Pre-Analysis Plan for The Effect of Cash Transfers and Market Access on Households in Rural Liberia and Malawi*

Shilpa Aggarwal[†] Jenny Aker[‡] Dahyeon Jeong[§] Naresh Kumar[¶]
David Sungho Park[‖] Jonathan Robinson[**] Alan Spearot[††]

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1 Description of Study

We are evaluating the impact of an unconditional cash transfer program implemented by the NGO GiveDirectly in Liberia and Malawi. The study takes place in 600 rural villages—300 in Liberia and 300 in Malawi. The research design is nearly identical in two countries, with small differences due to local context. In both countries, the cash transfers average about $500 USD per household, roughly equivalent to annual household expenditures. The treatment is randomized at the village level: in treatment villages, all households are given cash, while control villages receive nothing. The value of the transfer varies across villages: villages are randomly selected to receive $250, $500, or $750 per household. These sums are paid out in monthly $250 increments, so that villages receive 1, 2, or 3 payments. In addition, in Liberia, respondents are randomized into being paid this amount quarterly (spread out every 3 months for a year) or in up to three consecutive months. In Malawi, we worked with the NGO to attempt to randomly enroll the female or male head of household. Transfers

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[†]Indian School of Business, email: shilpa_aggarwal@isb.edu
[‡]Tufts University, email: jenny.aker@tufts.edu
[§]University of California, Santa Cruz, email: dajeong@ucsc.edu
[¶]University of California, Santa Cruz, email: nkumar5@ucsc.edu
[‖]University of California, Santa Cruz, email: davidspark@ucsc.edu
[**]University of California, Santa Cruz, email: jmrtwo@ucsc.edu
[††]University of California, Santa Cruz, email: aspearot@ucsc.edu

are made via mobile money; since pre-existing mobile money usage is low, beneficiaries are given the option to buy cell phones and are given help in signing up for mobile money.

In addition, we have cross-cut a randomized market access intervention. This intervention lowered transportation costs to reach an input retailer for agricultural inputs, but did not further subsidize inputs. In each country, of the 300 total villages in the study, 100 received cash only, 50 received market access only, 50 received both cash and market access, and 100 received nothing and served as control. The main outcome for this part of the analysis is agricultural decisions, especially input choices; our goal is to examine whether market access alone affects agricultural choices, and whether cash plus market access has a bigger effect than either cash or market access alone.

In total, we have a sample of 6,000 households across 600 villages in the two countries (300 villages in each country). Half of the sample receives cash transfers and the other half serves as control. In Liberia, the study is conducted in two waves (2018-2019 and 2019-2020), where 30% of the sample (90 villages) is enrolled in the first wave and 70% (210 villages) in the second. All 300 villages in Malawi are enrolled in a single wave (2019-2020). To measure the impact of the unconditional cash transfers (UCT) on household outcomes directly, we conducted an extensive baseline survey and will follow up with a similar endline survey about one to two years after cash transfers begin. In addition, we have enrolled a panel of 1,200 households into a phone survey sample. The goal of this exercise is to examine time-varying effects of the transfers. To our knowledge, most existing studies examine outcomes at a single point in time (often well after the transfers have been given out), and so are often set up to examine whether transfers have effects in the medium to long term. However, based upon previous evidence, it is likely that these vulnerable households will spend at least some money on food, and so it is not necessarily the case that they will be able to permanently change their income levels. While we expect these effects to dissipate over time, it is important to document this time path to accurately assess the present discounted value of transfers. Accordingly, within our phone survey sample, respondents are called every two months.

2 Experimental Design

2.1 Sampling

The study takes place in regions that were chosen by the partner NGO and funder based on a variety of factors, including poverty levels, cell phone coverage, and proximity to roads.

In Liberia, the project takes place in 6 districts in Bong and Nimba counties[1], which are areas that are not too remote from the capital, but which are about average in terms of poverty for Liberia. In Malawi, the project takes place in Chiradzulu and Machinga districts in the Southern Region. The project in Liberia is taking place over two years (2018-19 and 2019-20) due to the heavy rains which make field activities difficult in the summer, while in Malawi it takes place over 2019-20 only.

To draw a sample, GiveDirectly visited each village considered for study inclusion. In each village, GiveDirectly field staff visited each habitation and dropped a GPS pin to mark the structure. From this exercise, GiveDirectly was able to estimate the number of households in the village and dropped villages that were too large (to keep within a budget constraint for the cash transfers). GiveDirectly provided these GPS pins to the research team. Study households were randomly selected from this list of GPS pins.

2.2 Interventions:

2.2.1 Cash transfer program

The NGO GiveDirectly is providing cash transfers to households. The value of this transfer is experimentally selected (at the village level) to be $250, $500, or $750. These sums are paid out in monthly $250 increments, so that villages receive 1, 2, or 3 payments. There are several additional sub-randomizations. In Liberia, respondents are randomly chosen to be paid out quarterly, while others are paid over (up to three) consecutive months. In Malawi, households were randomly selected for either the male or female head of households to receive the transfer. At enrollment, if both spouses were home, the randomly selected male or female head was attempted to be enrolled; if only one spouse was available, that spouse was enrolled. Transfers are made via mobile money; since pre-existing mobile money usage is low, beneficiaries are given the option to buy cell phones and are given help in signing up for mobile money. The cost of the cell phone (less than $10) is deducted from the transfer.

2.2.2 Market access

A market access intervention is cross-randomized. Respondents are given a voucher to defray transportation costs to access inputs. We partner with agricultural input dealers in both countries to organize one-time market fairs. In Liberia, agricultural input dealers set up stalls at local market centers where inputs were made available. In Malawi, a major agricultural

[1]We work in the districts of Salala and Yeallequelleh in Bong county, and the districts of Twan River, Meinpea Mahn, Leewehpea Mahn, and Buu Yao in Nimba county.

input dealer set up events at prominent locations (such as primary schools). Inputs were not subsidized. We intended to run the market access intervention in all 600 villages, but due to COVID-19 the market access intervention had to be canceled in year 2 (in 2020), so that only the 90 villages in wave 1 could be included in the analysis.

2.3 Randomization

The experiment includes 600 total villages (300 in each country). The experiment will be cross-cut so that in each country 100 villages receive cash transfers, 100 serve as control, 50 receive market access only, and 50 receive both market access and cash. We plan to enroll a sample of 10 households per village, so that our target sample is 6,000 total households. There are several sub-treatments within the cash transfer treatment arm. First, the value of the transfers was randomly assigned by village to be $250, $500, or $750 per household. These sums are paid out in monthly $250 increments, so that villages receive 1, 2, or 3 payments. In addition, in Liberia, respondents are randomized within villages into being paid this amount quarterly (i.e. spread out every 3 months for a year), or in 3 consecutive months. Finally, in Malawi, GiveDirectly randomized whether the male or female head of the household received the cash transfer (conditional on both spouses being home at the time of enrollment). The randomization is stratified by administrative units known as "clan" for Bong in Liberia, "district" for Nimba in Liberia, and "traditional authority" in Malawi.

For higher statistical power for measuring spillovers of the cash transfer treatment, the intensity was randomly varied at a level higher than the village. In each country, we identified clusters of villages, and then randomized each cluster to pure control, low-intensity treatment, or high-intensity treatment.[2] In Malawi, the cluster we used is the existing administrative unit known as the "group village," which is between the "village" and "traditional authority."[3] In Liberia, there is no comparable administrative structure[4], so we ourselves determine geographical clusters of villages through a hierarchical clustering exercise.[5] Once these clusters were identified, we randomized across them.

[2]The average percentage of villages treated was about 46% in low-intensity clusters and about 74% in high-intensity clusters.

[3]Malawi has retained some aspects of its traditional governance structure, and every village in Malawi has a village head (or "chief") who is the main authority in the village. Villages are organized into group villages, with a group village head.

[4]The next level of administration to the "village" in Liberia is the "clan", which is too large for this analysis.

[5]Specifically, we used a hierarchical clustering procedure based on average distances between structures ("average linkage").

3 Data Collection

All outcomes will be measured via surveys conducted either in person or over the phone.

3.1 Household Baseline Survey

The baseline survey was conducted between November and December 2018 (for wave 1) and October-December 2019 (for wave 2) in Liberia and April-August 2019 in Malawi. The survey was administered to households in the study villages before treatment assignment. We interviewed one representative member of the 10 households that are randomly chosen within a village. The survey includes questions on demographics, asset ownership, savings, credit, transfers, mobile money, health, education, and agriculture. We included a detailed module on intimate partner violence (IPV) that randomized the use of a standard face-to-face survey methodology and an audio computer-assisted self-interview (ACASI) format, using a tablet. We followed best practices to conduct this module and the survey as a whole.[6] Following WHO's ethical and safety guidelines for IPV research, we conducted the surveys privately and employed only female enumerators, and we provided respondents with contact information for local resources for abused women. We also collected information on child anthropometrics, for children under the age of 5, in Malawi only. This survey takes about 2-3 hours. Survey modules and consent documents are available on the authors' websites.

3.2 Household High Frequency Phone Survey

A key intellectual contribution of this project is to examine how the effects of cash transfers vary with the time since transfer. We do this via phone surveys. During baseline, we randomly selected 2 households per village (1,200 total over the 2 countries) to receive cell phones and obtained consent to participate in a phone survey. The phone surveys will be conducted for approximately 12 months, starting shortly after households begin receiving their GiveDirectly transfers; each household in the phone survey will be called approximately 6 times during the course of the study with a randomized even/odd month schedule. The phone survey questions are similar to some modules in the baseline and endline, and collect information on food security, income, labor supply, expenditures, transfers, savings, and related topics. Each round of the phone survey takes about 45 minutes.

In light of the outbreak of COVID-19 in early 2020, we added a related module to phone surveys conducted after the COVID outbreak. The additional survey module contains a number of questions specific to COVID-19, including whether people have a basic under-

[6] We used the domestic violence module in the Demographic and Health Surveys (DHS).

standing of the virus, how individuals have changed behavior, how they are coping with the lockdowns related to the virus, and related questions. These modules were added in May 2020.

3.3 Household Endline Survey

This survey will be conducted about one to two years after treatment households received the first transfer from GiveDirectly. The survey content will be nearly identical to the baseline survey.

3.4 Crop Vendor Price Survey

Enumerators visited markets and enrolled crop vendors in a phone survey. Vendors sit at market stalls with their products displayed. Enumerators identified vendors, recorded the current price of the crop, and obtained consent to call the vendor back once per month over the next 12-24 months. The monthly phone call focused only on prices for the majority of data collection, and took about 5-10 minutes to complete. This data is used to create a panel of local prices.[7]

To evaluate changes in prices and study and non-study areas, we enrolled markets in the study area and other markets outside of it. In total, we enrolled 80 markets in Liberia and 95 markets in Malawi. In Liberia, approximately half of these are in areas that received cash transfers, and the other half are in areas that did not. In Malawi, about one quarter are in areas that received the transfer. To study the effect of injecting large amounts of cash into these areas, we plan to conduct a difference-in-difference analysis to look at changes in prices in study and non-study areas.

Similarly to the Household Phone Survey, we added a survey module related to COVID-19 in May 2020. In addition to the COVID-19-related questions added to the Household Phone Survey, crop vendors were asked about how their businesses were affected by the pandemic, including changes in number of customers, number of operating hours, revenue, and profit.

[7]The food or crop items included in Liberia were salt, imported rice, local rice, cassava, cassava flour, frozen chicken, fresh fish, dried fish, palm oil, pepper, bitterballs, okra, onions, cane juice. In Malawi, they were salt, sweet potato, rice, maize kernel, maize flour, chicken, soya, dried fish, mpiru, dried beans, groundnuts, tomato, eggs, onion, pigeon pea, and sugar.

3.5 Mobile Money Transaction Data

In order to measure whether and when our study respondents received cash payments from GiveDirectly, we plan to obtain mobile money transaction data from the partner telecom companies (MTN Lonestar and Orange in Liberia and Airtel in Malawi). In addition, this dataset will allow us to learn when and how much recipients decided to withdraw money. We intend to use this data primarily to verify dates at which respondents were paid money, and to examine whether respondents withdraw the entire amount immediately (or leave some money in the account).

4 Analysis: Effect of Cash Transfers

All regressions will be run on a pooled sample of both Liberia and Malawi, unless specified otherwise.

4.1 Effects estimated using endline survey

The main analysis for the intention-to-treat (ITT) effect of the cash transfers will be using data collected in the endline survey, with baseline measures of the outcomes (i.e., ANCOVA specification), and strata fixed effects. The regression equation will be

$$Y_{iv} = \gamma GD_v + \beta Y_{iv0} + \mu_s + \delta MA_v + \varepsilon_{iv} \tag{1}$$

where Y_{iv} is an outcome for individual i in village v, GD_v is treatment status for cash transfers for village v, MA_v is market access treatment status for village v, μ_s are coefficients on strata fixed effects,[8] and Y_{iv0} is the baseline measure of the outcome variable. For statistical inference of $\gamma = 0$, standard errors will be clustered at the village level, which is the unit of randomization of GD_v. This regression is valid so long as attrition between the treatment and control groups is balanced. We will test whether attrition is balanced in the analysis and, if it is not, run regressions to correct for this imbalance using the Lee bounding procedure.

4.2 Effects estimated using phone surveys

The analysis for dynamic treatment effects of cash transfers will be using monthly data collected in the high-frequency phone surveys (HFPS), running the following:

[8] This is clan for Bong in Liberia, district for Nimba in Liberia, and traditional authority (TA) for Malawi.

$$Y_{ivr} = \sum_{m=1}^{M} \alpha_m GD_v D_{m(v)} + \beta Y_{iv0} + \mu_{s(v)} + \phi_m + \delta MA_v + \varepsilon_{ivr}, \tag{2}$$

where Y_{ivr} is an outcome for individual i in village v at survey round r, GD_v is treatment status for cash transfers for village v, and $D_{m(v)}$ is a dummy variable indicating the number of months, m, since village v has received its first cash transfer payments at the time of survey round r. For control villages, the number of months since the first transfer is defined based on the months of transfers in treatment villages in the same geographical areas.[9] Y_{iv0} is a measure of the outcome from the baseline. ϕ_m are calendar month fixed effects. α_m represents the effect of cash transfers after m months since villages received its first payments up to M number of months.

We also analyze the dynamic treatment effects separately by villages that received different transfer amounts, \$250, \$500, and \$750:

$$Y_{ivr} = \sum_{m=1}^{M} \alpha_m GD_v D_{m(v)} (\gamma_1 GD_v^{250} + \gamma_2 GD_v^{500} + \gamma_3 GD_v^{750}) + \beta Y_{iv0} + \mu_{s(v)} + \phi_m + \delta MA_v + \varepsilon_{ivr}, \tag{3}$$

For statistical inference of whether the effect size is decreasing over time, we will test $\kappa < 0$ (standard errors clustered at village level) in the following equation:

$$Y_{ivr} = \kappa \cdot mGD_{vr} + \beta Y_{iv0} + \phi_m + \mu_{s(v)} + \delta MA_v + \varepsilon_{ivr}, \tag{4}$$

We will also pool survey rounds and test a pooled effect across all rounds as follows:

$$Y_{ivr} = \gamma GD_v + \beta Y_{iv0} + \phi_m + \mu_{s(v)} + \delta MA_v + \varepsilon_{ivr} \tag{5}$$

We will test whether γ is equal to 0, with standard errors clustered at village level.

Finally, at the time of this writing (June 2020), both Malawi and Liberia have been severely affected by economic disruptions due to COVID-19. We anticipate to examine treatment effects in survey rounds occurring after these disruptions have occurred.

4.3 Experimental subtreatments

The experiment has several subtreatment arms of the cash transfer treatment. In each country, the value of the transfer varied between \$250, \$500, and \$750. In addition, in Liberia, it was randomized whether people got "lump sum" or "flow" transfers, where the former was paid over (up to) three consecutive months, and the latter was paid in equal

[9] In a separate analysis, we will also analyze how the treatment effect varies with calendar months, to explore possible seasonality in treatment effects (due to factors such as the agricultural season, or COVID).

installments quarterly. In Malawi, the transfers were randomized whether the husband or wife was meant to receive the cash transfers, though in practice this will not be a perfect assignment since some spouses may be widowed, divorced, or away working.

Based on this, we will run several secondary specifications. First, for both countries, we will look at effects differentially by the size of the cash transfer ($250, $500, or $750):

$$Y_{iv} = \gamma_1 GD_v^{250} + \gamma_2 GD_v^{500} + \gamma_3 GD_v^{750} + \beta Y_{iv0} + \mu_s + \delta MA_v + \varepsilon_{iv} \tag{6}$$

Second, for Liberia only, we will examine whether effects differ between lump-sum and flow payments:

$$Y_{iv} = \theta_1 GD_{iv}^{lump} + \theta_2 GD_{iv}^{flow} + \beta Y_{iv0} + \mu_s + \delta MA_v + \varepsilon_{iv} \tag{7}$$

Third, for Malawi only, we will estimate treatment effects based on whether the household was selected to have the male head or female head receive the transfer:

$$Y_{iv} = \sigma_1 GD_v female_{iv} + \sigma_2 GD_v + \sigma_0 female_{iv} + \beta Y_{iv0} + \mu_s + \delta MA_v + \varepsilon_{iv} \tag{8}$$

Because we expect some level of non-compliance with treatment assignment (since some households are single-headed, and because both spouses will not always be at home for enrollment), we plan to instrument for the gender of the respondent using the intended recipient as initially randomized.

4.4 Heterogeneity

While we run the main analyses on the pooled samples of Liberia and Malawi, we will run all heterogeneity analyses separately for each country, since there are major contextual differences between the two countries (as well as some more minor differences in the timing of surveys, and in the specifics of the randomization). We also plan to conduct heterogeneity analysis between the first and second year of the study in Liberia, since the geographic location varied, and because of changes in the economy between years (especially COVID-19). Finally, we plan to conduct heterogeneity analysis by child gender, for education outcomes only.

4.5 Outcomes

4.5.1 Primary outcomes

The following is a list of variables in groups, in each of which we specify the index variable(s) that will be our primary variables for analysis. For analysis of the effects on these pre-specified outcomes, we will further report the p-values corrected for Family-Wise Error Rate and the sharpened q-values corrected for the False Discovery Rate, in addition to the standard p-values, as in Anderson (2008).

1. Food security

   (a) Food insecurity experience scale (FIES) [10]

   (b) Household dietary diversity score (HDDS)[11]

   (c) Food consumption score (FCS)[12]

   (d) Household hunger scale (HHS)[13]

   Index variable:

   - **Food security index: weighted average of the standardized z-scores of (a)-(d).**

2. Expenditure

   (a) Food (past month, by household)

   (b) Temptation goods (past month, by respondent)

   (c) Nondurable goods and services (past month, by household)

   (d) Clothes (past month, by household)

   (e) Education (past 6 months, by household)

   (f) Home repair and construction (past month, by household)

   (g) Health (past year, by household)

   (h) Contributions to church/mosque (past month, by household)

   (i) Contributions to funeral/wedding or other family events (past month, by household)

[10] See Cafiero et al. (2018) for details.
[11] See FAO (2013) for details.
[12] See WFP (2008) for details.
[13] See Ballard et al. (2011) for details.

(j) Nonmedical emergencies (past month, by household)

(k) Durable good purchases (since baseline)

Index variables:

- **Total monthly expenditure per capita: sum of (a)-(k) divided by the number of household members (i.e., household size)**
  - (e), (g) and (k) will be divided by the appropriate number of months, to make equivalent to a monthly recall.
- **Total food expenditure per capita: (a) over household size**
- **Total expenditure on home repair and construction per capita: (f) over household size**
- **Total expenditure on durable goods per capita: (k) over household size**

3. Wealth

(a) Value of land owned by household

(b) Value of housing structure owned by household

(c) Value of livestock owned by household

(d) Farm assets owned by household

(e) Value of durable goods owned by household

(f) Value of current balance in savings owned by household

(g) Value of assets and working capital for business owned by respondent

(h) Amount of outstanding loans by household

Index variable:

- **Net value of non-housing wealth of household: sum of (c)-(g) minus (h).**
- **Value of savings by household: (e).**

4. Non-agricultural income

(a) Income from working as casual worker (past 30 days)

(b) Profit from self-employment (past 30 days)

(c) Income from any other job (past 30 days)

Index variable:

- **Total non-agricultural income of respondent (past 30 days): sum of (a)-(c).**

5. Intimate partner violence (IPV) against women by male partners

   (a) Controlling behavior (past 12 months)

   (b) Emotional IPV (past 12 months)

   (c) Physical IPV (past 12 months)

   (d) Sexual IPV (past 12 months)

   (e) Injury from physical/sexual IPV (past 12 months)

   Index variables:

   - **Any IPV (past 12 months): indicator of any of (b)-(d).**
   - **Physical/sexual IPV (past 12 months): indicator of (c)-(d).**

6. Household resilience

   Index variable:

   - **Index of ability to recover from shocks and stresses**[14]

7. Interpersonal transfers

   (a) Transfers sent to spouse (past 3 months)

   (b) Transfers received from spouse (past 3 months)

   (c) Transfers sent to friend, non-spouse family relative, or neighbor (past 3 months)

   (d) Transfers received from friend, non-spouse family relative, or neighbor (past 3 months)

   Index variable:

   - **Total transfers sent (monthly): sum of (a) and (c), divided by 3.**
   - **Total transfers received (monthly): sum of (b) and (d), divided by 3.**

8. Psychological well-being

[14]Calculated based on USAID (2019). Refer to indicator # RESIL-a in p.192.

(a) Patient Health Questionnaire-9 (PHQ-9) score (0-27 scale)

(b) Responses to the Happiness and Well-being questions from the World Values Survey[15]

Index variable:

- **Psychological well-being index: weighted average of z-scores of (a) and (b).**

All monetary outcomes will be Winsorized at 1% and 99%.

4.5.2 Secondary Outcomes

1. Labor supply

   (a) Number of hours worked in own farm (past 30 days)

   (b) Number of hours worked as casual worker (past 30 days)

   (c) Number of hours worked in self-employment (past 30 days)

   (d) Number of hours worked in any other job (past 30 days)

   Index variable:

   - **Total labor supply of respondent (past 30 days): sum of (a)-(d).**

2. Household health investment

   (a) Percentage of household members seeking preventative care (past 3 months)

   (b) Percentage of household members slept under a mosquito net (last night)

   Index variable:

   - **Household health investment index: average of standardized z-scores of (a)-(b).**

3. Health investment in children

   Percentage of children under the age of 18 with any vaccination (a)

   (a) Per-child average percentage of recommended vaccinations received (b)

   Index variable:

[15] Questions #46-50 from World Values Survey Wave 7 (2017-2020) Questionnaire.

- **Under-5 children vaccination index: average of standardized z-scores of (a)-(b).**

4. Household health

   (a) Number of illnesses occurred per household member (past month)

   Index variables:

   - **Household health index: average of standardized z-scores of (a).**

5. Resilience to health shocks

   (a) Percentage of ill household members treated illness at all (past month)

   (b) Percentage of ill household members delayed treatment (past month)

   (c) Total number of missing days of work due to illness (past month)

   (d) Total number of missing days of school due to illness (past month)

   Index variables:

   - **Household resilience to health shocks: average of standardized z-scores of (a)-(d).**

6. Child anthropometrics (Malawi only)

   (a) Height for age (HAZ) of children under 5: z-scores on *WHO Child Growth Standards*

   (b) Weight for age (WAZ) of children under 5

   (c) Weight for height (WHZ) of children under 5

   (d) Mid-upper arm circumference (MUAC) for age of children under 5

   Index variables:

   - **Child stunting index: (a)**
   - **Child underweight index: (b)**
   - **Child wasting index 1: (c)**
   - **Child wasting index 2: (d)**

7. Education

(a) Percentage of children currently enrolled in school (by household)

(b) Average number of days of school missed (per child, past 12 months)

(c) Percentage of attending days of school (past week)

(d) Education expenditure (past 6 months)

Index variable:

- **Household education index: weighted average of z-scores of (a)-(d).**

8. Social capital

   Index variable:

   - **Index of social capital of household**[16]

9. Public goods contribution

   For community service activities in the past 12 months:[17]

   (a) Number of labor hours contributed

   (b) Cash contributions

   (c) Value of in-kind contributions

   Index variable:

   - **Public goods contribution index: weighted average of z-scores of (a)-(c)**

4.6 Additional analyses requested by funder and implementing partner

In addition to the above analysis, which will form the core of our main analysis, we plan several other analyses at the request of the funder. These include:

1. We will analyze the effect of cash on child anthropometrics (in Malawi only) separately by age. In particular, we will analyze effects with an interaction between age in years and the experimental treatment.

[16] Calculated based on USAID (2019). Refer to indicator # RESIL-b in p.196.

[17] List of activities include cleaning/maintaining/repairing/building of road/neighborhood/bridge, schools, clean water/bathing, washing, sanitary facilities, irrigation canal/weir, worship/cemetery, village/neighborhood facilities (meeting hall, office, gate, sports field), poor people dwellings, health facility (auxiliary community health centre/village polyclinic/integrated service post), etc. See Wong et al. (2008) for detail.

2. We will conduct sub-group analyses for various characteristics identified by the country missions at the beginning of the project. These include:

   (a) Food-insecure households

   (b) Smallholder farmers

   (c) Households with adolescent girls and young women

   (d) Households with orphans and vulnerable children

   (e) Households engaged in livelihoods that profit from the destruction of natural resources

   (f) Households with school-aged children

   (g) Youth-headed households (aged 18-35)

5 Analysis: Effect of Market Access and Cash Transfers

5.1 Average effect of market access

The regression equation will be exactly the same as equation (1), but here the coefficient of interest is δ. We will test $\delta = 0$ with standard errors clustered at village level, which is the randomization unit for MA_v.

5.2 Interaction between cash transfer and market access

To see the interaction effects between cash transfers and market access, we will run the following:

$$Y_{iv} = \delta MA_v + \gamma GD_v + \varphi MA_v \cdot GD_v + \beta Y_{iv0} + \mu_s + \varepsilon_{iv} \tag{9}$$

The market access analysis will not include year 2 of the Liberia study, since the market access intervention had to be canceled there due to COVID-19. The analysis will therefore include the entire sample in Malawi but only the 90 villages in the first year in Liberia.

5.3 Heterogeneity

As with the prior section, we will separately analyze effects in Liberia and Malawi.

5.4 Outcomes

5.4.1 Primary Outcomes

The following is a list of our primary variables for analysis. For analysis of the effects on these pre-specified outcomes, we will further report the p-values corrected for Family-Wise Error Rate and the sharpened q-values corrected for the False Discovery Rate, in addition to the standard p-values, as in Anderson (2008).

1. Binary indicator for chemical fertilizer purchases
2. Monetary sum of fertilizer purchases
3. Binary indicator for improved/hybrid seed purchases
4. Monetary sum of improved/hybrid seed purchases
5. Binary indicator for pesticide purchases
6. Monetary sum of pesticide purchases

All monetary outcomes will be Winsorized at 1% and 99%.

5.4.2 Secondary Outcomes

1. Agricultural productivity
    (a) Output quantity
    (b) Sales value of output
2. Agricultural labor
    (a) Total hours of labor time on farm
    (b) Total hours of casual labor hours off farm
    (c) Total hours of hired casual labor hours on farm
3. Land
    (a) Acreage of land used for farming
4. Crops sales
    (a) Indicator variable for selling any output

(b) Monetary value of sales

5. Crop choices

   (a) Number of crops grown

   (b) Indicator for growing a new crop

References

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