# Pre-analysis Plans (PAPs): Applications in Economics

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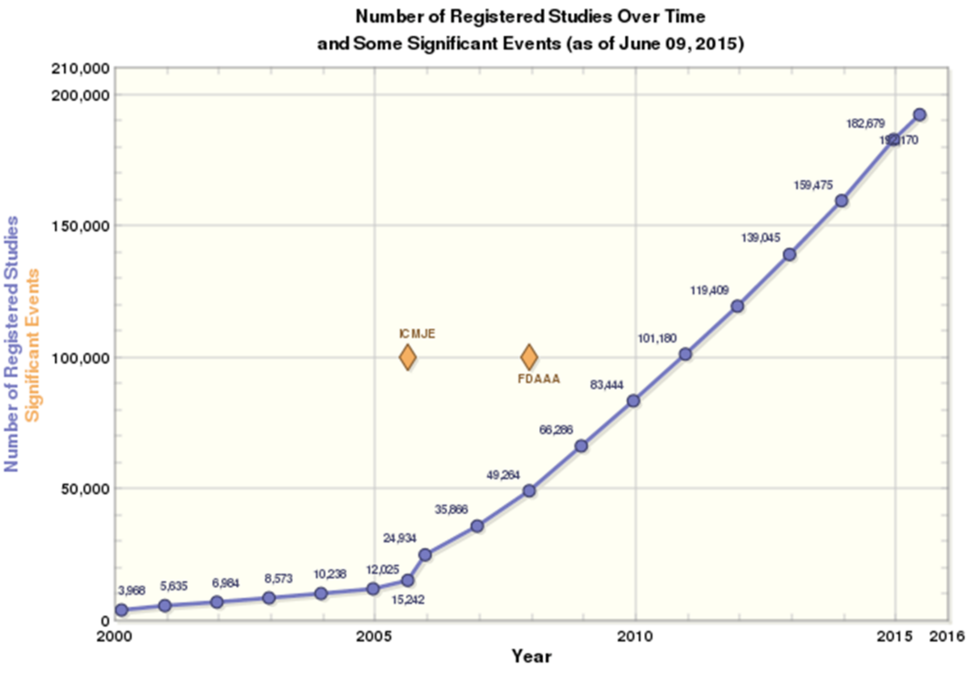
BITSS
Berkeley Initiative for Transparency in the Social Sciences

# Overview

- Quick scan
  - Early days for pre-registration in economics
  - The basic deal with PAPs
- GoBifo project: A natural for PAPs
  - Design features that posed risks
  - How the PAP mitigated those risks
  - Practicalities in implementing a PAP
- Debates project: A tougher fit
  - Ways to build in flexibility when research design demands it
  - Working the upside

# Pre-registration in economics

## Clinical trials in medicine (what Maya showed you earlier)

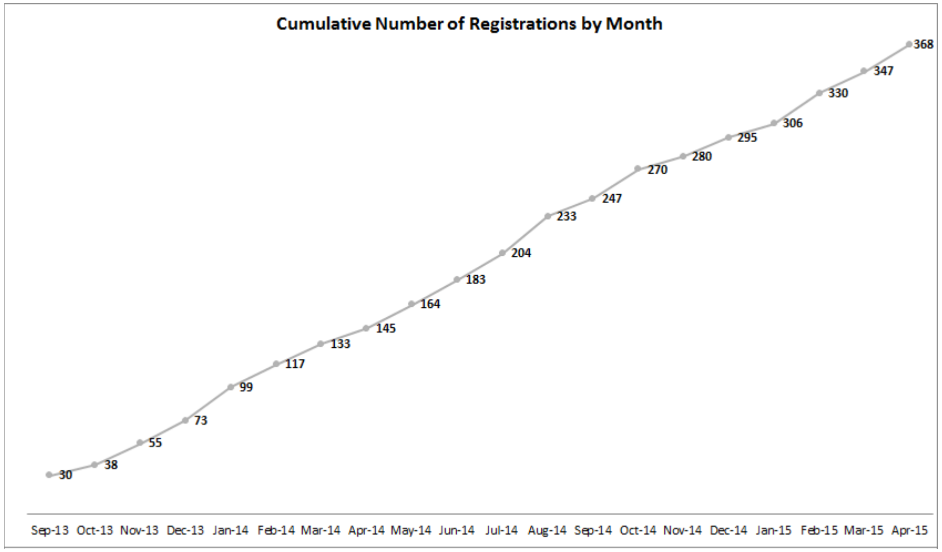


Number of Registered Studies Over Time
and Some Significant Events (as of June 09, 2015)

Source: http://ClinicalTrials.gov

*Source: www.clinicaltrials.gov/ct2/resources/trends*

## RCTs in the new American Economic Association Registry



Cumulative Number of Registrations by Month

*Source: J-PAL Research Newsletter: April 2015*

# AEA Registry: Minimal requirements

## Required fields

- Basic identifiers
  - trial title, country, status, keyword, abstract
- Study timeline
  - Trial start/end date, intervention start/end date
  - *Bonus icon if registered before intervention starts*
- Outcomes
- Experimental design (public)
  - Includes number of clusters and observations
- IRB approval details (if obtained)

## Additional details

- Eligible studies
  - Open to the social sciences (not just economics), non-AEA members too
  - Observational studies not on the table at the moment
- Options
  - PAPs not required
  - Privacy choices to hide items (like PAPs) until trial completion
- No current provision for outcome reporting
- Collaborations underway
  - Integrated search with OSF, 3ie, EGAP, other social science registries
  - Will require RCT working papers submitted to NBER to register

*Source: www.socialscienceregistry.org/site/about*

# Pre-analysis plans: The deal

## Upside

- Increases the credibility of your results
  - Reported results are less likely to be Type I errors
  - Generates correct p-values
  - Bolsters surprising results
- Leverages statistical power
  - Enables one sided tests
  - Protects you from endless robustness checks
- Shields you from vested interests

## Downside

- You can't cheat
- Requires time and effort up front
  - Some of this is valuable (better designed surveys), some is deadweight loss
- Reduces your flexibility
  - Must delineate exploratory from confirmatory work
  - Unclear how referee norms will adapt, expect some penalty

# Application 1: The GoBifo project

- Casey, Glennerster and Miguel (2012) estimates the impact of a community driven development program in Sierra Leone on:
  - the "hardware" of local public goods and economic activity, and
  - "software" of institutional performance and social capital
- CDD aims to improve the capacity and performance of local governance while enhancing the inclusion of marginalized groups, like women and youth, in village decision-making
- Research design was a large-scale randomized experiment covering 236 villages over a four year time frame (2005-09) with multiple sources of detailed data collection
- Overall, we found strong positive effects on hardware outcomes and no effects on institutional software

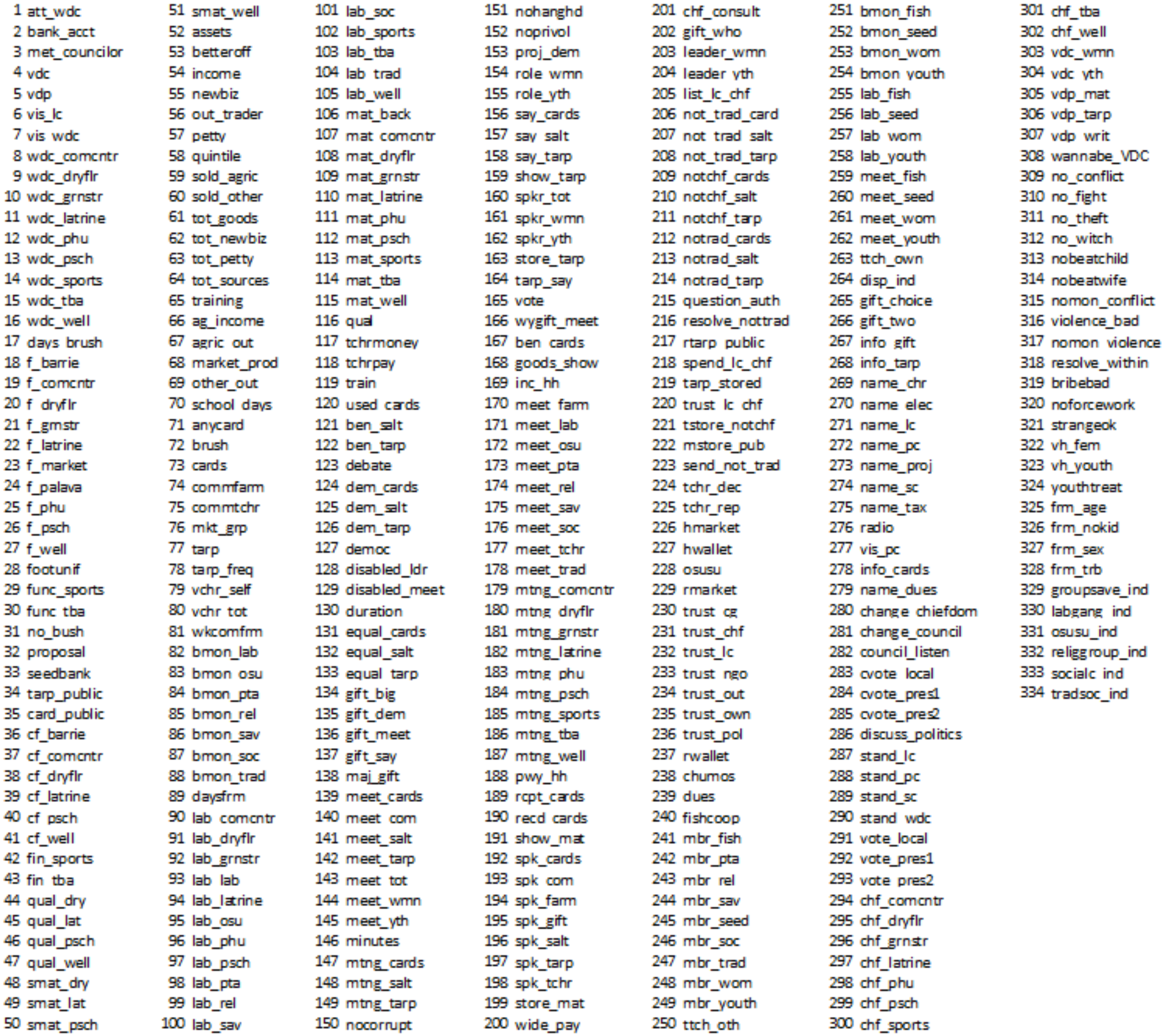
# Study features that posed risks

1. A vested interest focused on a loosely defined outcome
   - Donors viewed impacts on social capital as a defining feature of CDD
   - Imprecision in what exactly social capital entails provides an “out” that inconvenient results simply capture the wrong measures
2. Many relevant outcomes created scope for fruitful cherry picking
   - Institutions are multi-faceted and context-specific
   - Absence of standardized measures makes such tendentious reporting difficult to detect from the outside
3. Several sub-groups of theoretical interest
   - $X$ sub-groups by $Y$ hypotheses invites further cherry picking

# How the PAP helped mitigate those risks

1. Pre-project (2005) implementation agreement defined the hypothesis set
   - Five hypotheses explicitly capture different dimensions of social capital (trust, collective action, groups, information and inclusion)
2. Post-project (2009) PAP defined the universe of outcomes, matched them to specific survey measures, and mapped each one to a hypothesis
   - Provides a credible structure for multiple inference adjustment within and across hypotheses
   - Establishes the hypothesis-level mean effect index as a primary performance metric
   - Commits to providing treatment effect estimates for all 334 outcomes
3. PAP defines 6 primary and 4 secondary sub-groups of interest
   - Tests for heterogeneous effects account for multiple inference

# PAP disciplines discretion over the raw material…



1 att_wdc
2 bank_acct
3 met_councilor
4 vdc
5 vdp
6 vis_lc
7 vis wdc
8 wdc_comcntr
9 wdc_dryflr
10 wdc_grnstr
11 wdc_latrine
12 wdc_phu
13 wdc_psch
14 wdc_sports
15 wdc_tba
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17 days brush
18 f_barrie
19 f_comcntr
20 f dryflr
21 f_grnstr
22 f_latrine
23 f_market
24 f_palava
25 f_phu
26 f_psch
27 f_well
28 footunif
29 func_sports
30 func tba
31 no_bush
32 proposal
33 seedbank
34 tarp_public
35 card_public
36 cf_barrie
37 cf_comcntr
38 cf_dryflr
39 cf_latrine
40 cf psch
41 cf_well
42 fin_sports
43 fin tba
44 qual_dry
45 qual_lat
46 qual_psch
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53 betteroff
54 income
55 newbiz
56 out_trader
57 petty
58 quintile
59 sold_agric
60 sold_other
61 tot_goods
62 tot_newbiz
63 tot_petty
64 tot_sources
65 training
66 ag_income
67 agric out
68 market_prod
69 other_out
70 school days
71 anycard
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73 cards
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114 mat_tba
115 mat_well
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117 tchrmoney
118 tchrpay
119 train
120 used cards
121 ben_salt
122 ben_tarp
123 debate
124 dem_cards
125 dem_salt
126 dem_tarp
127 democ
128 disabled_ldr
129 disabled_meet
130 duration
131 equal_cards
132 equal_salt
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136 gift_meet
137 gift_say
138 maj_gift
139 meet_cards
140 meet com
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142 meet_tarp
143 meet tot
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146 minutes
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156 say_cards
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158 say_tarp
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162 spkr_yth
163 store_tarp
164 tarp_say
165 vote
166 wygift_meet
167 ben cards
168 goods_show
169 inc_hh
170 meet farm
171 meet_lab
172 meet_osu
173 meet_pta
174 meet_rel
175 meet_sav
176 meet_soc
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187 mtng_well
188 pwy_hh
189 rcpt_cards
190 recd cards
191 show_mat
192 spk_cards
193 spk com
194 spk_farm
195 spk_gift
196 spk_salt
197 spk_tarp
198 spk_tchr
199 store_mat
200 wide_pay
201 chf_consult
202 gift_who
203 leader_wmn
204 leader yth
205 list_lc_chf
206 not_trad_card
207 not trad salt
208 not_trad_tarp
209 notchf_cards
210 notchf_salt
211 notchf_tarp
212 notrad_cards
213 notrad_salt
214 notrad_tarp
215 question_auth
216 resolve_nottrad
217 rtarp public
218 spend_lc_chf
219 tarp_stored
220 trust lc chf
221 tstore_notchf
222 mstore_pub
223 send_not_trad
224 tchr_dec
225 tchr_rep
226 hmarket
227 hwallet
228 osusu
229 rmarket
230 trust cg
231 trust_chf
232 trust_lc
233 trust ngo
234 trust_out
235 trust_own
236 trust_pol
237 rwallet
238 chumos
239 dues
240 fishcoop
241 mbr_fish
242 mbr_pta
243 mbr rel
244 mbr_sav
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248 mbr_wom
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251 bmon_fish
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262 meet_youth
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266 gift_two
267 info gift
268 info_tarp
269 name_chr
270 name elec
271 name_lc
272 name_pc
273 name_proj
274 name_sc
275 name_tax
276 radio
277 vis_pc
278 info_cards
279 name_dues
280 change chiefdom
281 change_council
282 council_listen
283 cvote local
284 cvote_pres1
285 cvote_pres2
286 discuss_politics
287 stand_lc
288 stand_pc
289 stand_sc
290 stand wdc
291 vote_local
292 vote_pres1
293 vote pres2
294 chf_comcntr
295 chf_dryflr
296 chf_grnstr
297 chf_latrine
298 chf_phu
299 chf_psch
300 chf_sports
301 chf_tba
302 chf_well
303 vdc_wmn
304 vdc yth
305 vdp_mat
306 vdp_tarp
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309 no_conflict
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311 no_theft
312 no_witch
313 nobeatchild
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315 nomon_conflict
316 violence_bad
317 nomon violence
318 resolve_within
319 bribebad
320 noforcework
321 strangeok
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323 vh_youth
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329 groupsave_ind
330 labgang ind
331 osusu_ind
332 religgroup_ind
333 socialc ind
334 tradsoc_ind

# Into a clear set of results with high internal validity

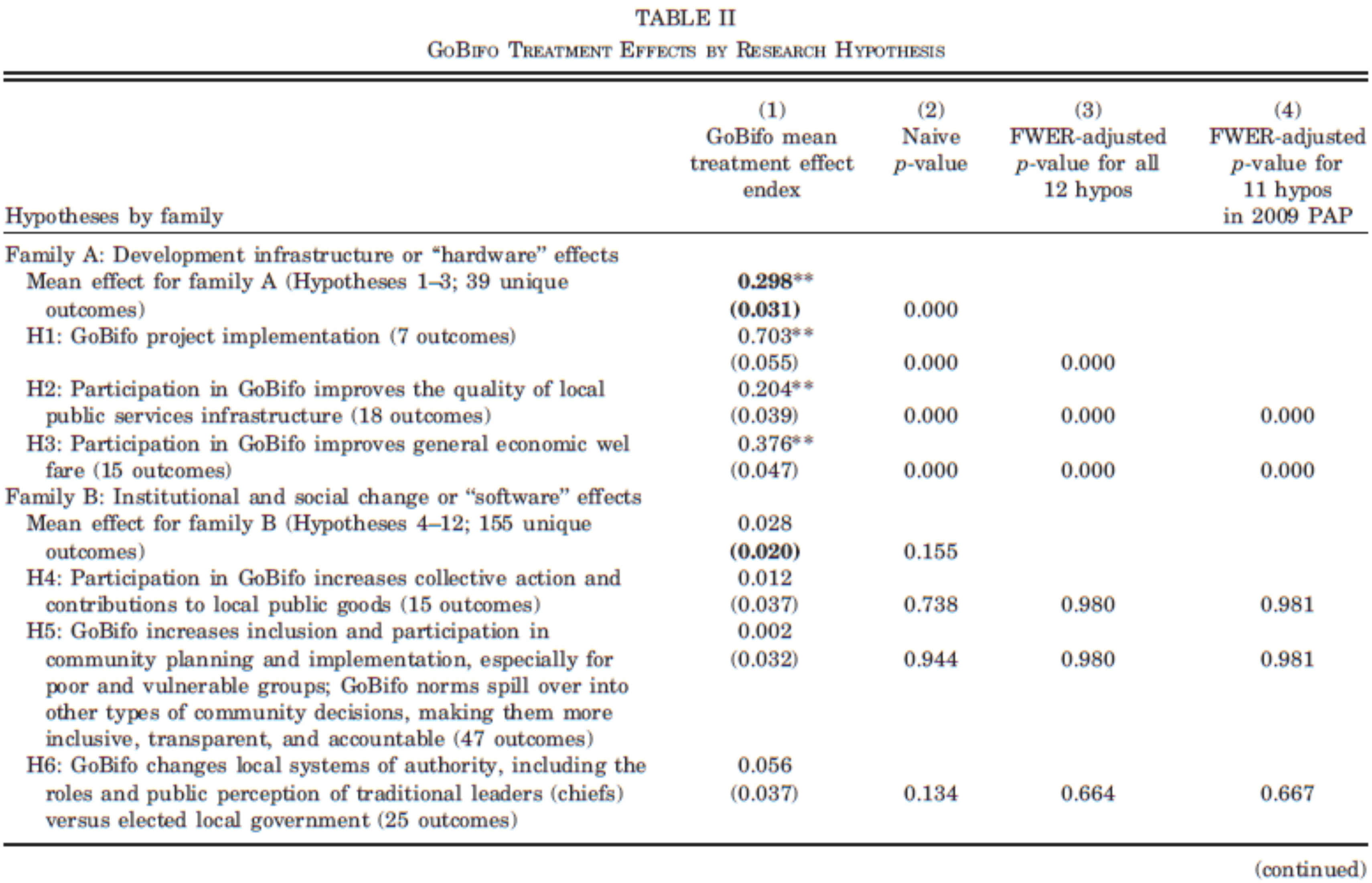


TABLE II

GoBifo Treatment Effects by Research Hypothesis

| Hypotheses by family | (1)<br>GoBifo mean<br>treatment effect<br>endex | (2)<br>Naive<br>*p*-value | (3)<br>FWER-adjusted<br>*p*-value for all<br>12 hypos | (4)<br>FWER-adjusted<br>*p*-value for<br>11 hypos<br>in 2009 PAP |
|---|---|---|---|---|
| Family A: Development infrastructure or “hardware” effects | | | | |
| Mean effect for family A (Hypotheses 1–3; 39 unique | 0.298** | | | |
| outcomes) | **(0.031)** | 0.000 | | |
| H1: GoBifo project implementation (7 outcomes) | 0.703** | | | |
| | (0.055) | 0.000 | 0.000 | |
| H2: Participation in GoBifo improves the quality of local | 0.204** | | | |
| public services infrastructure (18 outcomes) | (0.039) | 0.000 | 0.000 | 0.000 |
| H3: Participation in GoBifo improves general economic wel | 0.376** | | | |
| fare (15 outcomes) | (0.047) | 0.000 | 0.000 | 0.000 |
| Family B: Institutional and social change or “software” effects | | | | |
| Mean effect for family B (Hypotheses 4–12; 155 unique | 0.028 | | | |
| outcomes) | **(0.020)** | 0.155 | | |
| H4: Participation in GoBifo increases collective action and | 0.012 | | | |
| contributions to local public goods (15 outcomes) | (0.037) | 0.738 | 0.980 | 0.981 |
| H5: GoBifo increases inclusion and participation in | 0.002 | | | |
| community planning and implementation, especially for | (0.032) | 0.944 | 0.980 | 0.981 |
| poor and vulnerable groups; GoBifo norms spill over into | | | | |
| other types of community decisions, making them more | | | | |
| inclusive, transparent, and accountable (47 outcomes) | | | | |
| H6: GoBifo changes local systems of authority, including the | 0.056 | | | |
| roles and public perception of traditional leaders (chiefs) | (0.037) | 0.134 | 0.664 | 0.667 |
| versus elected local government (25 outcomes) | | | | |

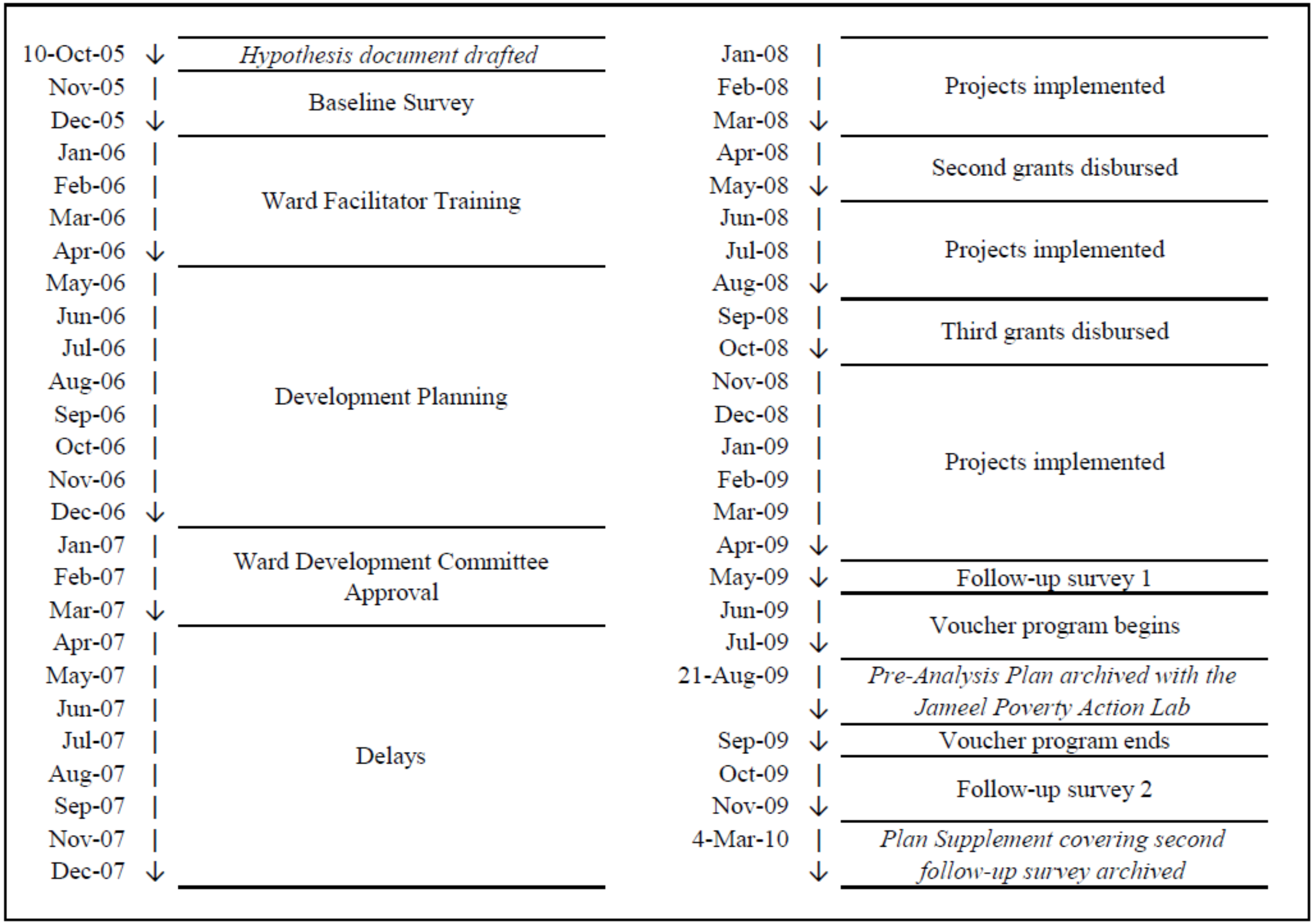
(continued)

# How does this work?

- PAP document specifies:
  - Hypotheses and outcomes
    - Distinguish primary from secondary outcomes if relevant
    - Link outcomes to specific survey measures, precisely defined
    - Group outcomes into hypotheses / families
  - Econometric specifications
    - Design basics
    - Control set
    - Stratification variables
    - Clustering level, observations per cluster
    - Dimensions of heterogeneous treatment effects / sub-group analysis
    - Mean effects by level if relevant
    - Inclusion and exclusion rules

# Timeline

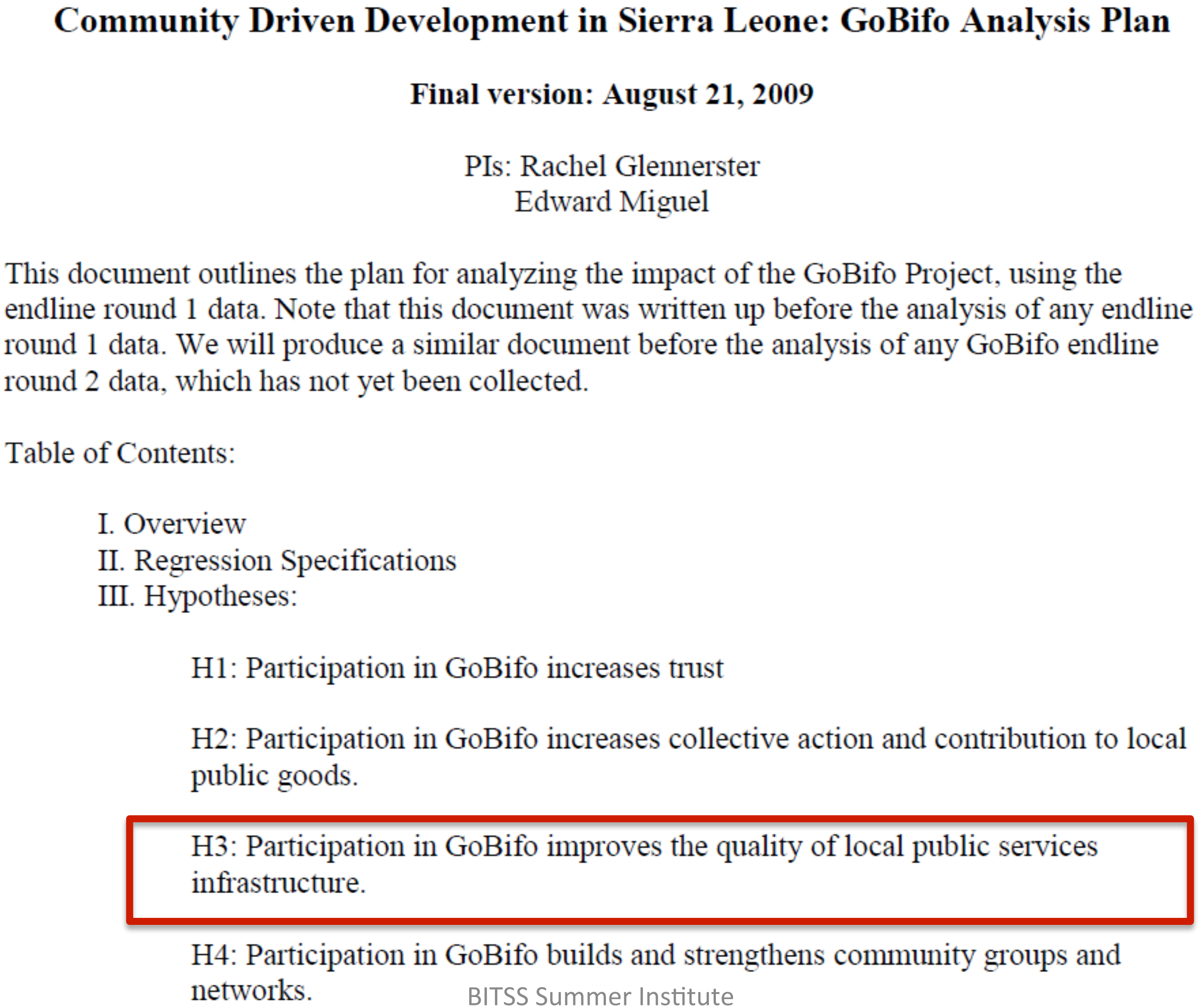
**Appendix B: Project and Research Timeline**



| | | |
|---|---|---|
| 10-Oct-05 | ↓ | *Hypothesis document drafted* |
| Nov-05 | \| | Baseline Survey |
| Dec-05 | ↓ | |
| Jan-06 | \| | Ward Facilitator Training |
| Feb-06 | \| | |
| Mar-06 | \| | |
| Apr-06 | ↓ | |
| May-06 | \| | Development Planning |
| Jun-06 | \| | |
| Jul-06 | \| | |
| Aug-06 | \| | |
| Sep-06 | \| | |
| Oct-06 | \| | |
| Nov-06 | \| | |
| Dec-06 | ↓ | |
| Jan-07 | \| | Ward Development Committee Approval |
| Feb-07 | \| | |
| Mar-07 | ↓ | |
| Apr-07 | \| | Delays |
| May-07 | \| | |
| Jun-07 | \| | |
| Jul-07 | \| | |
| Aug-07 | \| | |
| Sep-07 | \| | |
| Nov-07 | \| | |
| Dec-07 | ↓ | |

| | | |
|---|---|---|
| Jan-08 | \| | Projects implemented |
| Feb-08 | \| | |
| Mar-08 | ↓ | |
| Apr-08 | \| | Second grants disbursed |
| May-08 | ↓ | |
| Jun-08 | \| | Projects implemented |
| Jul-08 | \| | |
| Aug-08 | ↓ | |
| Sep-08 | \| | Third grants disbursed |
| Oct-08 | ↓ | |
| Nov-08 | \| | Projects implemented |
| Dec-08 | \| | |
| Jan-09 | \| | |
| Feb-09 | \| | |
| Mar-09 | \| | |
| Apr-09 | ↓ | |
| May-09 | ↓ | Follow-up survey 1 |
| Jun-09 | \| | Voucher program begins |
| Jul-09 | ↓ | |
| 21-Aug-09 | \| | *Pre-Analysis Plan archived with the Jameel Poverty Action Lab* |
| | ↓ | |
| Sep-09 | ↓ | Voucher program ends |
| Oct-09 | \| | Follow-up survey 2 |
| Nov-09 | ↓ | |
| 4-Mar-10 | \| | *Plan Supplement covering second follow-up survey archived* |
| | ↓ | |

# What the GoBifo PAP looks like



## Community Driven Development in Sierra Leone: GoBifo Analysis Plan

**Final version: August 21, 2009**

PIs: Rachel Glennerster
Edward Miguel

This document outlines the plan for analyzing the impact of the GoBifo Project, using the endline round 1 data. Note that this document was written up before the analysis of any endline round 1 data. We will produce a similar document before the analysis of any GoBifo endline round 2 data, which has not yet been collected.

Table of Contents:

# The working document

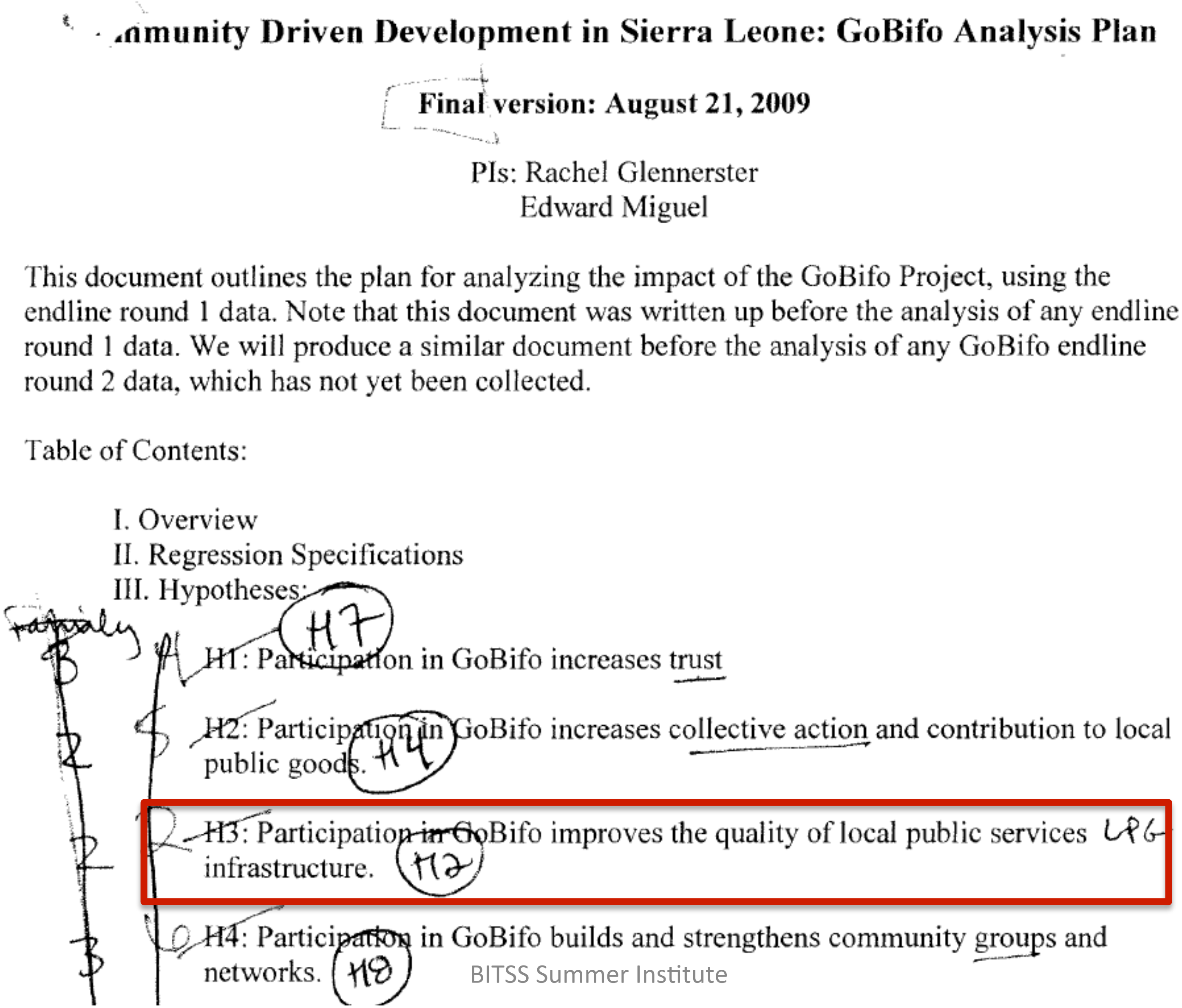


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Table of Contents:

~~Partially~~

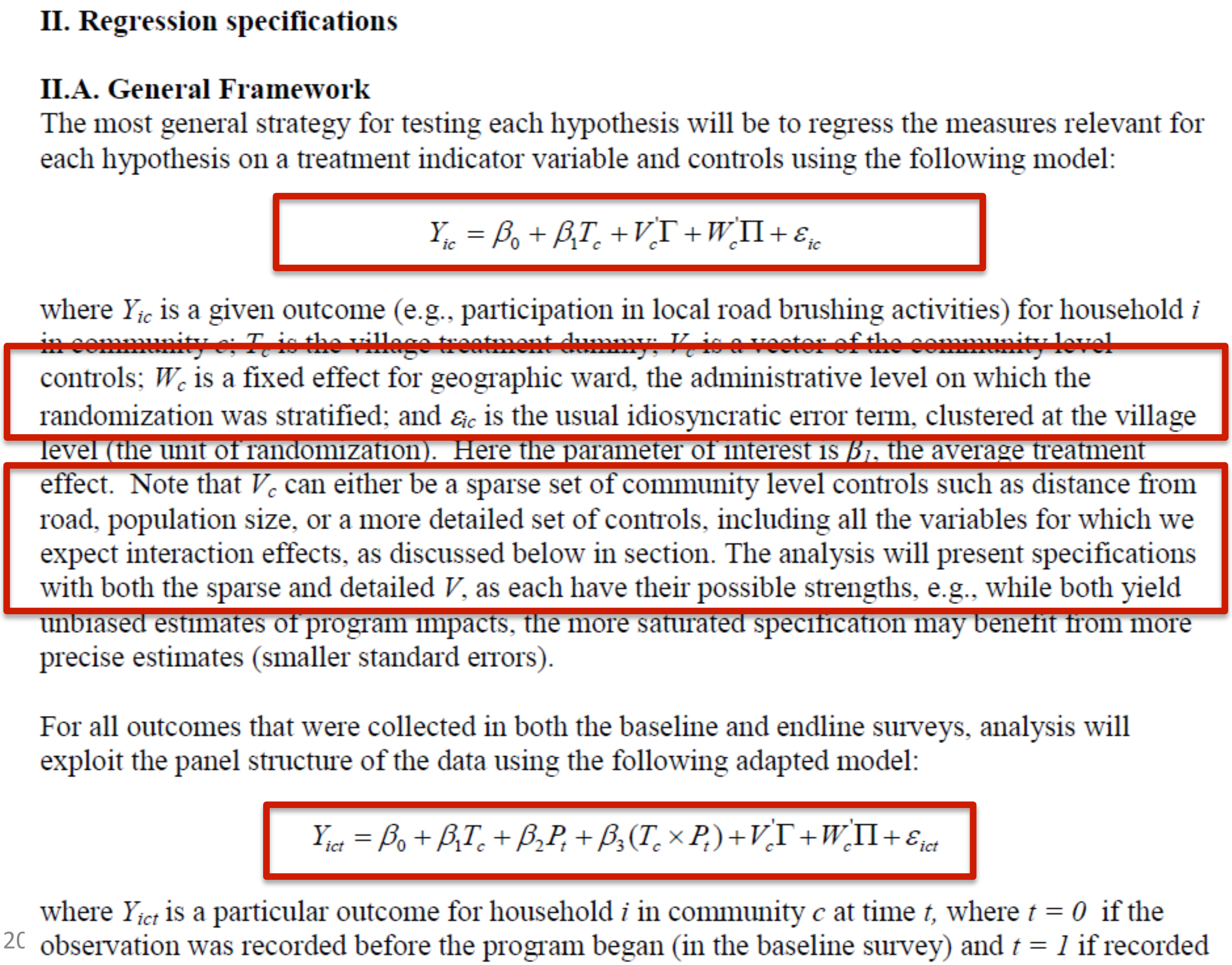
3 A ~~H1~~: Participation in GoBifo increases trust H7

2 $ ~~H2~~: Participation in GoBifo increases collective action and contribution to local public goods. H4

2 R ~~H3~~: Participation ~~in Go~~Bifo improves the quality of local public services LPG infrastructure. H2

3 O ~~H4~~: Participation in GoBifo builds and strengthens community groups and networks. H8

# Econometric specifications



## II. Regression specifications

### II.A. General Framework

The most general strategy for testing each hypothesis will be to regress the measures relevant for each hypothesis on a treatment indicator variable and controls using the following model:

$$Y_{ic} = \beta_0 + \beta_1 T_c + V_c^{'}\Gamma + W_c^{'}\Pi + \varepsilon_{ic}$$

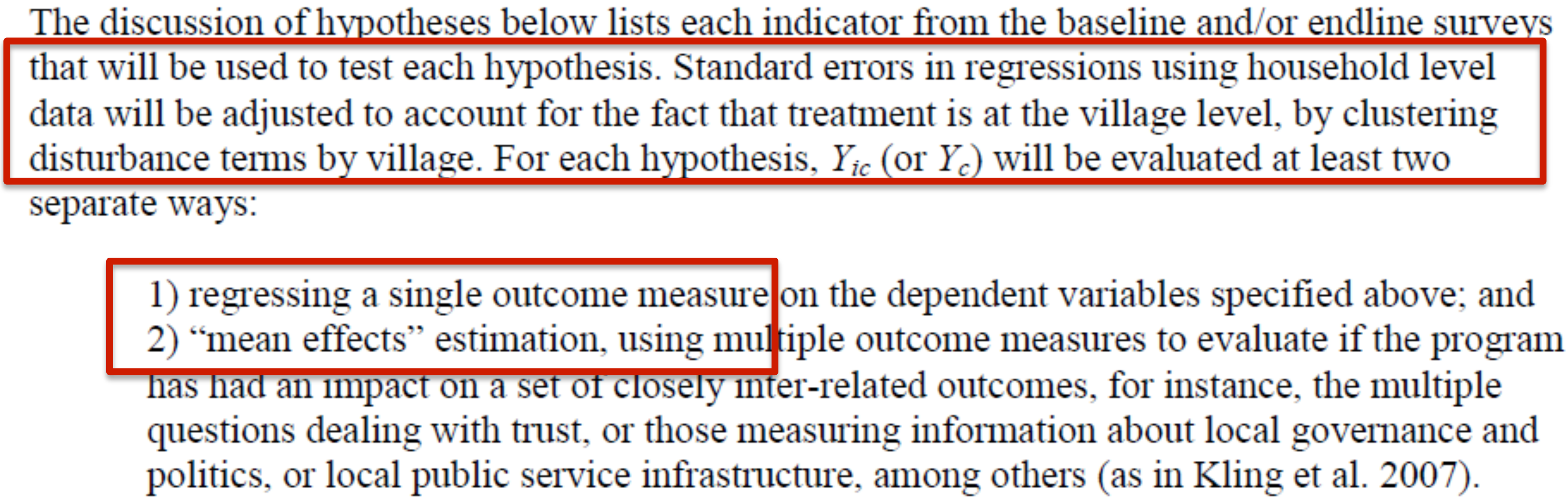
where $Y_{ic}$ is a given outcome (e.g., participation in local road brushing activities) for household $i$ in community $c$; $T_c$ is the village treatment dummy; $V_c$ is a vector of the community level controls; $W_c$ is a fixed effect for geographic ward, the administrative level on which the randomization was stratified; and $\varepsilon_{ic}$ is the usual idiosyncratic error term, clustered at the village level (the unit of randomization). Here the parameter of interest is $\beta_1$, the average treatment effect. Note that $V_c$ can either be a sparse set of community level controls such as distance from road, population size, or a more detailed set of controls, including all the variables for which we expect interaction effects, as discussed below in section. The analysis will present specifications with both the sparse and detailed $V$, as each have their possible strengths, e.g., while both yield unbiased estimates of program impacts, the more saturated specification may benefit from more precise estimates (smaller standard errors).

For all outcomes that were collected in both the baseline and endline surveys, analysis will exploit the panel structure of the data using the following adapted model:

$$Y_{ict} = \beta_0 + \beta_1 T_c + \beta_2 P_t + \beta_3 (T_c \times P_t) + V_c^{'}\Gamma + W_c^{'}\Pi + \varepsilon_{ict}$$

where $Y_{ict}$ is a particular outcome for household $i$ in community $c$ at time $t$, where $t = 0$ if the observation was recorded before the program began (in the baseline survey) and $t = 1$ if recorded

# Econometric specifications (cont.)



The discussion of hypotheses below lists each indicator from the baseline and/or endline surveys that will be used to test each hypothesis. Standard errors in regressions using household level data will be adjusted to account for the fact that treatment is at the village level, by clustering disturbance terms by village. For each hypothesis, $Y_{ic}$ (or $Y_c$) will be evaluated at least two separate ways:

1) regressing a single outcome measure on the dependent variables specified above; and
2) "mean effects" estimation, using multiple outcome measures to evaluate if the program has had an impact on a set of closely inter-related outcomes, for instance, the multiple questions dealing with trust, or those measuring information about local governance and politics, or local public service infrastructure, among others (as in Kling et al. 2007).

# Table III: Sensitivity to specification choices

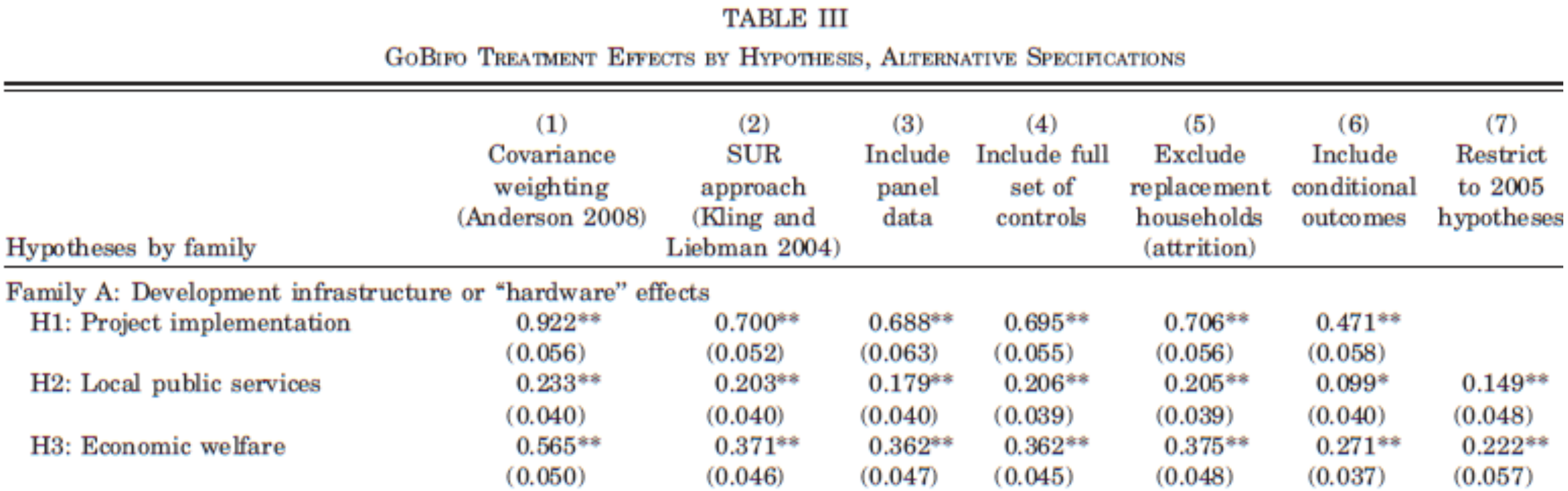
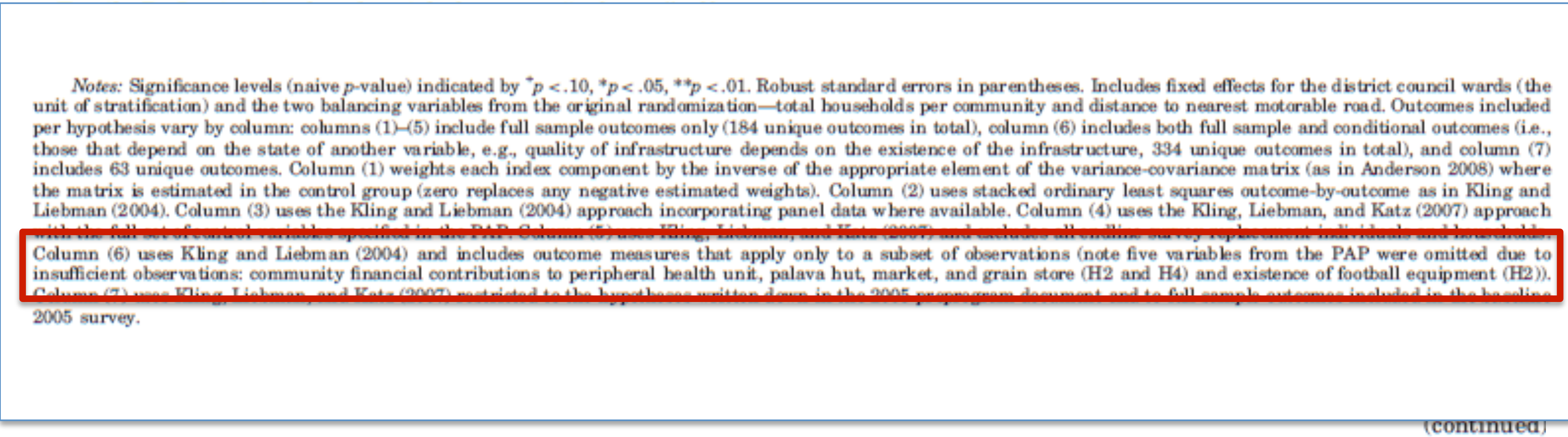


TABLE III

GoBifo Treatment Effects by Hypothesis, Alternative Specifications

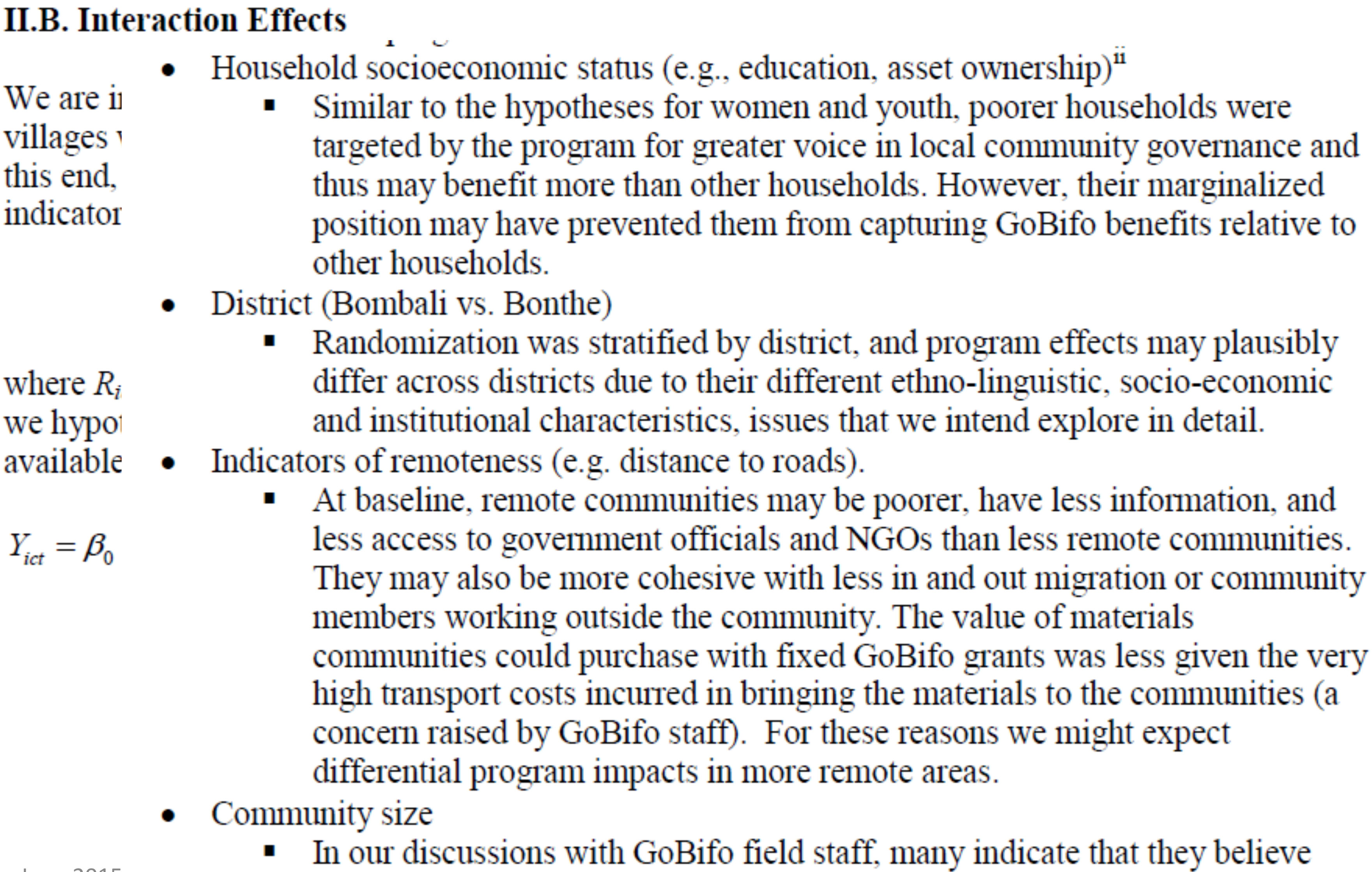
| Hypotheses by family | (1)<br>Covariance weighting (Anderson 2008) | (2)<br>SUR approach (Kling and Liebman 2004) | (3)<br>Include panel data | (4)<br>Include full set of controls | (5)<br>Exclude replacement households (attrition) | (6)<br>Include conditional outcomes | (7)<br>Restrict to 2005 hypotheses |
|---|---|---|---|---|---|---|---|
| Family A: Development infrastructure or "hardware" effects | | | | | | | |
| H1: Project implementation | 0.922** | 0.700** | 0.688** | 0.695** | 0.706** | 0.471** | |
| | (0.056) | (0.052) | (0.063) | (0.055) | (0.056) | (0.058) | |
| H2: Local public services | 0.233** | 0.203** | 0.179** | 0.206** | 0.205** | 0.099* | 0.149** |
| | (0.040) | (0.040) | (0.040) | (0.039) | (0.039) | (0.040) | (0.048) |
| H3: Economic welfare | 0.565** | 0.371** | 0.362** | 0.362** | 0.375** | 0.271** | 0.222** |
| | (0.050) | (0.046) | (0.047) | (0.045) | (0.048) | (0.037) | (0.057) |



*Notes:* Significance levels (naive *p*-value) indicated by $^{+}p < .10$, $^{*}p < .05$, $^{**}p < .01$. Robust standard errors in parentheses. Includes fixed effects for the district council wards (the unit of stratification) and the two balancing variables from the original randomization—total households per community and distance to nearest motorable road. Outcomes included per hypothesis vary by column: columns (1)–(5) include full sample outcomes only (184 unique outcomes in total), column (6) includes both full sample and conditional outcomes (i.e., those that depend on the state of another variable, e.g., quality of infrastructure depends on the existence of the infrastructure, 334 unique outcomes in total), and column (7) includes 63 unique outcomes. Column (1) weights each index component by the inverse of the appropriate element of the variance-covariance matrix (as in Anderson 2008) where the matrix is estimated in the control group (zero replaces any negative estimated weights). Column (2) uses stacked ordinary least squares outcome-by-outcome as in Kling and Liebman (2004). Column (3) uses the Kling and Liebman (2004) approach incorporating panel data where available. Column (4) uses the Kling, Liebman, and Katz (2007) approach with the full set of control variables specified in the PAP. Column (5) uses Kling, Liebman, and Katz (2007) and excludes all endline survey replacement individuals and households. Column (6) uses Kling and Liebman (2004) and includes outcome measures that apply only to a subset of observations (note five variables from the PAP were omitted due to insufficient observations: community financial contributions to peripheral health unit, palava hut, market, and grain store (H2 and H4) and existence of football equipment (H2)). Column (7) uses Kling, Liebman, and Katz (2007) restricted to the hypotheses written down in the 2005 preprogram document and to full sample outcomes included in the baseline 2005 survey.

(continued)

# Econometric specifications (cont. 2)



**II.B. Interaction Effects**

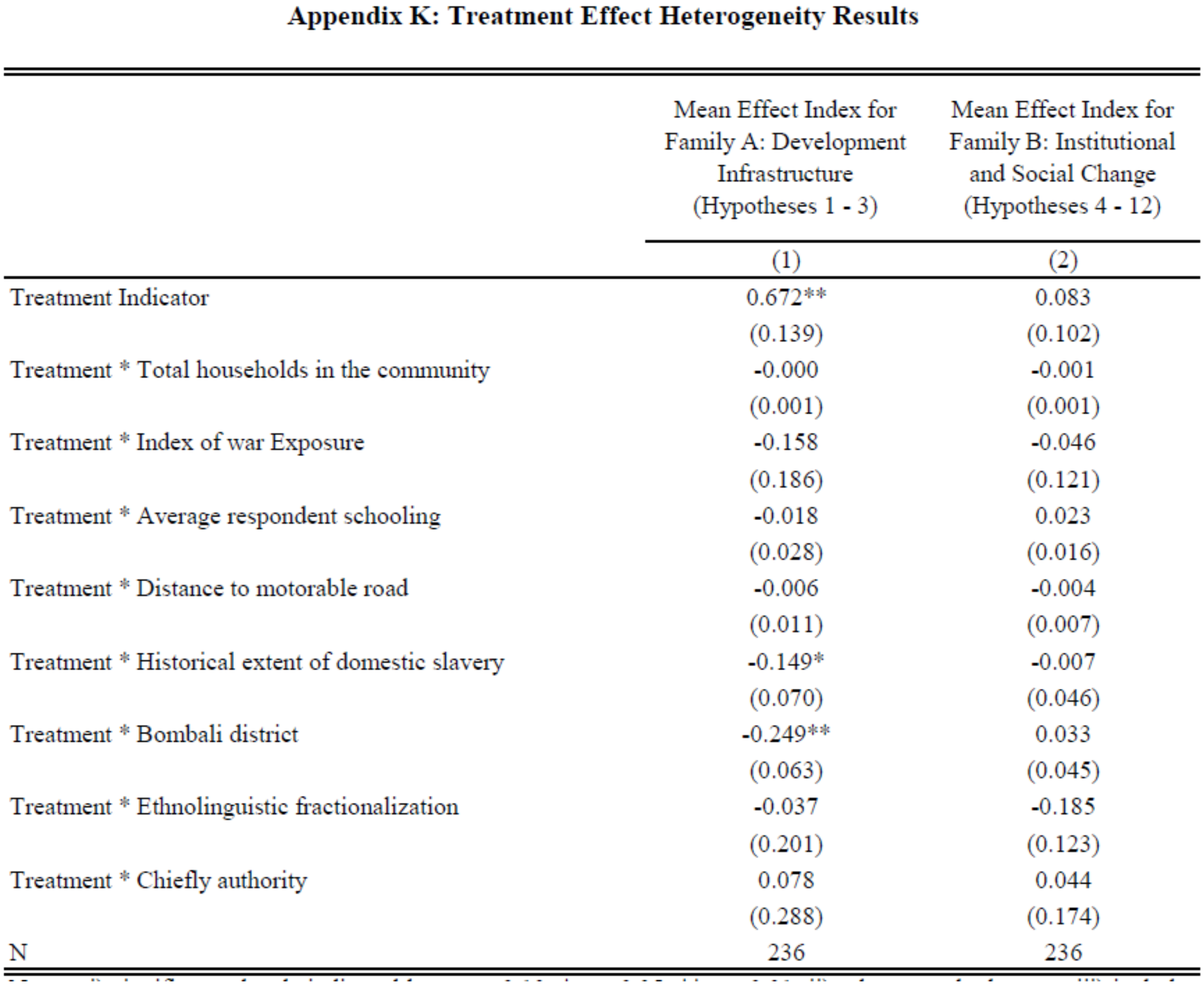
We are i
villages
this end,
indicator

where $R_i$
we hypo
available

$Y_{ict} = \beta_0$

- Household socioeconomic status (e.g., education, asset ownership)[ii]
  - Similar to the hypotheses for women and youth, poorer households were targeted by the program for greater voice in local community governance and thus may benefit more than other households. However, their marginalized position may have prevented them from capturing GoBifo benefits relative to other households.
- District (Bombali vs. Bonthe)
  - Randomization was stratified by district, and program effects may plausibly differ across districts due to their different ethno-linguistic, socio-economic and institutional characteristics, issues that we intend explore in detail.
- Indicators of remoteness (e.g. distance to roads).
  - At baseline, remote communities may be poorer, have less information, and less access to government officials and NGOs than less remote communities. They may also be more cohesive with less in and out migration or community members working outside the community. The value of materials communities could purchase with fixed GoBifo grants was less given the very high transport costs incurred in bringing the materials to the communities (a concern raised by GoBifo staff). For these reasons we might expect differential program impacts in more remote areas.
- Community size
  - In our discussions with GoBifo field staff, many indicate that they believe

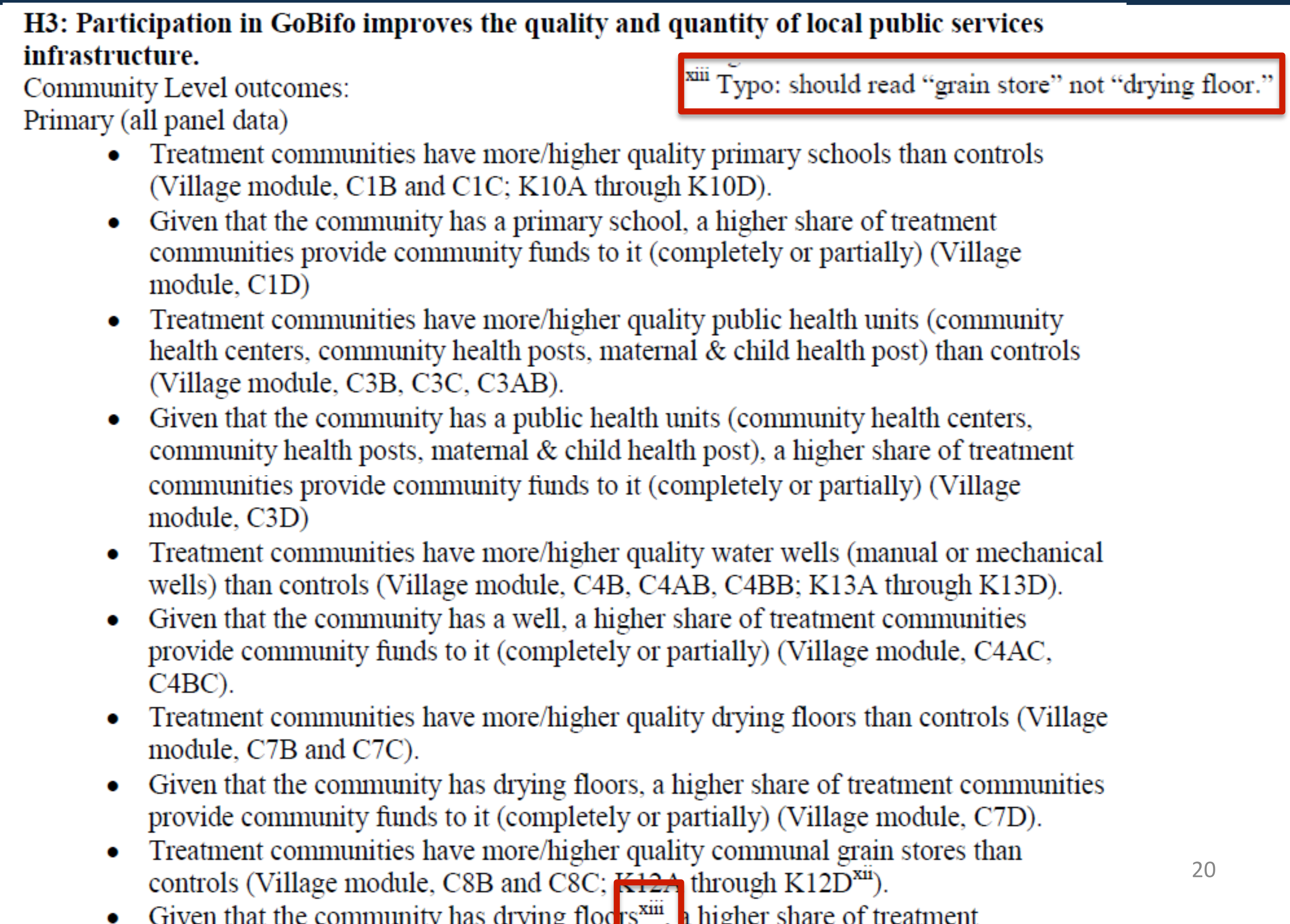
# Heterogeneous effects appendix table



**Appendix K: Treatment Effect Heterogeneity Results**

| | Mean Effect Index for Family A: Development Infrastructure (Hypotheses 1 - 3) | Mean Effect Index for Family B: Institutional and Social Change (Hypotheses 4 - 12) |
|---|---|---|
| | (1) | (2) |
| Treatment Indicator | 0.672** | 0.083 |
| | (0.139) | (0.102) |
| Treatment * Total households in the community | -0.000 | -0.001 |
| | (0.001) | (0.001) |
| Treatment * Index of war Exposure | -0.158 | -0.046 |
| | (0.186) | (0.121) |
| Treatment * Average respondent schooling | -0.018 | 0.023 |
| | (0.028) | (0.016) |
| Treatment * Distance to motorable road | -0.006 | -0.004 |
| | (0.011) | (0.007) |
| Treatment * Historical extent of domestic slavery | -0.149* | -0.007 |
| | (0.070) | (0.046) |
| Treatment * Bombali district | -0.249** | 0.033 |
| | (0.063) | (0.045) |
| Treatment * Ethnolinguistic fractionalization | -0.037 | -0.185 |
| | (0.201) | (0.123) |
| Treatment * Chiefly authority | 0.078 | 0.044 |
| | (0.288) | (0.174) |
| N | 236 | 236 |

# Outcomes by hypothesis



**H3: Participation in GoBifo improves the quality and quantity of local public services infrastructure.**

Community Level outcomes:

Primary (all panel data)

- Treatment communities have more/higher quality primary schools than controls (Village module, C1B and C1C; K10A through K10D).
- Given that the community has a primary school, a higher share of treatment communities provide community funds to it (completely or partially) (Village module, C1D)
- Treatment communities have more/higher quality public health units (community health centers, community health posts, maternal & child health post) than controls (Village module, C3B, C3C, C3AB).
- Given that the community has a public health units (community health centers, community health posts, maternal & child health post), a higher share of treatment communities provide community funds to it (completely or partially) (Village module, C3D)
- Treatment communities have more/higher quality water wells (manual or mechanical wells) than controls (Village module, C4B, C4AB, C4BB; K13A through K13D).
- Given that the community has a well, a higher share of treatment communities provide community funds to it (completely or partially) (Village module, C4AC, C4BC).
- Treatment communities have more/higher quality drying floors than controls (Village module, C7B and C7C).
- Given that the community has drying floors, a higher share of treatment communities provide community funds to it (completely or partially) (Village module, C7D).
- Treatment communities have more/higher quality communal grain stores than controls (Village module, C8B and C8C; K12A through K12D[xii]).
- Given that the community has drying floors[xiii], a higher share of treatment

[xiii] Typo: should read “grain store” not “drying floor.”

# Primary results table

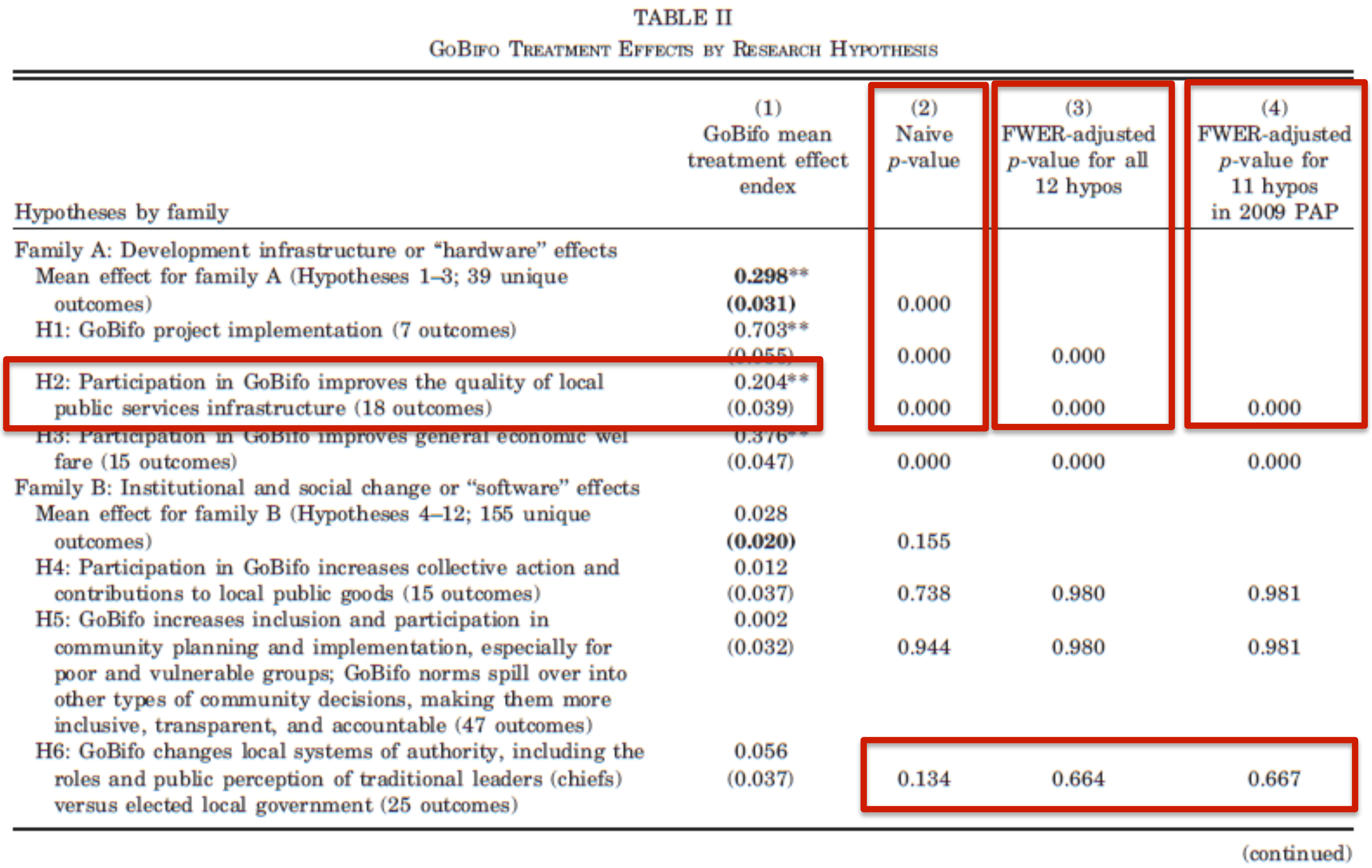


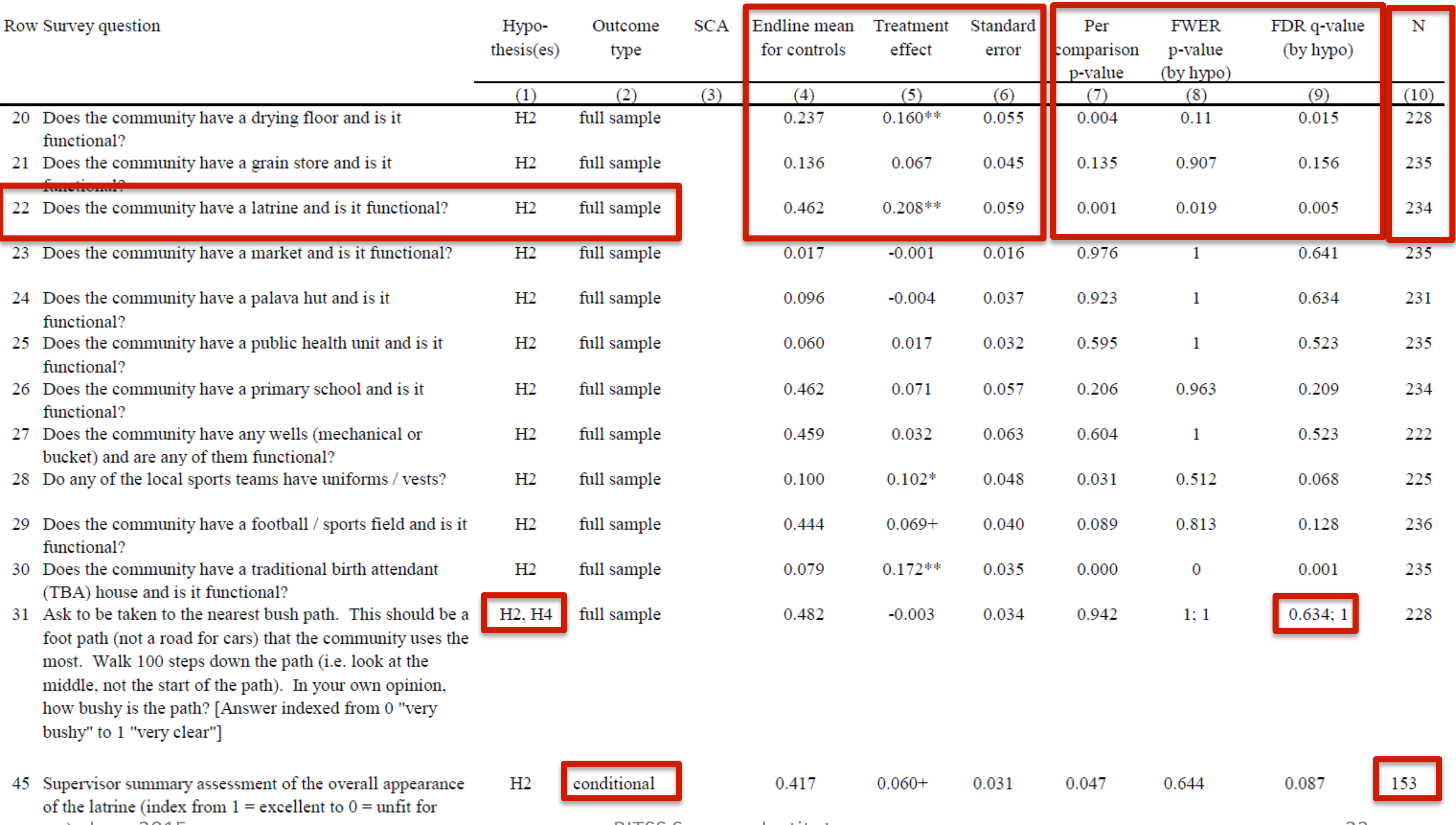
TABLE II

GoBifo Treatment Effects by Research Hypothesis

| Hypotheses by family | (1)<br>GoBifo mean treatment effect endex | (2)<br>Naive *p*-value | (3)<br>FWER-adjusted *p*-value for all 12 hypos | (4)<br>FWER-adjusted *p*-value for 11 hypos in 2009 PAP |
|---|---|---|---|---|
| Family A: Development infrastructure or "hardware" effects | | | | |
| Mean effect for family A (Hypotheses 1–3; 39 unique outcomes) | **0.298****<br>**(0.031)** | 0.000 | | |
| H1: GoBifo project implementation (7 outcomes) | 0.703**<br>(0.055) | 0.000 | 0.000 | |
| H2: Participation in GoBifo improves the quality of local public services infrastructure (18 outcomes) | 0.204**<br>(0.039) | 0.000 | 0.000 | 0.000 |
| H3: Participation in GoBifo improves general economic welfare (15 outcomes) | 0.376**<br>(0.047) | 0.000 | 0.000 | 0.000 |
| Family B: Institutional and social change or "software" effects | | | | |
| Mean effect for family B (Hypotheses 4–12; 155 unique outcomes) | 0.028<br>**(0.020)** | 0.155 | | |
| H4: Participation in GoBifo increases collective action and contributions to local public goods (15 outcomes) | 0.012<br>(0.037) | 0.738 | 0.980 | 0.981 |
| H5: GoBifo increases inclusion and participation in community planning and implementation, especially for poor and vulnerable groups; GoBifo norms spill over into other types of community decisions, making them more inclusive, transparent, and accountable (47 outcomes) | 0.002<br>(0.032) | 0.944 | 0.980 | 0.981 |
| H6: GoBifo changes local systems of authority, including the roles and public perception of traditional leaders (chiefs) versus elected local government (25 outcomes) | 0.056<br>(0.037) | 0.134 | 0.664 | 0.667 |

(continued)

# “Raw results” appendix table



| Row | Survey question | Hypo-thesis(es) | Outcome type | SCA | Endline mean for controls | Treatment effect | Standard error | Per comparison p-value | FWER p-value (by hypo) | FDR q-value (by hypo) | N |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| 20 | Does the community have a drying floor and is it functional? | H2 | full sample | | 0.237 | 0.160** | 0.055 | 0.004 | 0.11 | 0.015 | 228 |
| 21 | Does the community have a grain store and is it functional? | H2 | full sample | | 0.136 | 0.067 | 0.045 | 0.135 | 0.907 | 0.156 | 235 |
| 22 | Does the community have a latrine and is it functional? | H2 | full sample | | 0.462 | 0.208** | 0.059 | 0.001 | 0.019 | 0.005 | 234 |
| 23 | Does the community have a market and is it functional? | H2 | full sample | | 0.017 | -0.001 | 0.016 | 0.976 | 1 | 0.641 | 235 |
| 24 | Does the community have a palava hut and is it functional? | H2 | full sample | | 0.096 | -0.004 | 0.037 | 0.923 | 1 | 0.634 | 231 |
| 25 | Does the community have a public health unit and is it functional? | H2 | full sample | | 0.060 | 0.017 | 0.032 | 0.595 | 1 | 0.523 | 235 |
| 26 | Does the community have a primary school and is it functional? | H2 | full sample | | 0.462 | 0.071 | 0.057 | 0.206 | 0.963 | 0.209 | 234 |
| 27 | Does the community have any wells (mechanical or bucket) and are any of them functional? | H2 | full sample | | 0.459 | 0.032 | 0.063 | 0.604 | 1 | 0.523 | 222 |
| 28 | Do any of the local sports teams have uniforms / vests? | H2 | full sample | | 0.100 | 0.102* | 0.048 | 0.031 | 0.512 | 0.068 | 225 |
| 29 | Does the community have a football / sports field and is it functional? | H2 | full sample | | 0.444 | 0.069+ | 0.040 | 0.089 | 0.813 | 0.128 | 236 |
| 30 | Does the community have a traditional birth attendant (TBA) house and is it functional? | H2 | full sample | | 0.079 | 0.172** | 0.035 | 0.000 | 0 | 0.001 | 235 |
| 31 | Ask to be taken to the nearest bush path. This should be a foot path (not a road for cars) that the community uses the most. Walk 100 steps down the path (i.e. look at the middle, not the start of the path). In your own opinion, how bushy is the path? [Answer indexed from 0 "very bushy" to 1 "very clear"] | H2, H4 | full sample | | 0.482 | -0.003 | 0.034 | 0.942 | 1; 1 | 0.634; 1 | 228 |
| 45 | Supervisor summary assessment of the overall appearance of the latrine (index from 1 = excellent to 0 = unfit for use) | H2 | conditional | | 0.417 | 0.060+ | 0.031 | 0.047 | 0.644 | 0.087 | 153 |

# Why this matters:
# The paper we could have written

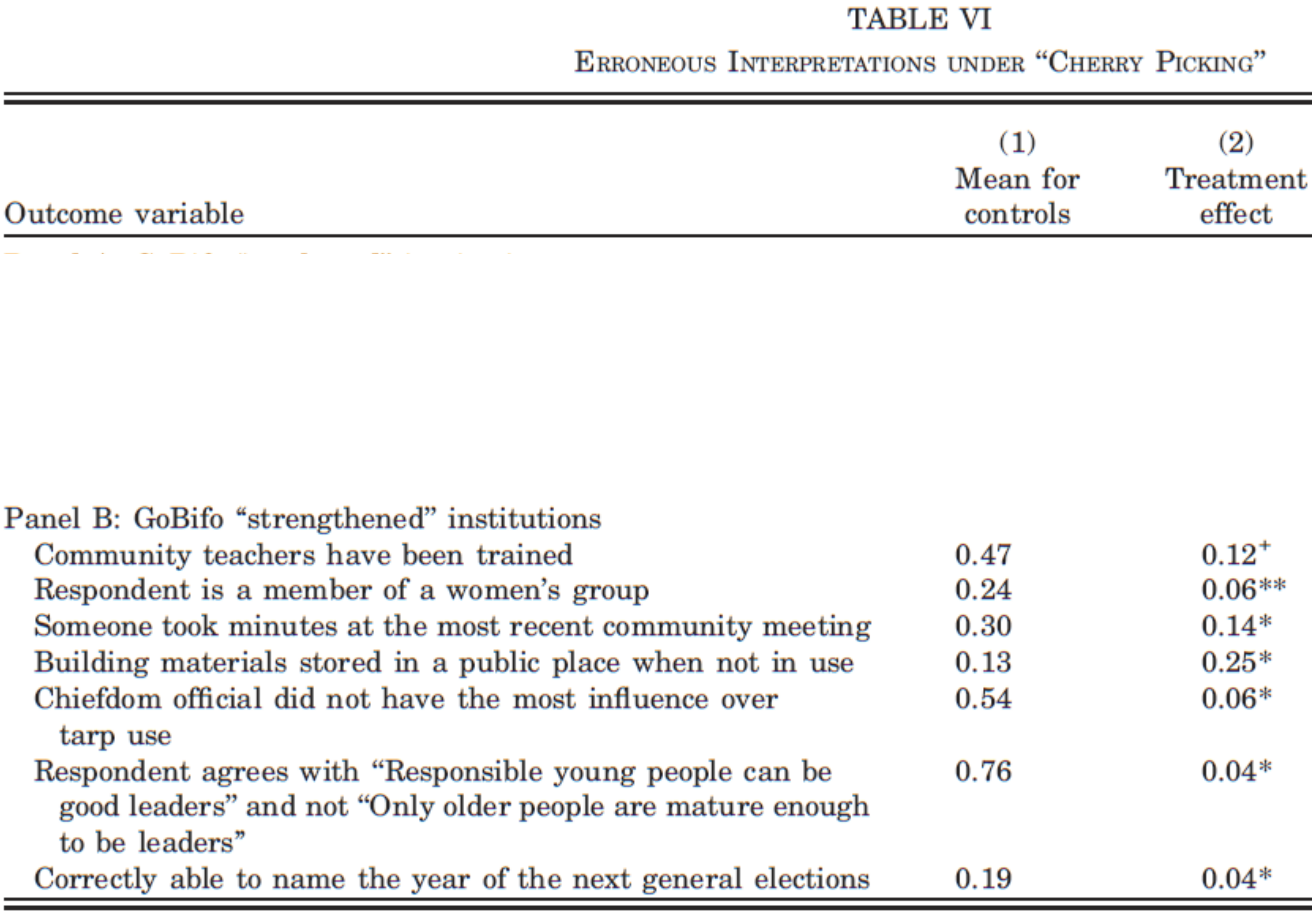


TABLE VI

ERRONEOUS INTERPRETATIONS UNDER "CHERRY PICKING"

| Outcome variable | (1)<br>Mean for controls | (2)<br>Treatment effect |
|---|---|---|
| Panel B: GoBifo "strengthened" institutions | | |
| Community teachers have been trained | 0.47 | $0.12^{+}$ |
| Respondent is a member of a women's group | 0.24 | 0.06** |
| Someone took minutes at the most recent community meeting | 0.30 | 0.14* |
| Building materials stored in a public place when not in use | 0.13 | 0.25* |
| Chiefdom official did not have the most influence over tarp use | 0.54 | 0.06* |
| Respondent agrees with "Responsible young people can be good leaders" and not "Only older people are mature enough to be leaders" | 0.76 | 0.04* |
| Correctly able to name the year of the next general elections | 0.19 | 0.04* |

# Why this matters:
# The paper we could have written (v2)

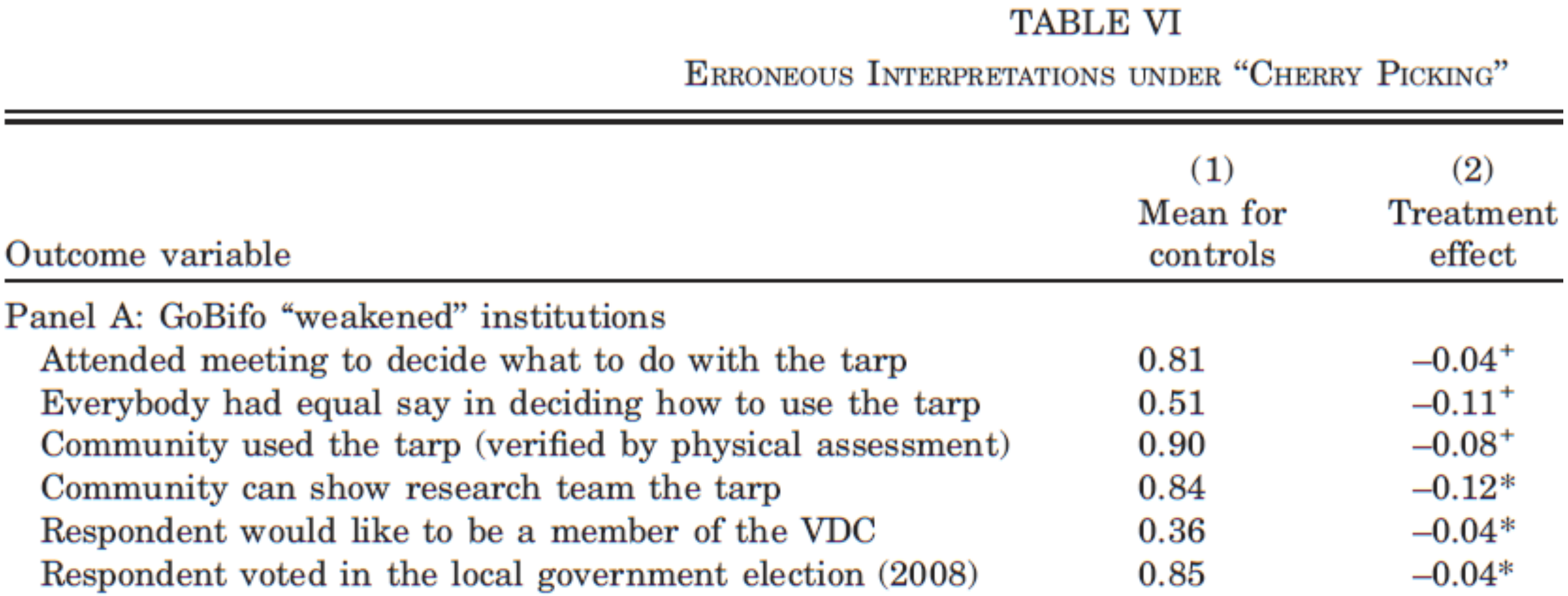


TABLE VI

ERRONEOUS INTERPRETATIONS UNDER "CHERRY PICKING"

| Outcome variable | (1)<br>Mean for controls | (2)<br>Treatment effect |
|---|---|---|
| Panel A: GoBifo "weakened" institutions | | |
| Attended meeting to decide what to do with the tarp | 0.81 | –0.04$^{+}$ |
| Everybody had equal say in deciding how to use the tarp | 0.51 | –0.11$^{+}$ |
| Community used the tarp (verified by physical assessment) | 0.90 | –0.08$^{+}$ |
| Community can show research team the tarp | 0.84 | –0.12* |
| Respondent would like to be a member of the VDC | 0.36 | –0.04* |
| Respondent voted in the local government election (2008) | 0.85 | –0.04* |

# Incorporating omissions and learning

- We forgot things: added a hypothesis ex post regarding project implementation by drawing together outcomes already in the PAP
- We learned from research fieldwork and piloting: developed new measures of collective action (e.g. SCAs); threw out baseline measures with little variance
- We acquired new information from program implementation: did not anticipate the focus on skills training, so added new measures to the endline survey
- We added framing to ease interpretation: grouped hypotheses under two intuitive families ex post

# A compromise: Limited flexibility with full transparency

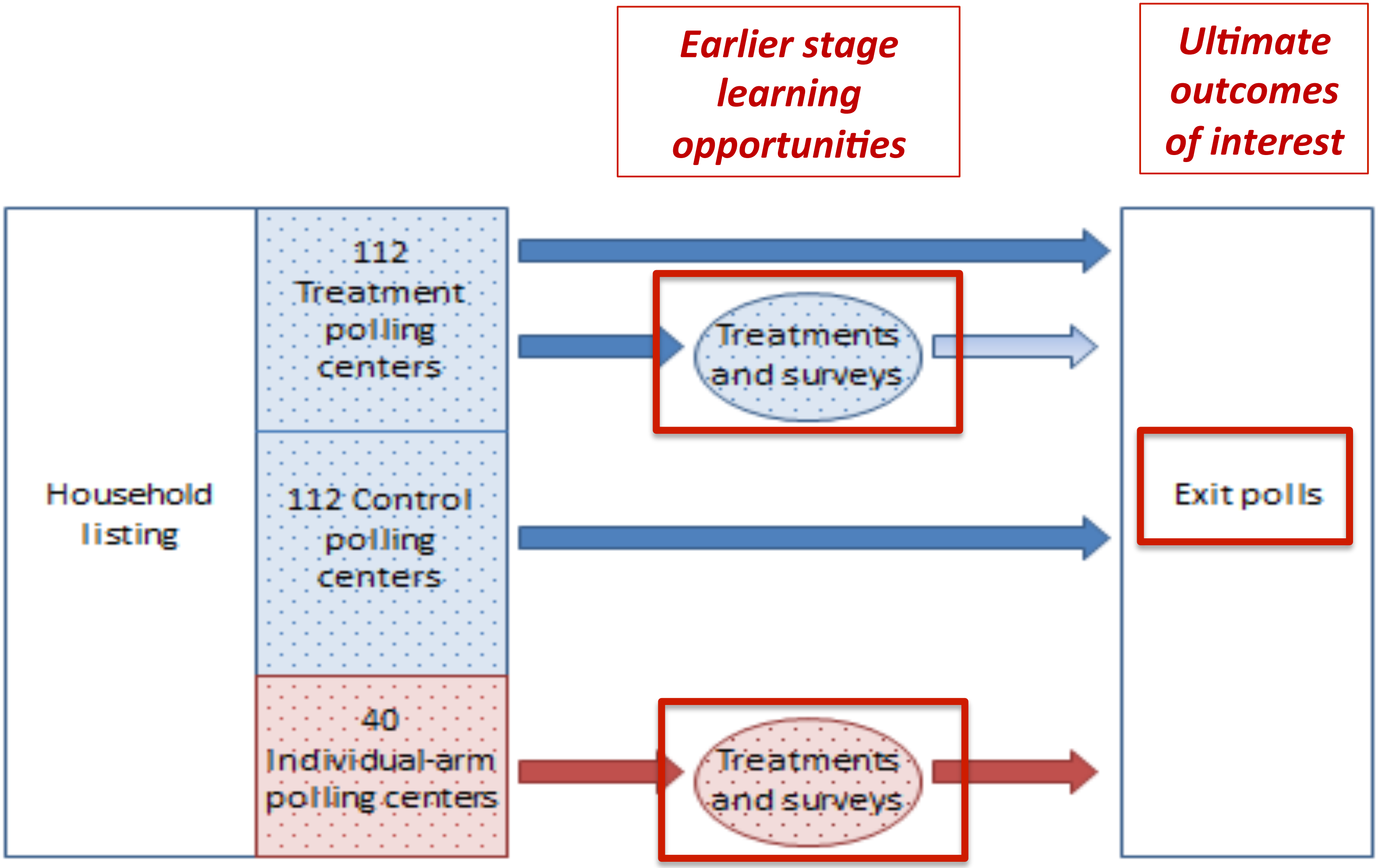
- Some flexibility is useful to counter downside risks of a "purist" approach
  - Rigidity may stifle learning or limit leverage of all available information
  - Requiring full specification, fully *ex ante* eliminates scope for adjustment after interim looks at the data (Olken 2015)
  - Excessive up front costs may deter adoption

- … If it is accompanied by transparency to maintain the credibility of the pre-specification process
  - Report results with and without ex post adjustment
  - Identify what was pre-specified and when to allow readers to make their own informed judgments

# Application 2: The Debates project

- Bidwell, Casey and Glennerster (ongoing) study the impact of debates between Parliamentary candidates on voter behavior, candidate campaign spending and politician performance
- Key differences from the GoBifo application
  - Very tight implementation timeline: a matter of weeks between official announcement of candidates and Election Day
  - Early implementation/data collection stages designed to inform later stages, but not enough time to process and analyze data in between (pre-specification useful for planning, survey writing)
  - Cherry picking less of a risk as primary data source is a 15 minute exit poll with relatively few outcomes
  - Built more "upside" into the PAP

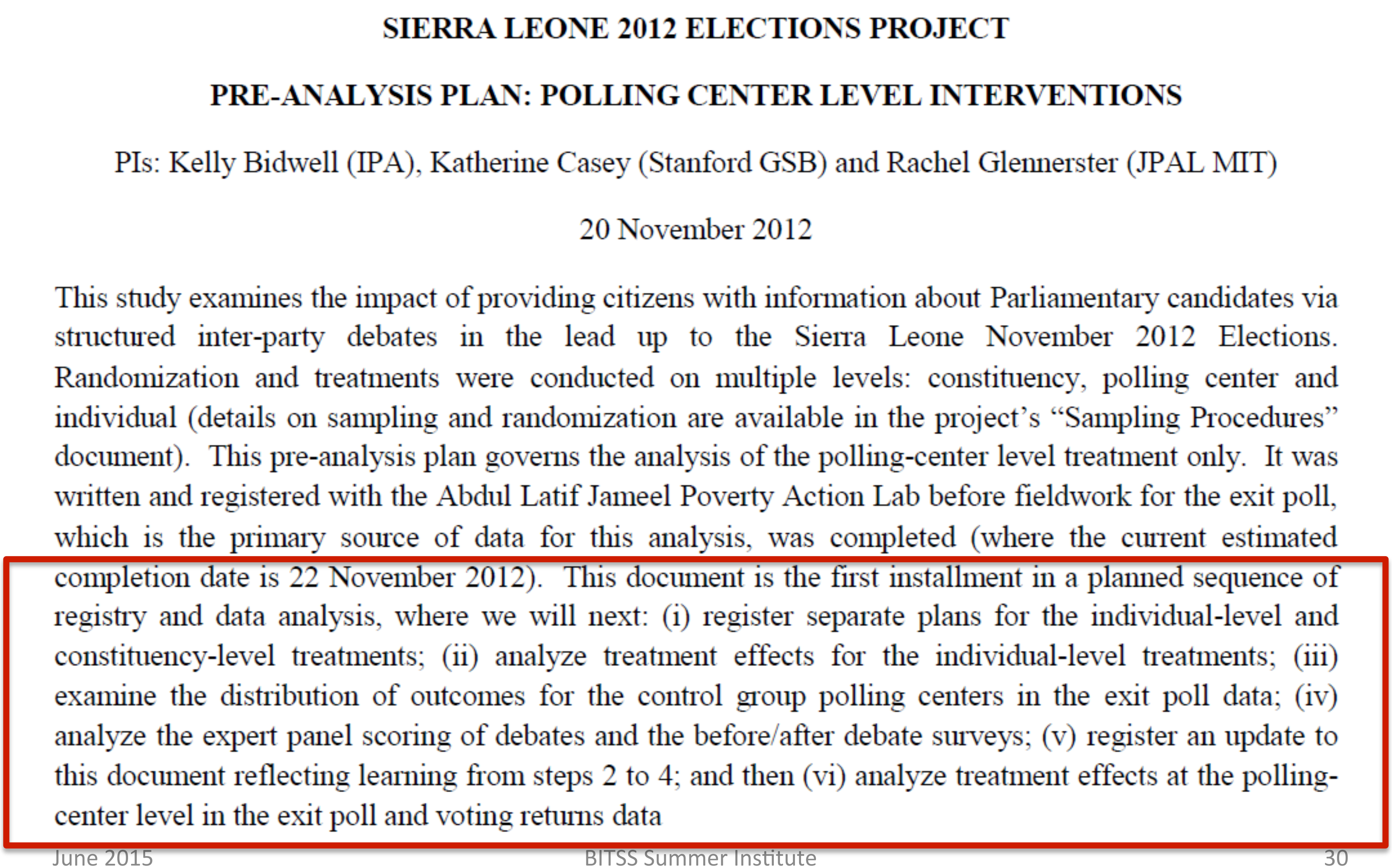
# Timeline


Earlier stage learning opportunities
Ultimate outcomes of interest
Household listing
112 Treatment polling centers
112 Control polling centers
40 Individual-arm polling centers
Treatments and surveys
Treatments and surveys
Exit polls

# How we built in some flexibility

- From a purist perspective, we specified the main PAP governing the final stage exit poll outcomes first, while the exit poll was still in the field
- To accommodate flexibility, that first PAP lays out the planned series of intermediate analyses including how earlier stages would inform later stages
- We lodged a separate PAP for the intermediate stages before looking at that earlier data
- After conducting the intermediate analysis, we lodged a revision to the main PAP before analyzing the final data

# 1st PAP governs ultimate final stage outcomes



SIERRA LEONE 2012 ELECTIONS PROJECT

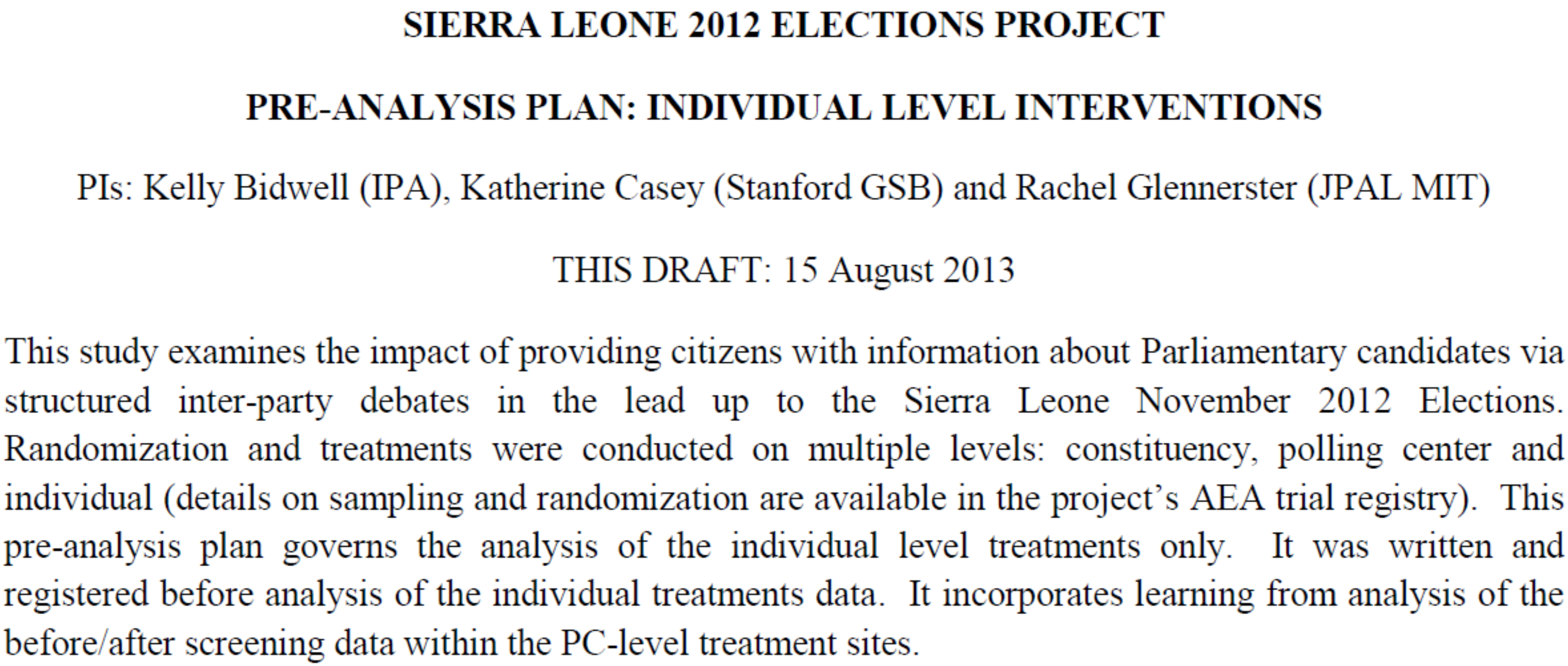
PRE-ANALYSIS PLAN: POLLING CENTER LEVEL INTERVENTIONS

PIs: Kelly Bidwell (IPA), Katherine Casey (Stanford GSB) and Rachel Glennerster (JPAL MIT)

20 November 2012

This study examines the impact of providing citizens with information about Parliamentary candidates via structured inter-party debates in the lead up to the Sierra Leone November 2012 Elections. Randomization and treatments were conducted on multiple levels: constituency, polling center and individual (details on sampling and randomization are available in the project's "Sampling Procedures" document). This pre-analysis plan governs the analysis of the polling-center level treatment only. It was written and registered with the Abdul Latif Jameel Poverty Action Lab before fieldwork for the exit poll, which is the primary source of data for this analysis, was completed (where the current estimated completion date is 22 November 2012). This document is the first installment in a planned sequence of registry and data analysis, where we will next: (i) register separate plans for the individual-level and constituency-level treatments; (ii) analyze treatment effects for the individual-level treatments; (iii) examine the distribution of outcomes for the control group polling centers in the exit poll data; (iv) analyze the expert panel scoring of debates and the before/after debate surveys; (v) register an update to this document reflecting learning from steps 2 to 4; and then (vi) analyze treatment effects at the polling-center level in the exit poll and voting returns data

# Separate PAPs for intermediate stage



**SIERRA LEONE 2012 ELECTIONS PROJECT**

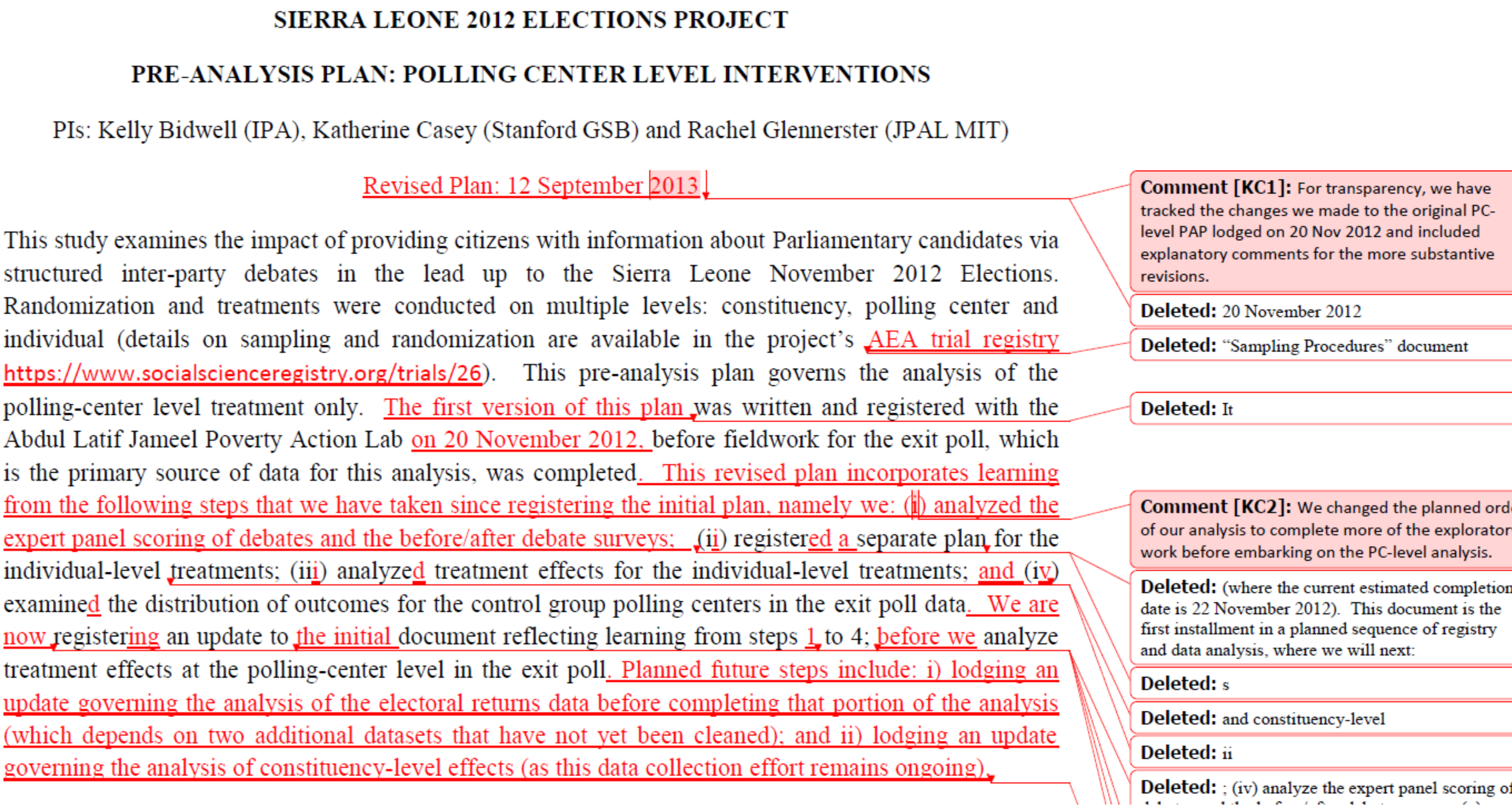
**PRE-ANALYSIS PLAN: INDIVIDUAL LEVEL INTERVENTIONS**

PIs: Kelly Bidwell (IPA), Katherine Casey (Stanford GSB) and Rachel Glennerster (JPAL MIT)

THIS DRAFT: 15 August 2013

This study examines the impact of providing citizens with information about Parliamentary candidates via structured inter-party debates in the lead up to the Sierra Leone November 2012 Elections. Randomization and treatments were conducted on multiple levels: constituency, polling center and individual (details on sampling and randomization are available in the project's AEA trial registry). This pre-analysis plan governs the analysis of the individual level treatments only. It was written and registered before analysis of the individual treatments data. It incorporates learning from analysis of the before/after screening data within the PC-level treatment sites.

# Revised final stage PAP



SIERRA LEONE 2012 ELECTIONS PROJECT

PRE-ANALYSIS PLAN: POLLING CENTER LEVEL INTERVENTIONS

PIs: Kelly Bidwell (IPA), Katherine Casey (Stanford GSB) and Rachel Glennerster (JPAL MIT)

Revised Plan: 12 September 2013

This study examines the impact of providing citizens with information about Parliamentary candidates via structured inter-party debates in the lead up to the Sierra Leone November 2012 Elections. Randomization and treatments were conducted on multiple levels: constituency, polling center and individual (details on sampling and randomization are available in the project's AEA trial registry https://www.socialscienceregistry.org/trials/26). This pre-analysis plan governs the analysis of the polling-center level treatment only. The first version of this plan was written and registered with the Abdul Latif Jameel Poverty Action Lab on 20 November 2012, before fieldwork for the exit poll, which is the primary source of data for this analysis, was completed. This revised plan incorporates learning from the following steps that we have taken since registering the initial plan, namely we: (i) analyzed the expert panel scoring of debates and the before/after debate surveys; (ii) registered a separate plan for the individual-level treatments; (iii) analyzed treatment effects for the individual-level treatments; and (iv) examined the distribution of outcomes for the control group polling centers in the exit poll data. We are now registering an update to the initial document reflecting learning from steps 1 to 4; before we analyze treatment effects at the polling-center level in the exit poll. Planned future steps include: i) lodging an update governing the analysis of the electoral returns data before completing that portion of the analysis (which depends on two additional datasets that have not yet been cleaned); and ii) lodging an update governing the analysis of constituency-level effects (as this data collection effort remains ongoing).

**Comment [KC1]:** For transparency, we have tracked the changes we made to the original PC-level PAP lodged on 20 Nov 2012 and included explanatory comments for the more substantive revisions.

**Deleted:** 20 November 2012

**Deleted:** "Sampling Procedures" document

**Deleted:** It

**Comment [KC2]:** We changed the planned ord of our analysis to complete more of the explorator work before embarking on the PC-level analysis.

**Deleted:** (where the current estimated completion date is 22 November 2012). This document is the first installment in a planned sequence of registry and data analysis, where we will next:

**Deleted:** s

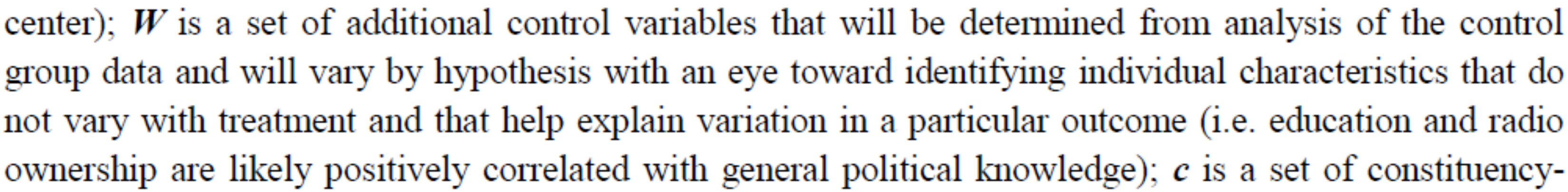
**Deleted:** and constituency-level

**Deleted:** ii

**Deleted:** ; (iv) analyze the expert panel scoring of

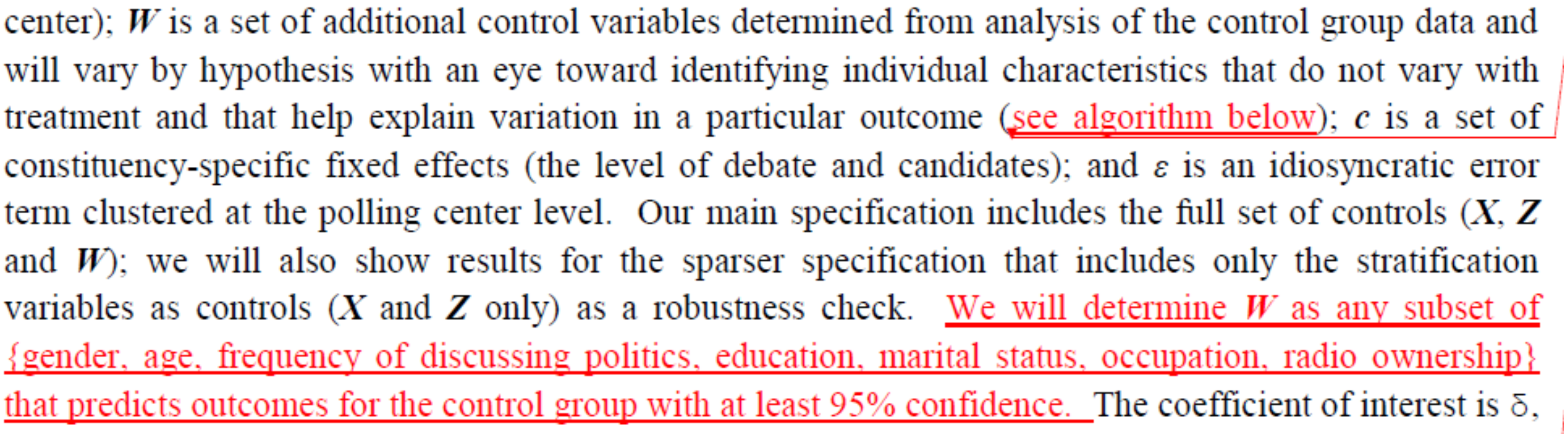
# Learning and algorithms to choose controls

- We specified how we would choose control variables after looking at the data
  - In 1st PAP:



center); $W$ is a set of additional control variables that will be determined from analysis of the control group data and will vary by hypothesis with an eye toward identifying individual characteristics that do not vary with treatment and that help explain variation in a particular outcome (i.e. education and radio ownership are likely positively correlated with general political knowledge); $c$ is a set of constituency-

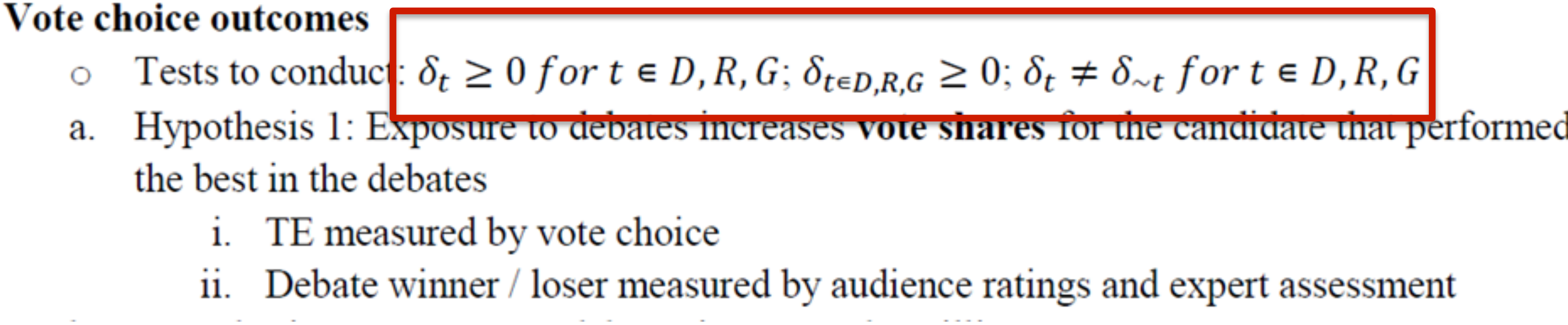
  - In Revised PAP:



center); $W$ is a set of additional control variables determined from analysis of the control group data and will vary by hypothesis with an eye toward identifying individual characteristics that do not vary with treatment and that help explain variation in a particular outcome (see algorithm below); $c$ is a set of constituency-specific fixed effects (the level of debate and candidates); and $\varepsilon$ is an idiosyncratic error term clustered at the polling center level. Our main specification includes the full set of controls ($X$, $Z$ and $W$); we will also show results for the sparser specification that includes only the stratification variables as controls ($X$ and $Z$ only) as a robustness check. We will determine $W$ as any subset of {gender, age, frequency of discussing politics, education, marital status, occupation, radio ownership} that predicts outcomes for the control group with at least 95% confidence. The coefficient of interest is $\delta$,

# Upside: One-sided tests

- For outcomes with a clear theoretically predicted direction, we pre-specified one-sided tests
- For those without clear direction, tests are two sided



**Vote choice outcomes**

- Tests to conduct: $\delta_t \geq 0\ for\ t \in D, R, G$; $\delta_{t \in D,R,G} \geq 0$; $\delta_t \neq \delta_{\sim t}\ for\ t \in D, R, G$

a. Hypothesis 1: Exposure to debates increases **vote shares** for the candidate that performed the best in the debates

   i. TE measured by vote choice

   ii. Debate winner / loser measured by audience ratings and expert assessment

# What does this mix look like?

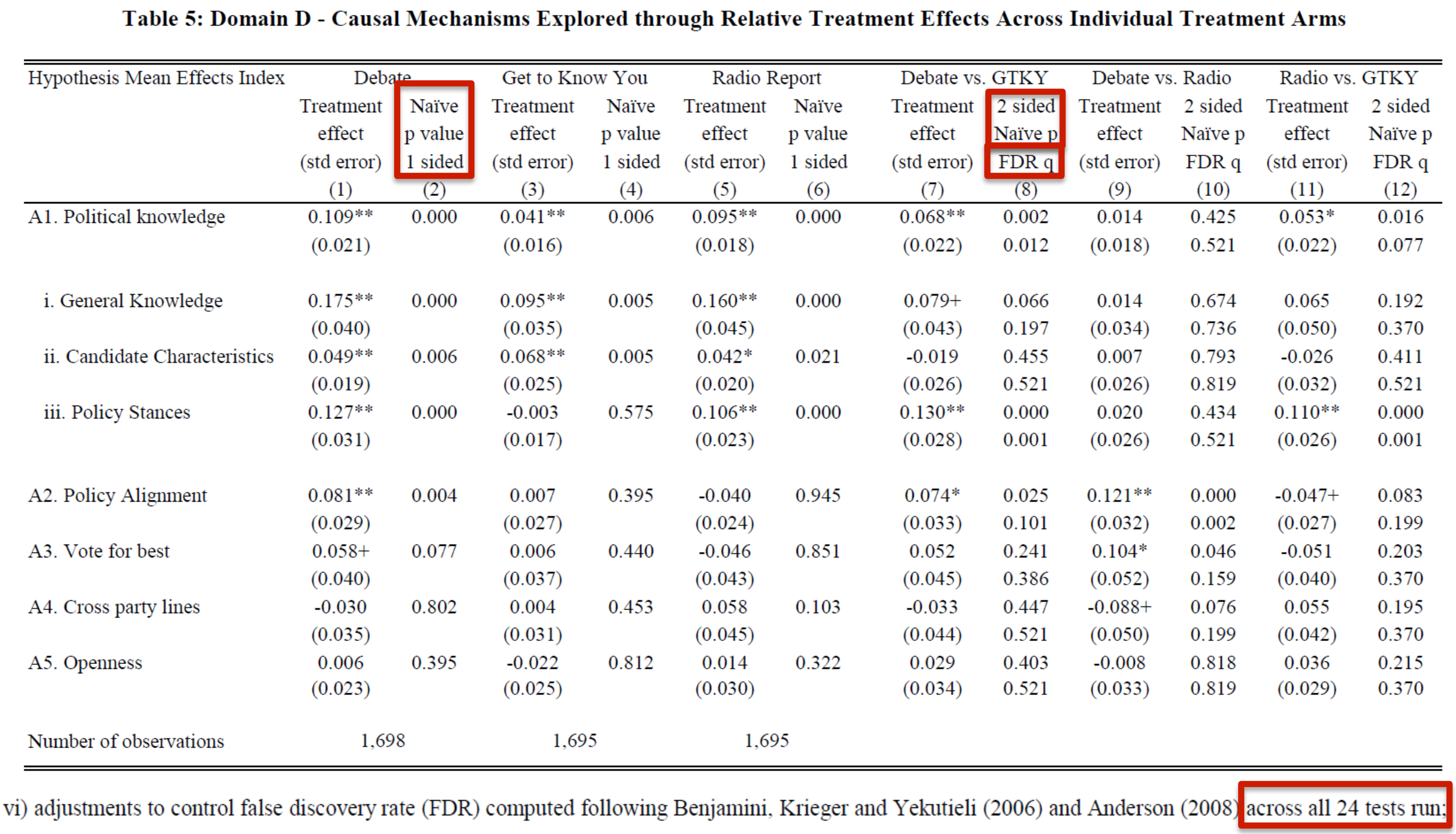


**Table 5: Domain D - Causal Mechanisms Explored through Relative Treatment Effects Across Individual Treatment Arms**

| Hypothesis Mean Effects Index | Debate | | Get to Know You | | Radio Report | | Debate vs. GTKY | | Debate vs. Radio | | Radio vs. GTKY | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Treatment effect (std error) | Naïve p value 1 sided | Treatment effect (std error) | Naïve p value 1 sided | Treatment effect (std error) | Naïve p value 1 sided | Treatment effect (std error) | 2 sided Naïve p FDR q | Treatment effect (std error) | 2 sided Naïve p FDR q | Treatment effect (std error) | 2 sided Naïve p FDR q |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| A1. Political knowledge | 0.109** | 0.000 | 0.041** | 0.006 | 0.095** | 0.000 | 0.068** | 0.002 | 0.014 | 0.425 | 0.053* | 0.016 |
| | (0.021) | | (0.016) | | (0.018) | | (0.022) | 0.012 | (0.018) | 0.521 | (0.022) | 0.077 |
| i. General Knowledge | 0.175** | 0.000 | 0.095** | 0.005 | 0.160** | 0.000 | 0.079+ | 0.066 | 0.014 | 0.674 | 0.065 | 0.192 |
| | (0.040) | | (0.035) | | (0.045) | | (0.043) | 0.197 | (0.034) | 0.736 | (0.050) | 0.370 |
| ii. Candidate Characteristics | 0.049** | 0.006 | 0.068** | 0.005 | 0.042* | 0.021 | -0.019 | 0.455 | 0.007 | 0.793 | -0.026 | 0.411 |
| | (0.019) | | (0.025) | | (0.020) | | (0.026) | 0.521 | (0.026) | 0.819 | (0.032) | 0.521 |
| iii. Policy Stances | 0.127** | 0.000 | -0.003 | 0.575 | 0.106** | 0.000 | 0.130** | 0.000 | 0.020 | 0.434 | 0.110** | 0.000 |
| | (0.031) | | (0.017) | | (0.023) | | (0.028) | 0.001 | (0.026) | 0.521 | (0.026) | 0.001 |
| A2. Policy Alignment | 0.081** | 0.004 | 0.007 | 0.395 | -0.040 | 0.945 | 0.074* | 0.025 | 0.121** | 0.000 | -0.047+ | 0.083 |
| | (0.029) | | (0.027) | | (0.024) | | (0.033) | 0.101 | (0.032) | 0.002 | (0.027) | 0.199 |
| A3. Vote for best | 0.058+ | 0.077 | 0.006 | 0.440 | -0.046 | 0.851 | 0.052 | 0.241 | 0.104* | 0.046 | -0.051 | 0.203 |
| | (0.040) | | (0.037) | | (0.043) | | (0.045) | 0.386 | (0.052) | 0.159 | (0.040) | 0.370 |
| A4. Cross party lines | -0.030 | 0.802 | 0.004 | 0.453 | 0.058 | 0.103 | -0.033 | 0.447 | -0.088+ | 0.076 | 0.055 | 0.195 |
| | (0.035) | | (0.031) | | (0.045) | | (0.044) | 0.521 | (0.050) | 0.199 | (0.042) | 0.370 |
| A5. Openness | 0.006 | 0.395 | -0.022 | 0.812 | 0.014 | 0.322 | 0.029 | 0.403 | -0.008 | 0.818 | 0.036 | 0.215 |
| | (0.023) | | (0.025) | | (0.030) | | (0.034) | 0.521 | (0.033) | 0.819 | (0.029) | 0.370 |
| Number of observations | 1,698 | | 1,695 | | 1,695 | | | | | | | |

vi) adjustments to control false discovery rate (FDR) computed following Benjamini, Krieger and Yekutieli (2006) and Anderson (2008) across all 24 tests run;

# Where does this matter most?

28 Constituencies

224 PCs

5,415 Voters

# Constituency-level results

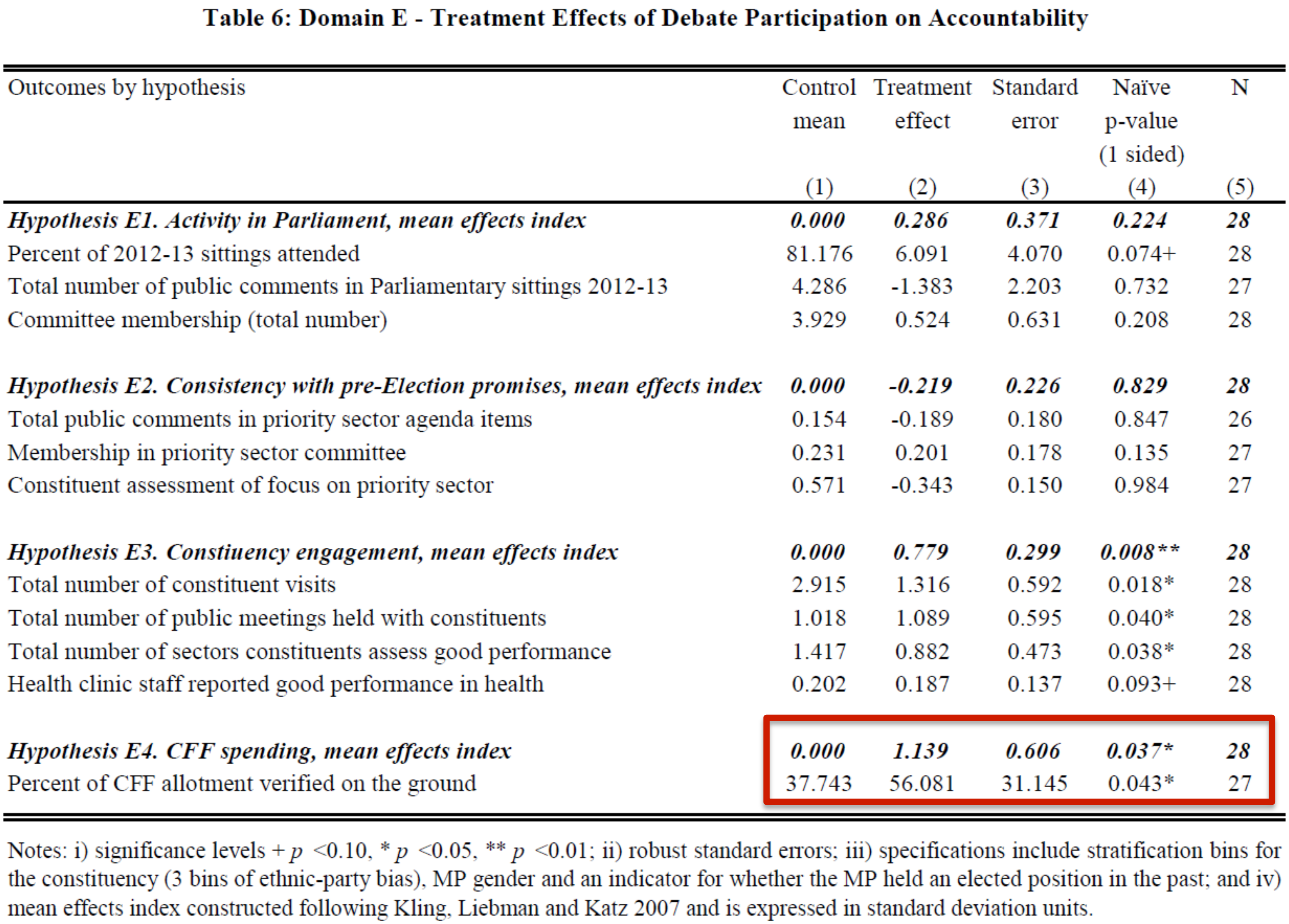


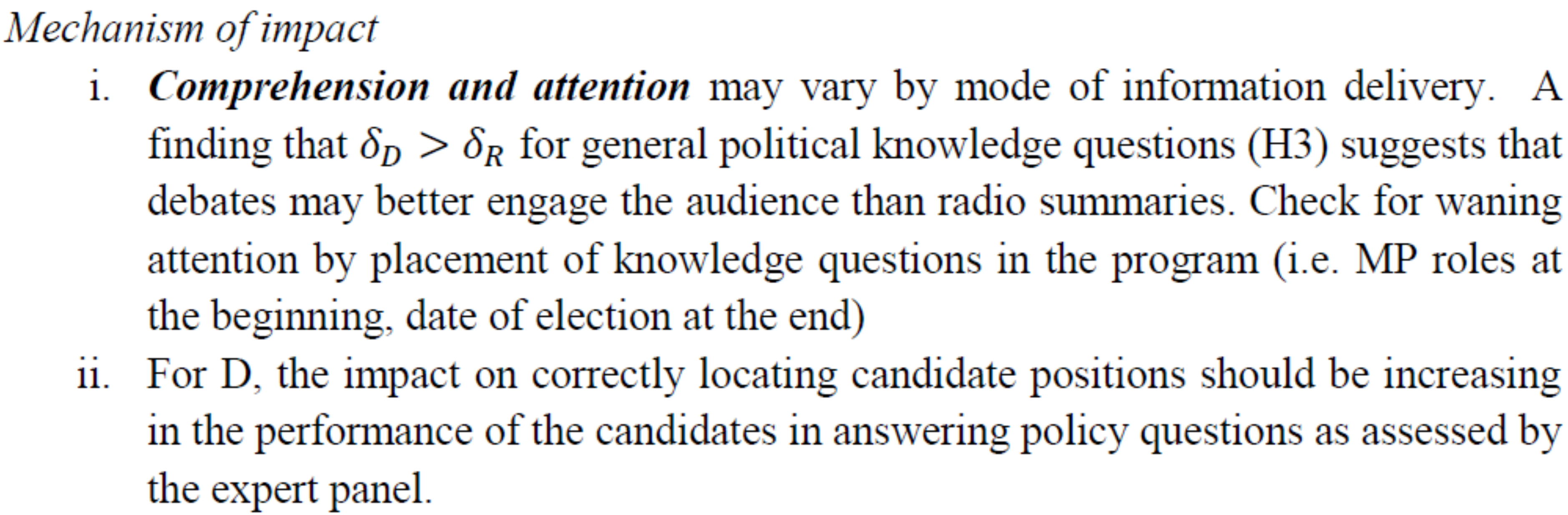
**Table 6: Domain E - Treatment Effects of Debate Participation on Accountability**

| Outcomes by hypothesis | Control mean | Treatment effect | Standard error | Naïve p-value (1 sided) | N |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| ***Hypothesis E1. Activity in Parliament, mean effects index*** | ***0.000*** | ***0.286*** | ***0.371*** | ***0.224*** | ***28*** |
| Percent of 2012-13 sittings attended | 81.176 | 6.091 | 4.070 | 0.074+ | 28 |
| Total number of public comments in Parliamentary sittings 2012-13 | 4.286 | -1.383 | 2.203 | 0.732 | 27 |
| Committee membership (total number) | 3.929 | 0.524 | 0.631 | 0.208 | 28 |
| ***Hypothesis E2. Consistency with pre-Election promises, mean effects index*** | ***0.000*** | ***-0.219*** | ***0.226*** | ***0.829*** | ***28*** |
| Total public comments in priority sector agenda items | 0.154 | -0.189 | 0.180 | 0.847 | 26 |
| Membership in priority sector committee | 0.231 | 0.201 | 0.178 | 0.135 | 27 |
| Constituent assessment of focus on priority sector | 0.571 | -0.343 | 0.150 | 0.984 | 27 |
| ***Hypothesis E3. Constiuency engagement, mean effects index*** | ***0.000*** | ***0.779*** | ***0.299*** | ***0.008***** | ***28*** |
| Total number of constituent visits | 2.915 | 1.316 | 0.592 | 0.018* | 28 |
| Total number of public meetings held with constituents | 1.018 | 1.089 | 0.595 | 0.040* | 28 |
| Total number of sectors constituents assess good performance | 1.417 | 0.882 | 0.473 | 0.038* | 28 |
| Health clinic staff reported good performance in health | 0.202 | 0.187 | 0.137 | 0.093+ | 28 |
| ***Hypothesis E4. CFF spending, mean effects index*** | ***0.000*** | ***1.139*** | ***0.606*** | ***0.037**** | ***28*** |
| Percent of CFF allotment verified on the ground | 37.743 | 56.081 | 31.145 | 0.043* | 27 |

Notes: i) significance levels + *p* <0.10, * *p* <0.05, ** *p* <0.01; ii) robust standard errors; iii) specifications include stratification bins for the constituency (3 bins of ethnic-party bias), MP gender and an indicator for whether the MP held an elected position in the past; and iv) mean effects index constructed following Kling, Liebman and Katz 2007 and is expressed in standard deviation units.

# Upside: Bolstering descriptive analysis

- Pre-specified potential causal mechanisms to add credibility to eventual descriptive analysis and inference



*Mechanism of impact*

i. ***Comprehension and attention*** may vary by mode of information delivery. A finding that $\delta_D > \delta_R$ for general political knowledge questions (H3) suggests that debates may better engage the audience than radio summaries. Check for waning attention by placement of knowledge questions in the program (i.e. MP roles at the beginning, date of election at the end)

ii. For D, the impact on correctly locating candidate positions should be increasing in the performance of the candidates in answering policy questions as assessed by the expert panel.

# How to quantify the value? Coffman and Niederle (2015)

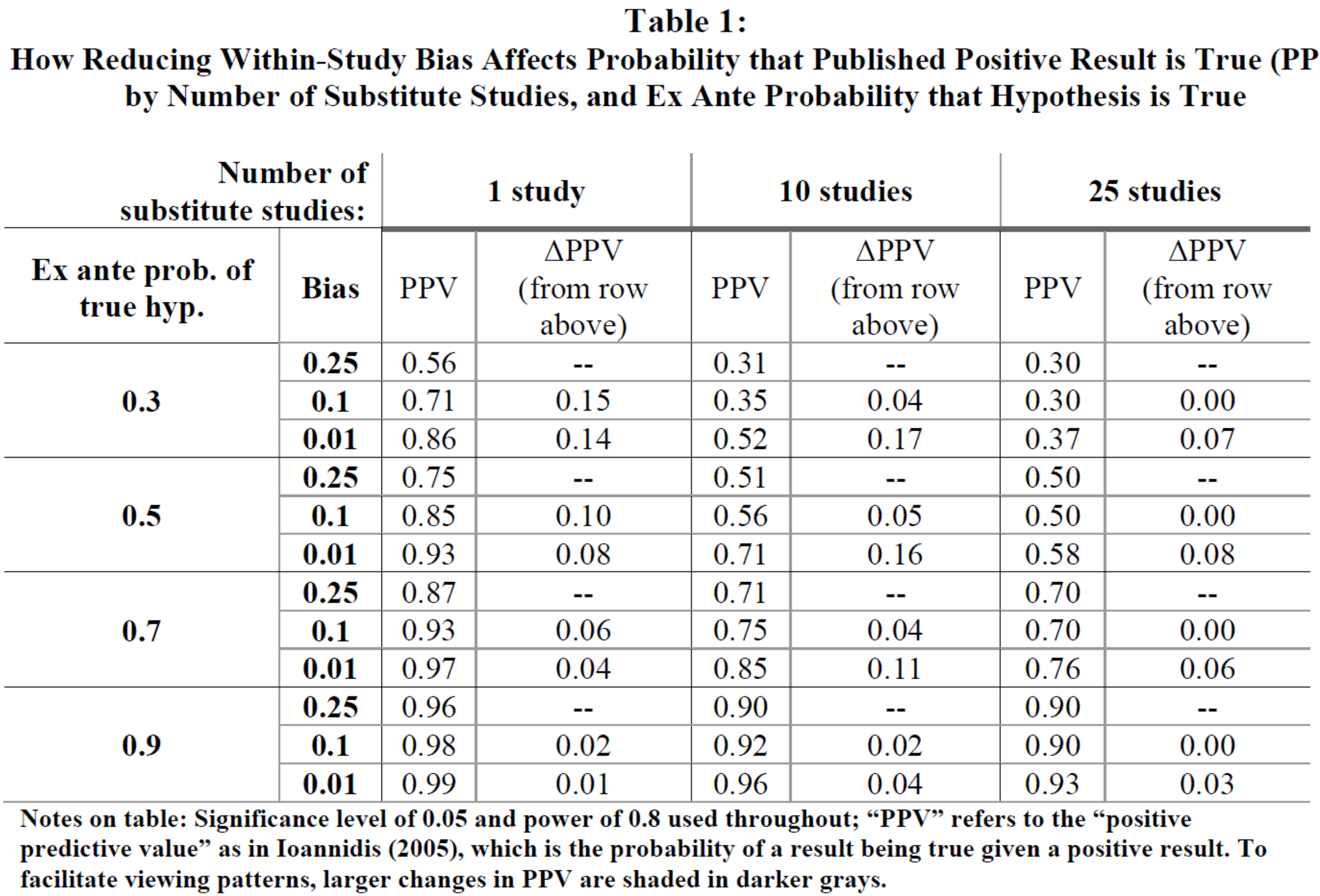


**Table 1:**
**How Reducing Within-Study Bias Affects Probability that Published Positive Result is True (PPV), by Number of Substitute Studies, and Ex Ante Probability that Hypothesis is True**

| Number of substitute studies: | | 1 study | | 10 studies | | 25 studies | |
|---|---|---|---|---|---|---|---|
| **Ex ante prob. of true hyp.** | **Bias** | PPV | ΔPPV (from row above) | PPV | ΔPPV (from row above) | PPV | ΔPPV (from row above) |
| **0.3** | **0.25** | 0.56 | -- | 0.31 | -- | 0.30 | -- |
| | **0.1** | 0.71 | 0.15 | 0.35 | 0.04 | 0.30 | 0.00 |
| | **0.01** | 0.86 | 0.14 | 0.52 | 0.17 | 0.37 | 0.07 |
| **0.5** | **0.25** | 0.75 | -- | 0.51 | -- | 0.50 | -- |
| | **0.1** | 0.85 | 0.10 | 0.56 | 0.05 | 0.50 | 0.00 |
| | **0.01** | 0.93 | 0.08 | 0.71 | 0.16 | 0.58 | 0.08 |
| **0.7** | **0.25** | 0.87 | -- | 0.71 | -- | 0.70 | -- |
| | **0.1** | 0.93 | 0.06 | 0.75 | 0.04 | 0.70 | 0.00 |
| | **0.01** | 0.97 | 0.04 | 0.85 | 0.11 | 0.76 | 0.06 |
| **0.9** | **0.25** | 0.96 | -- | 0.90 | -- | 0.90 | -- |
| | **0.1** | 0.98 | 0.02 | 0.92 | 0.02 | 0.90 | 0.00 |
| | **0.01** | 0.99 | 0.01 | 0.96 | 0.04 | 0.93 | 0.03 |

**Notes on table: Significance level of 0.05 and power of 0.8 used throughout; "PPV" refers to the "positive predictive value" as in Ioannidis (2005), which is the probability of a result being true given a positive result. To facilitate viewing patterns, larger changes in PPV are shaded in darker grays.**

# Conclusion

- Pre-analysis plans (PAPs) help enhance the credibility of research
- Pre-specification and PAPs are still in very early stages in economics
- As norms evolve, one strategy to accommodate learning is limited flexibility with complete transparency
- Include the most stringent "purist" specifications as a benchmark for more flexible or *ex post* adjustments
- PAPs are not without costs, but offer opportunities for upside as well

# Remaining Costs

- Complexity and the challenge (and wastefulness) of pre-specifying a fully enumerated decision tree of all possible constellations of results (Olken 2015)
  - Magruder and Andersen here?