for all household members participating in this activity. Divide this by four to determine weekly hours dedicated to charcoal production.
 - Revenue from charcoal making business past week [\$]: total cash and credit sales from the past month (question 8.27/8.28) divided by four.
- Sustainable livestock practices index: sum up of livestock management activity component values plus the value of the rotational grazing response (see below).
 - Livestock management activities: code as 0 or 1 each of the components of question 6.11, with 1 indicating a positive management activity.
 - Rotational grazing is covered in question 6.21, with responses be coded as follows:

Daily	5
Bi weekly	2
3-4 times a week	4
Weekly	3
Monthly	1

- Natural Resource Management (NRM) knowledge index
 - Drought and disaster management strategies aggregate: drought management strategies are binary responses across 13 options in question 12.03, and disaster management strategies are binary responses across 8 options in question 12.04. Take the sum of all responses (i.e., the number of yeses).

- Climate change knowledge index: reorganize coding of responses in question 12.02 so that higher numbers indicate greater knowledge of climate change. This means reversing the scale for options b, c, d, f, g, i, l, n (using letters from google sheets version of survey). Take the sum across all options.

Economic outcomes and household well-being

- Target participant economic activity index
 - Target participant business revenue
 - Sum of revenue of all businesses (incl livestock rearing and trading done for business) that the target participant has plus revenue from livestock product sales (eggs, milk, meat) per month
 - Target participants asset value
 - Sum of value of productive assets associated with the participant business (incl. livestock if livestock is listed as business)
- Food security index
 - Household Food Insecurity Access Scale (HFIAS)
 - Food Consumption Score (FCS)
- Subjective well-being index
 - Kessler 6
 - Life satisfaction and relative economic status
 - Average of four 1-10 ladder questions: current life satisfaction, life satisfaction in five years, current relative economic status, relative economic status in five years

Secondary outcomes

All outcomes that are not listed as primary outcomes are considered secondary outcomes, see attached survey instrument.

Implementer-collected monthly business outcomes panel

In addition to survey outcomes, we will analyze differences in outcomes between the Green and the Standard arms based on monthly monitoring data from the implementer, which is available for participants only.

We will study differences not only in the cross-section, but also investigate the time-series. In initial take-up data, Green and Standard arms chose different types of businesses. We are interested in whether the differences in business choices leads to lower variance in business income over time.

Outcomes available in monthly monitoring panel:

- Business membership

- Business types
- Business income and profitability
- Sales, purchases expenses & losses
- Cash, food, and goods distributed
- Primary business value
- Secondary business value
- Graduation criteria

Data collection and timing of analysis

While data collection was completed at the time of submission of this analysis plan, the researchers have been blind to the treatment effect estimates, with the exception of analysis of survey attrition which was conducted during data collection and included comparisons of attrition rates by treatment status for the purpose of management of potential differential attrition.