Information Technology and Political Engagement: Mixed Evidence from Uganda

Supplementary Information

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1 Introduction

This appendix provides more information on the theoretical framework, design, implementation, and analysis of the three experiments discussed in our paper "Information Technology and Political Engagement: Mixed Evidence from Uganda". We begin with a simple model that clarifies the implications arising from political bias and information asymmetries and helps motivate some of the mechanisms we examine in Section 4. We then describe the uSpeak program in greater detail. We then present a comprehensive list of differences between the controlled experiment and the scaled-up nationwide uSpeak program, as well as additional results, especially those pertaining to the *no flatenning* finding. We complete by providing additional information on the mechanism experiment we conducted in Arua district to explore gender differences in responses to an invitation to communicate with public officials.

2 Logic

In this section we explore formally the logic of preference articulation in weak information environments, and especially whether the incentives to bear the costs of political communication might differ across subsections of the population.

Consider a politician who has to decide what share α_i^j of resources to allocate to group i in sector j subject to $\sum_i \sum_j \alpha_i^j = 1$. Say that each group i values only one sector but the politician is uncertain about the sectoral preference of groups and believes group i favors sector j with probability q_i^j. Politicians maximize a weighted average of expected group welfare with bias parameter β_i, $\sum_i \beta_i = 1$:

$$u(\alpha) = \sum_i \beta_i \sum_j q_i^j \sqrt{\alpha_i^j}$$

This set up can represent a large range of institutional environments. By letting one of the groups correspond to the politician themselves, or their party, we can capture variation in the degree to which politicians seek to respond to the interests of constituents. Similarly, the β_i term can be interpreted as capturing either the electoral importance of groups or non-electoral significance, such as ethnic affinity with politicians, which past work has demonstrated can affect distributional outcomes [@burgess2015value; @kramon2016ethnic]. The square root function here may be interpreted either as reflecting concavity in the benefits to groups from a policy or in the politician's valuation of these benefits to voters. The main results below extend immediately to more general formulations such as $\sum_i \beta_i \sum_j q_i^j (\alpha_i^j)^\gamma$. The formulation does not however handle decision rules in which the gains from supporting constituents depend on how satisfied other constituents are, as is the case for coalitional politics [@humphreys2008coalitions].

The question of interest then is what preferences do politicians have over information on voters? What preferences do voters have over politicians' information and how do these affect equality of outcomes?

Given the above utility function, the politician's optimal allocation is:

$$\alpha_i^j = \frac{(\beta_i q_i^j)^2}{\sum_h \sum_k (\beta_h q_h^k)^2}$$

Thus distributions to groups reflect how informed politicians are about group preferences: they allocate more where they can allocate accurately. The total allocation to a group is then $\frac{\beta_i^2 \sum_j (q_i^j)^2}{\sum_h \sum_k (\beta_h q_h^k)^2}$, which, along with bias, depends on the *fragmentation* of beliefs—corresponding here to the squared term on q in the numerator — the more fragmented beliefs are across sectors the less is provided to a group overall.

Consider a case with two group and two sectors. If there were certainty that group 1 preferred sector 1 and uncertainty over group 2's preferences, group 1 would receive twice as many benefits as group 2 *even in the absence of ethnic, or other sources of, bias*: $\sum_j \alpha_i^j = \frac{2\beta_1^2}{2\beta_1^2+\beta_2^2}$.

In this case a politician's "indirect" utility, given information q and under the assumption that she implements optimal allocations, would be:

$$v(q) = \sum_i \beta_i \sum_j q_i^j \left(\frac{(\beta_i q_i^j)^2}{\sum_h \sum_k (\beta_h q_h^k)^2} \right)^{.5} = \left(\sum_i \sum_k (\beta_i q_i^k)^2 \right)^{.5}$$

We see from this that, *ceteris paribus*, the marginal gains for a politician from a reduction in the fragmentation of beliefs is greater for favored groups. For example, starting from an uninformed position, if a politician were to choose between being informed about group 1 or group 2, this would mean a comparison between $\left(\beta_1^2 + .5\beta_2^2\right)^{.5}$ and $\left(\beta_2^2 + .5\beta_1^2\right)^{.5}$. The former exceeds the latter if $\beta_1 > \beta_2$.

Thus if they have to choose, politicians invest more in learning about the preferences of favored groups. Because of this, *favored groups may be benefited doubly*: because politicians *care* more about them and because they *know* more about them. These simple logics highlight how in the presence of bias there can be inequality in information, which contributes to greater inequality in resource allocation.

Say now that voters can take actions to render politicians more informed. Will they have incentives to do so? The sensitivity of allocations to a voter 1's preferred sector (here across two sectors) to beliefs that 1's preferred sector is indeed sector 1 is given by:

$$\frac{\partial \alpha_1^1}{\partial q_1^1} = 2\beta_1^2 q_1^1 \frac{\sum_{k\neq 1} \sum_h (\beta_k q_k^h)^2 + (1-q_1^1)\beta_1^2}{(\sum_k \sum_h (\beta_k q_k^h)^2)^2} \tag{1}$$

This is positive everywhere, as long as $\beta_1 > 0$, even if $\beta_1 < \beta_2$.

Thus there are always gains for a voter from politicians being more informed about their preferences—more information will always mean better targeting of resources. Note that it is quite possible that better information means that the politician is more uncertain about priorities (for example if they started putting greater weight on the wrong sector) and will allocate less to a group, but still allocate it more effectively to that group. It is also ambiguous whether the gains to more information are increasing in the bias of the politician towards other groups. Similarly, marginal gains are lower when politicians are more informed about other groups (i.e. have less dispersed beliefs).[1]

There can however be ranges in which groups for whom there is weak information have greater incentives to provide information than groups about whom there is good information, even if biases go against them. To see this, note that with two groups (and dropping the sector superscripts on q_i), the marginal gains are greater for group 1 if:

$$\beta_1^4 q_1(1-q_1) + \beta_1^2\beta_2^2\left(q_1(q_2^2 + (1-q_2)^2) - q_2(q_1^2 + (1-q_1)^2)\right) - \beta_2^4 q_2(1-q_2) > 0$$

This has a term that is increasing in the preference weighted uncertainty of own group preferences, decreasing in the preference weighted uncertainty of other group preferences and a third term that depends on relative uncertainty and relative preferences (increasing in the fragmentation of other group information and decreasing in the fragmentation of own group information).

Thus a weaker group may have greater incentive to communicate if there is greater uncertainty about their preferences and less uncertainty about the privileged groups preferences. The point is obvious at the extremes, if $q_2 = 1$ the condition is $q_1\beta_1^2 > (1-2q_1)\beta_2^2$ which holds for any $q_1 \geq .5$.

[1] Note that the marginal gain has the form: $a(x+b)(x+d)^{-2}$, so the derivative is: $a(x+d)^{-2} - 2a(x+b)(x+d)^{-3} = a\frac{d-2b-x}{(x+d)^3}$, since $x+d$ is positive, the derivative is negative as long $d < x+2b$. In general, this cannot be guaranteed. For example, with $x=0$, this condition is equivalent to $\beta_1^2((q1)^2 + (1-q1)^2) < 2\beta_1^2(1-q1)$ or $q_1 < .5^{.5}$. See Figure 1 for intuition.

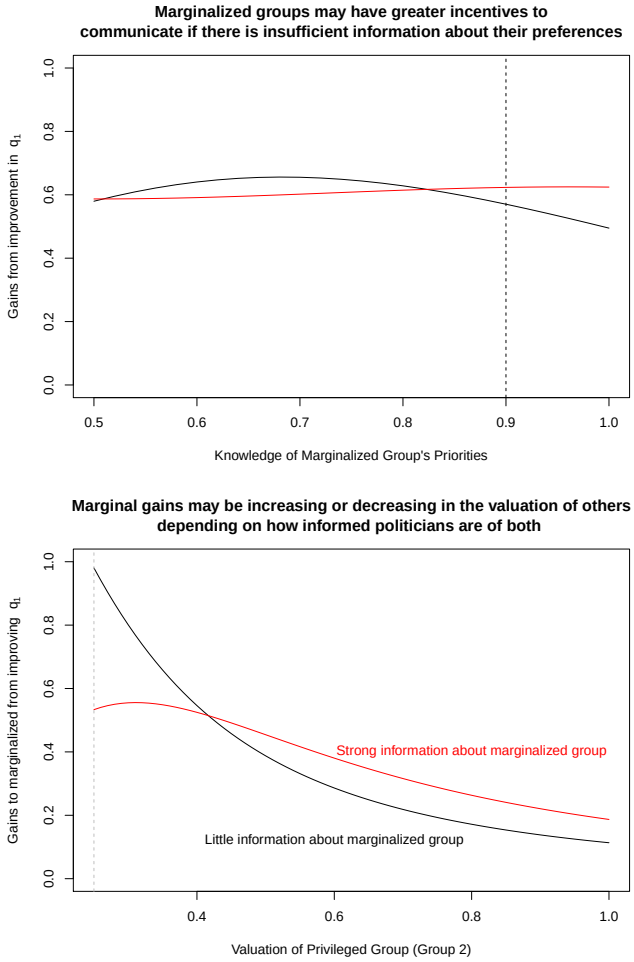


Figure 1: Upper panel: Marginal gains from increasing information about marginalized group's preferences (red) and privilieged groups preferences (black), given prior beliefs about privileged group's preferences of 0.9. Lower panel: Gains to marginalized group depending on how privileged the privileged group is; β_1 set at 0.25; q_2 at .75, for $q_1 = .5$ (black line) and $q_1 = .9$ (red line).

Figure 1 (upper panel) sharpens this intuition for a case with two sectors and preferences for the privileged group of $\beta_2 = .55$ and for the marginalized group of $\beta_1 = .45$. Here, with prior beliefs on the privileged group's preferred sector of $q_2 = 0.9$ the marginalized group has a stronger incentive to provide information than the privileged group in a set of situations in which the politician is (strictly) less informed about it. The lower panel illustrates the depressing effect of relative marginalization in most ranges – in general the more privileged is the privileged group the weaker is the incentive for the marginalized group to provide information. The exception is when biases are weak and there is already strong information about the marginalized group relative to the privileged group.

The model's core results are therefore the following: although marginalized voters might benefit less from informed politicians, they can have stronger incentives to make up the information gap; given equal opportunities, marginalized citizens about whom there is weak information can have incentives to inform politicians more than less marginalized citizens, even though informed politicians prefer to allocate to less marginalized citizens. The incentive to make up the gap comes from two sources. First there are greater effects of information at low levels; second there are strategic incentives: gains from providing information can be greater when politicians are more informed about other groups.

We emphasize that while these logics are consistent with optimal behavior, the results are sensitive to multiple features of this specification, such as the degree of concavity, order of play, and differential costs of access. For example, with log utility, politician allocations do not depend on information. We see this as the key payoff from formalizing our theoretical framework: although the model clarifies the types of logics in operation, it also makes clear that one cannot expect these logics to hold universally and underscores the importance of empirical analysis.

Studying the logic of political communication described in the model above, and especially the conditions under which different constituents are more likely to invest in communicating their preferences to politicians, is hard. This is because there are likely unobserved characteristics at the individual and the constituency level that are correlated both with the *availability* of communication channels and *intensity* of political communication. We address this challenge by using a field experiment research design in which the availability of a new innovative communication channel has been randomly assigned.

3 The uSpeak Program

The Ugandan Parliament, the National Democratic Institute (NDI) and the research team partnered to develop and implement an innovative IT platform designed to improve the quality of MP/constituent communication in Uganda. The joint effort resulted in the introduction of the uSpeak system, which allowed constituents in randomly selected constituencies to directly contact their MP via SMS, or a voice call. Incoming messages were processed and posted in a casework management system, which was hosted in Parliament. MPs could then respond to constituents, and/or forward the message to other state agents through the platform. Radio and person-to-person marketing strategies were used to promote uSpeak to Uganda's voting-age population in randomly selected areas.

3.1 The Platform

The uSpeak platform had two core components. First, it had a "back-end" component that received and sorted messages by intended recipient (MP). This part of the system also sent automatic airtime reimbursements to users sending text-messages in months that were assigned to a "free" message treatment condition. This part of the system was custom built and maintained by Yo! Uganda, a software development and telecom services provider in Uganda. The second component of the platform was the uSpeak interface (i.e., a case management system), which allowed MPs to access their messages, respond to constituents, forward messages to other government offices, record what was done on each case, and view simple statistics about messaging (type and frequency). The interface was custom designed by Gov2U, and is described in more detail below. Not all parts of the uSpeak platform were fully automated, and NDI hired a small team of data entrants to tag the messages that were received by issue, and to make and receive calls from constituents who had issues using the system.

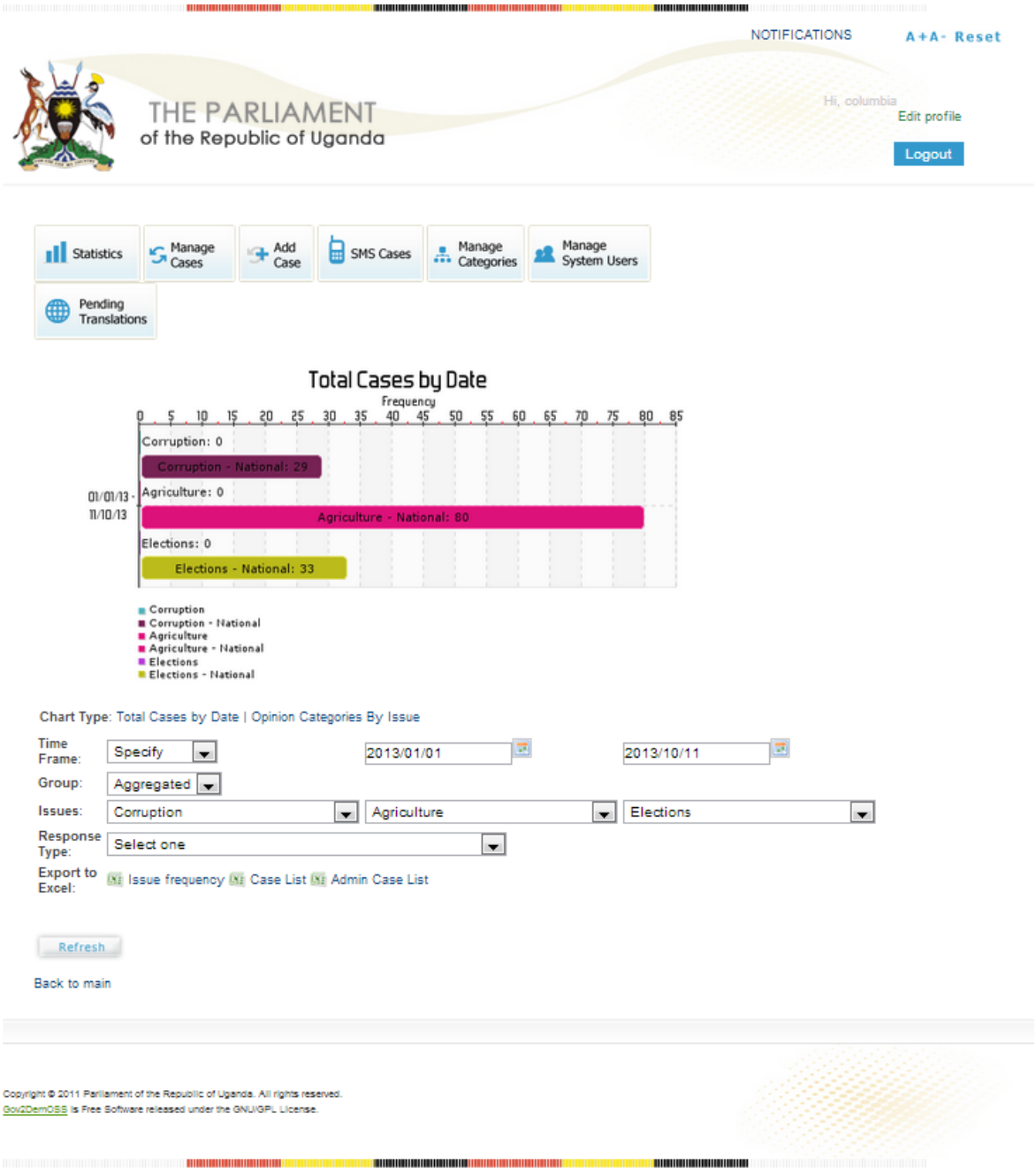
3.2 MP side

The uSpeak platform was designed by Gov2U, a non-profit, non-governmental organization that supports political discourse between citizens and elected officials through the use of technology. Gov2U develops ICT tools that provide opportunities for citizens to actively engage in deliberation with officials to improve policymaking procedures. Gov2U works in a wide range of contexts, and has built similar case management platforms for legislatures in the EU, and other African countries. The platform was hosted on the Parliament's servers, and the research team at NDI had full administrator access to the back-end, allowing the research team to read and classify all messages.

The platform's main function was to deliver messages to MPs in an organized way. To this end, Gov2U designed an "inbox" that displayed messages and associated case histories. The inbox functioned a lot like email, in the sense that messages could be replied-to or forwarded on. MPs or their political assistants could also note case histories, marking messages as "resolved" or "open", etc.

A second key function was to aggregate constituent messages in a way that was useful to the work of the MP, be it constituent services or legislative work. Messages were categorized into 41 different policy areas. The platform used the labeled data to present MPs with simple bar graphs showing the distribution of issue type over a user-defined time period. MPs could also view their messages grouped by type of message (request for action, request for information, etc.). Figure 2 provides a screenshot of the case-tracking system interface to demonstrate the aggregation functionalities of the uSpeak platform.

Figure 2: **MP's uSpeak Message Aggregation**



Note: MPs could use uSpeak to view aggregated message data, by issue or issue type, and they could define the time-frame of each query.

3.2.1 Voter Side

Constituents sent messages to the uSpeak platform by composing a text-message on their phone, and sending the message to a four digits short-code (that functions as a phone number). Each MP selected for participation in the program was further assigned a unique code. These unique codes needed to be included in the SMS in order to classify and deliver the message to the intended MP. In Uganda, mobile phone numbers are registered to users who are required to provide their addresses, but this information is not public, so the unique code was the tool we used to match messages to constituencies and MPs. In some areas, both the constituency MP and the district (women) MP were participating in the program, so constituents had two MPs they could message. In this case the code allowed us to distinguish the intended recipient. In the case that the MPs code was not included, call center employees attempted to contact the sender and identify the intended MP recipient. A small sample of raw messages sent via the uSpeak system are displayed in Table 1.

Table 1: Sample of uSpeak messages

478	Hon can u work 2gether with SENU,PL'SE,4 MELLINIUM DEVELOPMENT.
204.	ISWAMATA AGOGONG OSEUNAI NANDALA BON.
142	I got an accident during elections i got treatment frm Mbra ref hsp & Mr [Name] & spent 10 month I hv improved bt nowhere 2 start so Hon see hw u can help.

3.3 Marketing Strategies

NDI (and the research team) delivered constituents information on the (experimental) variations in price and feedback via study's marketing tools. The marketing of the uSpeak program was managed by Real Marketing (now Real group), a Ugandan marketing and advertising firm that was hired by NDI.

The uSpeak program was advertised primarily through MP-specific radio advertisements, which were played twice daily 3 days a week for the duration of the 6-month pilot. The ads contained information about price and feedback, variations in which were experimentally manipulated. Advertisements were recorded in local languages used in each constituency and played on radio stations that were recommended by both the MPs and the marketing firm. Below we provide a short skit that demonstrates the 30-seconds ads that were used to promote the uSpeak system in treatment areas.

uSpeak Radio Advertisment

Description: *In this concept we envision a village meeting. Sometimes MPs can be in attendance but most times they have representatives. When their representative finally arrives; everybody wants to speak to him.*

USPEAK signature tune

Sfx: Rowdy meeting with everyone trying to talk at the same time; revving of a car engine.

Mvo 1: eeehehe has come! Now lets tell him everything so that he can go and tell Hon. Kadaga as we say it.

Mvo 2: we need more drugs in the hospitals

Fvo 1: the roof on the primary school was blown off

Mvo 2: mama dorotia has increased the price of waragi

Voices: tell her.eeeh.even the

Mvo 3: *(frustrated)* Order! Order! Order! What is this? Have we turned the meeting into a market place? There is a new way of communicating to Hon. Kadaga! It is the USPEAK way!

Fvo 1: USPEAK?

Anncr: Yes! USPEAK, a new easier way to talk to Hon.Kadaga. Just type her code, 413, then your message and send to 6020, leave her a voice message on 0312207950, or phone the USPEAK call centre on 0312207955. All calls and voicemails cost their usual rates across all networks.

Experimental Price Variation Please note that all SMS to participating MPs in Kamuli District

cost Shs 110 this month.

USPEAK; Talking to your MP made easier

Figure 3: **Sample Price Schedule**

	District 1	District 2	District 3	District 4	District 5	District 6	District 7	District 8
Month 1	Full	Free	Full	Free	Full	Free	Full	Free
Month 2	Free	Full	Free	Full	Free	Full	Free	Full
Month 3	Full	Free	Free	Full	Full	Free	Free	Full
WASHOUT PERIOD								
Month 4	Free	Full	Full	Free	Free	Full	Full	Free
Month 5	Full	Full	Full	Full	Free	Free	Free	Free
Month 6	Free	Free	Free	Free	Full	Full	Full	Full

Note: Possible treatment schedules.

3.4 uSpeak Types of Incoming Messages

Classification of message types sent to the USpeak system

	Number	Proportion
Unclassified	160	0.08
Communal	806	0.41
National	97	0.05
Personal	883	0.45

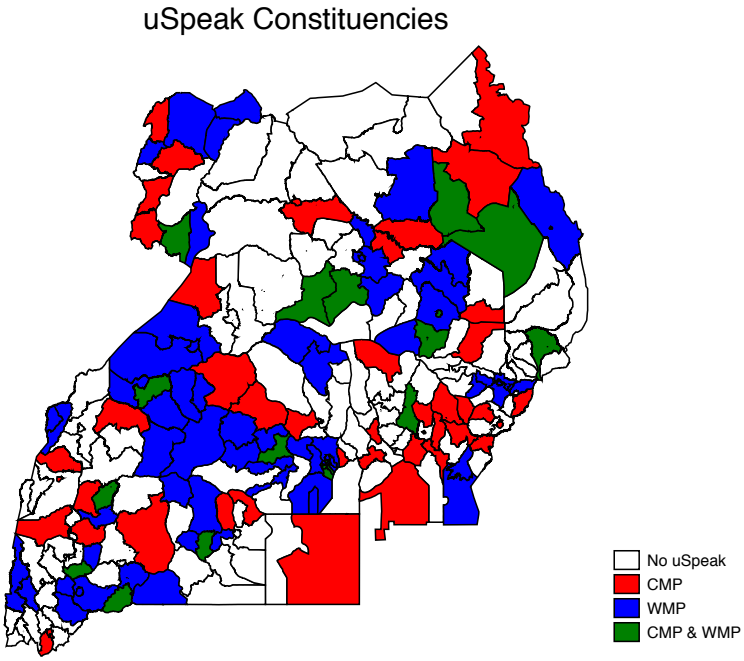
Table 2: Classification of Messages sent to MPs via uSpeak

3.5 The Lottery

Recruitment for the uSpeak program took place in December 2011. A total of 186 MPs (out of 350) volunteered to participate in the program. Of this group, we use block randomization to select 100 MPs to receive access to the uSpeak program, and 86 MPs to serve as a control group for the initial pilot (study) period. In addition, 10 MPs from the Parliamentary Committee were included in the program, but not the study.

Blocks (for random selection) were constructed using MP type (constituency MP or district (women) MP), region, and party. Importantly, the lottery took place in public, in the presence of all the MPs who had volunteer to participate in the pilot phase. The block structure is demonstrated below in the public lottery protocol, which we provide for transparency. Figure 4 below shows the geographic distribution of treatment assignment.

Figure 4: **uSpeak Constituencies**



Note: Geographic representation of treatment assignment. CMP denotes Constituency MPs and WMP denotes Women (District) MPs. Both Constituency and District MPs are elected from single member political units via first-past-the-post majoritarian electoral rule. Whereas both male and female candidates can complete for seats in constituency elections, district seats are reserved for women; i.e., only female candidates can compete for those seats. At the time of the study Uganda had 238 Constituency MPs and 112 District (or women) MPs.

Date: 3 December 2012

By: [ANON]

DRAFT LOTTERY PROCEDURE

Overview

A **fair lottery** approach is being used to select MPs to take part in the pilot PCS program. The lottery is designed to ensure that all MPs have the same chance of being selected (approximately 56%) but also to ensure that there is equal (proportionate) representation of all parties as well as of both constituency and district MPs and across regions.

To do this 19 separate lotteries will be held according, each one grouping together MPs of the same type, party and region. For example lottery "1" is for all directly elected independents in the Central region.

Table 1: Lottery Lists

GROUP	BIN CODE	PARTY	CATEGORY	REGION	NUMBER IN LOTTERY	NUMBER TO BE SELECTED	LETTERS
INDEP	1	INDEP	DEMP	CENTRAL	5	3	A-E
INDEP	2	INDEP	DEMP	EASTERN	7	4	A-G
INDEP	3	INDEP	DEMP	NORTHERN	3	2	A-C
INDEP	4	INDEP	DEMP	WESTERN	4	2	A-D
INDEP	5	INDEP	WMP	ALL	5	3	A-E
NRM	6	NRM	DEMP	CENTRAL	15	8	A-O
NRM	7	NRM	DEMP	EASTERN	21	11	A-U
NRM	8	NRM	DEMP	NORTHERN	16	9	A-P
NRM	9	NRM	DEMP	WESTERN	21	11	A-U
NRM	10	NRM	WMP	CENTRAL	10	6	A-J
NRM	11	NRM	WMP	EASTERN	13	7	A-M
NRM	12	NRM	WMP	NORTHERN	12	7	A-L
NRM	13	NRM	WMP	WESTERN	15	8	A-O
OPP		CP	DEMP	ALL	1	1	NO LOTTERY
OPP	14	DP	DEMP	ALL	7	4	A-G
OPP	15	FDC	DEMP	OTHER (NOT EAST)	6	3	A-F
OPP	16	FDC	DEMP	EASTERN	7	4	A-G
OPP	17	FDC	WMP	ALL	9	5	A-I
OPP		JEEMA	DEMP	ALL	1	1	NO LOTTERY
OPP	18	UPC	DEMP	ALL	5	3	A-E
OPP	19	UPC	WMP	ALL	2	1	A-B
TOTAL					185	103	

[Note that there are no lotteries for JEEMA or CP as they have only 1 registered MP each.]

Note: If additional MPs volunteer for lotteries then they may be added to the appropriate lottery group *before* the lottery takes place. The "number to be selected" will not change. So for example the Lottery 1 target might change from 3/5 to 3/6 if an extra member is added. All extra members must be listed on the lottery sheet.

PROCEDURE

1 BEFORE THE LOTTERY:

Equipment:

Two large flip charts;

1. Small envelopes (200),
2. Markers,
3. Labels with printed letters (A – Z)
4. A large bag
5. Camera
6. Video recorder

Tasks:

1. For each lottery on each day first identify from Table 1:
   a. How many people in the lottery = Number of envelopes and number slips you need
   b. How many are to be selected
2. Then prepare the set of envelopes for that lottery.
3. Prepare a recording sheet on the flip board. The recording sheet should look as follows:

Sample <u>Pre-Prepared</u> Flip Chart Page for Lottery 1

LOTTERY NUMBER: 1	**DATE**: 2 December 2011	**NUMBER TO BE SELECTED**: 3
NAME OF LOTTERY: Independents, Constituency MPs from Central Region		
ORDER SELECTED	**CODE**	**MP NAME**
____	A	Nsanja Patrick K. Mabirizi
____	B	Ssempijja Vincent Bamulangaki
____	C	Mpuuga Mathias
____	D	Kaddumukasa Ssozi Jerome
____	E	Kiyingi Bbosa Kenneth Joseph

2 THE LOTTERY

1. **Start the video recording, video should capture the group in attendance, the drawing of lots and the flipboard.**

2. **Introduce the general lottery:**

   Script: *NDI is working with parliament* ***to pilot the PCS system to support MP-constituency communication. 103 MPs are to be selected to take part in the pilot in the coming days. A*** *fair lottery*

approach is being used to select MPs to take part in the pilot PCS program. The lottery is designed to ensure that all MPs have the same chance of being selected (approximately 56%) but also to ensure that there is equal (proportionate) representation of all parties as well as of both constituency and district MPs and across regions. Besides being fair, an advantage of the lottery approach is that it will help us in better estimating the usefulness of the PCS system by comparing how things work for those that take part in the pilot relative to those that do not.

To do this 19 separate lotteries will be held over the coming days, each one grouping together MPs of the same type, party and region. For example lottery "1" is for all directly elected independents in the Central region. This approach ensures that no party, MP type, or region end up unfairly represented in the system.

3. **You should introduce each lottery with a Script as follows**:

   Script: *The next lottery is for all (type of MP) from party (X) in region Y (if applicable). There are X MPs in this group from which Y will be selected.*

   Example*: The next lottery is for all independent MPs representing constituencies in Central Region. There are 5 MPs in this group from which 3 will be selected.*

4. **Implement the lottery for each bin (do every bin in the set whether or not any MPs from the list are present):**

   Script*: I have here X envelopes, each one containing a letter between A-X. You will see also that I have on this flipboard the names of the MPs in this lottery; these names are in random order and each one has a letter beside it. I will now place these letters in this bag and give it a good shuffle and then ask X to start selecting envelopes at random. The first X envelopes selected will be the ones to take part in the lottery.*

   Script Example*: I have here **5** envelopes, each one containing a letter between **A-E**. You will see also that I have on this flipboard the names of the MPs in this lottery; these names are in random order and each one has a letter beside it. I will now place these in this bag and give it a good shuffle and then ask Anas to start selecting envelopes at random. The first 3 envelopes selected will be the ones to take part in the lottery.*

   1. Place the envelopes in the bag. Shuffle very visibly; ask everyone if they agree that they are well shuffled!
   2. Have someone take them out one at a time.
   3. When the first one is taken out mark "1" on the flipboard beside the letter chosen.
   4. When the second one is taken out mark "2" on the flipboard beside the letter chosen.
   5. Continue in this manner.
   6. When you reach the target number, **pause** and place an ✘ beside all the people selected. Clarify that these are the ones that have been selected.
   7. Then continue selecting an numbering until all letters are taken from the bag – note: this process confirms to everyone that each MP did indeed have only one letter in the bag.

Sample Completed Flip Chart Page for Lottery 1

LOTTERY NUMBER: 1	DATE: 2 December 2011	NUMBER TO BE SELECTED: 3
NAME OF LOTTERY: Independents, Constituency MPs from Central Region		
ORDER SELECTED	**CODE**	**MP NAME**
1 ✘	A	Nsanja Patrick K. Mabirizi
5	C	Ssempijja Vincent Bamulangaki
2 ✘	D	Mpuuga Mathias
4	E	Kaddumukasa Ssozi Jerome
3 ✘	F	Kiyingi Bbosa Kenneth Joseph

5. **After the lottery for each bin:**
   Photograph the flipboard! Photograph the flipboard! Make sure your photo is readable.

6. **Proceed to next lottery bin**

3 WHEN FINISHED WITH ALL LOTTERY BINS:

a. Thanks all participants
b. Stop videotaping
c. **Make sure that you have photographs of all results, store them immediately and email to the research team.**
d. Store the flipboards in a safe location
e. **Write up a description of ANYTHING UNUSUAL that happened. In particular if there were any attempts or suspected on any side to alter the outcomes of the lottery. Needless to say it is critical that no one yields in to pressure for inclusion in this!**

********** End of Protocols **********

3.6 Treatment Scheme

Figure 5: Treatment Scheme Example

District Code	District Name	District Type	MPs	Number of MPs	Month	Price	Feedback
1	APAC	MIXED	AJOK LUCY & AKORA MAXWELL EBONG PATRICK & AYOO TONNY	3	1	FREE	NONE
1	APAC	MIXED	AJOK LUCY & AKORA MAXWELL EBONG PATRICK & AYOO TONNY	3	2	FULL	NONE
1	APAC	MIXED	AJOK LUCY & AKORA MAXWELL EBONG PATRICK & AYOO TONNY	3	3	FULL	NONE
1	APAC	MIXED	AJOK LUCY & AKORA MAXWELL EBONG PATRICK & AYOO TONNY	3	4	FREE	SCHOOL + USERS
1	APAC	MIXED	AJOK LUCY & AKORA MAXWELL EBONG PATRICK & AYOO TONNY	3	5	FULL	NONE
1	APAC	MIXED	AJOK LUCY & AKORA MAXWELL EBONG PATRICK & AYOO TONNY	3	6	FREE	SCHOOL
2	ARUA	OPP	OKUONZI SAM AGATRE & WADRI KASSIANO EZATI	2	1	FULL	NONE
2	ARUA	OPP	OKUONZI SAM AGATRE & WADRI KASSIANO EZATI	2	2	FREE	NONE
2	ARUA	OPP	OKUONZI SAM AGATRE & WADRI KASSIANO EZATI	2	3	FULL	NONE
2	ARUA	OPP	OKUONZI SAM AGATRE & WADRI KASSIANO EZATI	2	4	FREE	SCHOOL + USERS
2	ARUA	OPP	OKUONZI SAM AGATRE & WADRI KASSIANO EZATI	2	5	FREE	NONE
2	ARUA	OPP	OKUONZI SAM AGATRE & WADRI KASSIANO EZATI	2	6	FULL	SCHOOL
3	BUNDIBUGYO	NRM	NTABAZI HARRIET	1	1	FULL	NONE
3	BUNDIBUGYO	NRM	NTABAZI HARRIET	1	2	FREE	NONE
3	BUNDIBUGYO	NRM	NTABAZI HARRIET	1	3	FREE	NONE
3	BUNDIBUGYO	NRM	NTABAZI HARRIET	1	4	FULL	SCHOOL
3	BUNDIBUGYO	NRM	NTABAZI HARRIET	1	5	FULL	NONE
3	BUNDIBUGYO	NRM	NTABAZI HARRIET	1	6	FREE	SCHOOL + USERS
5	GULU	MIXED	OULANYAH JACOB L'OKORI & ACIRE CHRISTOPHER	2	1	FREE	NONE
5	GULU	MIXED	OULANYAH JACOB L'OKORI & ACIRE CHRISTOPHER	2	2	FULL	NONE
5	GULU	MIXED	OULANYAH JACOB L'OKORI & ACIRE CHRISTOPHER	2	3	FREE	NONE
5	GULU	MIXED	OULANYAH JACOB L'OKORI & ACIRE CHRISTOPHER	2	4	FULL	NONE
5	GULU	MIXED	OULANYAH JACOB L'OKORI & ACIRE CHRISTOPHER	2	5	FREE	SCHOOL
5	GULU	MIXED	OULANYAH JACOB L'OKORI & ACIRE CHRISTOPHER	2	6	FULL	SCHOOL + USERS
6	HOIMA	NRM	KAAHWA TOPHACE BYAGIRA	1	1	FULL	NONE
6	HOIMA	NRM	KAAHWA TOPHACE BYAGIRA	1	2	FREE	NONE
6	HOIMA	NRM	KAAHWA TOPHACE BYAGIRA	1	3	FULL	NONE
6	HOIMA	NRM	KAAHWA TOPHACE BYAGIRA	1	4	FREE	SCHOOL + USERS
6	HOIMA	NRM	KAAHWA TOPHACE BYAGIRA	1	5	FULL	SCHOOL
6	HOIMA	NRM	KAAHWA TOPHACE BYAGIRA	1	6	FREE	NONE

4 Descriptive Stats

Table 3: **Summary Statistics (Endline Citizen Survey)**

Statistic	N	Mean	St. Dev.	Min	Max
uSpeak Treated	1,748	1.243	0.429	1	2
uSpeak Survey Category	1,748	0.757	0.429	0	1
Probability of Assignment	1,748	0.664	0.130	0.500	0.861
Gender	1,748	0.499	0.500	0	1
Education	1,748	1.556	1.027	0	5
Average Monthly Income	1,655	2.454	2.593	0	10
Relative Economic Status	1,730	2.644	1.175	1	5
Knowledge of uSpeak	1,748	0.223	0.416	0	1
Knowledge of uSpeak by constituency	1,614	0.636	1.099	0	3
Influence: President	1,681	2.393	1.194	1	4
Influence: MP	1,705	2.724	1.157	1	4
Influence: LC5	1,702	2.771	1.156	1	4
Influence: Clan Leader	1,629	2.888	1.134	1	4
Influence: Kingdom	1,358	2.528	1.187	1	4
District	1,748	27.415	14.882	2	53
Phone Ownership	1,620	0.386	0.487	0	1
uSpeak too complicated	1,622	0.515	0.500	0	1
uSpeak too expensive	1,608	0.386	0.487	0	1
Other ways to contact reps	1,624	0.270	0.444	0	1
Bad Consequences	1,622	0.252	0.434	0	1
Never hear back	1,633	0.453	0.498	0	1
No Phone	1,620	0.386	0.487	0	1
Prefer to leave to others	1,640	0.288	0.453	0	1
Radio Listenership	1,741	3.078	1.272	0	4
Radio Ownership	1,744	0.737	0.440	0	1
Satisfaction with MP	1,684	2.513	1.110	1	4
Satisfaction with President	1,717	3.214	0.938	1	4
Satisfaction with local government	1,686	2.689	0.990	1	4
Political Participation: Index	1,748	0.022	0.606	−1.785	3.202
Participation: Discuss with others	1,739	2.725	1.042	1	4
Participation: Community Meeting	1,740	2.338	1.046	1	4
Participation: Letter	1,743	1.427	0.800	1	4
Participation: Talk to Leaders	1,743	2.074	1.059	1	4
Participation: Talk to District Leaders	1,740	1.534	0.858	1	4
Participation: Talk to MP	1,740	1.408	0.779	1	4
Participation: SMS to official	1,739	1.245	0.651	1	4
Participation: Call official	1,739	1.329	0.720	1	4
Participation: Sign a Petition	1,730	1.225	0.632	1	4
Participation: Protest	1,734	1.202	0.599	1	4
Inverse Probability Weighting	1,748	1.883	0.888	1.161	4.821
Knowledge of uSpeak by Constituency: Binary	1,614	0.283	0.450	0	1
Wealth: Binary	1,655	0.338	0.473	0	1
Education: Binary	1,748	0.487	0.500	0	1

5 Accounting for Compliance

In this section we discuss the approach we used to further our understanding of where and when the treatments (radio advertisements with price information) were delivered in practice. This analysis is important for testing the extent to which treatment compliance, as defined in the main text, can help account for the divergent results between the controlled experiment and the scaled-up nationwide program. We focus on the following analyses:

- **Adherence to randomization:** We analyze radio monitoring data collected by a private company we hired (Synovate Media Monitoring) to check the actual recorded times at which radio ads aired against the intended schedule and price treatment assignments.
- **Listenership in our survey data:** In addition we analyze data collected via an endline survey of a national representative sample of constituents. Findings from that survey allow us to examine whether Ugandans are likely to listen to the radio stations the marketing firm used to air the radio ads. Specifically, we measure, for each MP, the share of constituents who reported listening to the radio station that delivered treatments. This measure relies on about 36 observations per constituency, so admittedly this is a relatively noisy measure of coverage and listenership within constituencies.

5.1 Radio Monitoring Data

As mentioned we also analyzed data collected by a private firm, synovate, which the research team had hired to examine radio stations' compliance with their contractual obligation to play certain ads at specific times. Synovate's radio monitoring data covers radio stations operating in 50 districts across Uganda, and for 4 of the total 6 months of the intervention. Of the radio advertisements monitored by Synovate, 99.72% of the ads were aired on time and in their entirety. Of the 50 districts monitored, 44 had no problems at all with airing of advertisements over the 4 months for which we have data. We conclude that the low uptake in the nationwide program could not be because of failure to ensure the delivery of the treatments.

In our main analysis we found that men were significantly more likely than women to send messages to their elected representative using uSpeak. We use the endline survey data to also test whether the gender gap in participation could be driven, in part, by differences in the radio stations that are most listened to, and therefore in exposure to treatment. 7 shows the relative distributions of self-reported listening patterns across gender groups. Importantly, we find no significant difference in the rates at which men and women were likely to listen to the radio stations that had played the uSpeak ads.

5.2 Listenership in our survey data

In the endline survey of constituents, we asked respondents to list the three stations they listened to most frequently. We then matched survey responses with the list of radio stations that NDI contracted to deliver the uSpeak radio spots that advertised the new service. We find that the radio stations used by the marketing firm were listed by 38% of surveyed constituents (see Figure 6). The fact that 62% of respondents did not list the uSpeak marketing radio station among their top three most popular stations, may explain a share of the weak first stage. We note that subjects may still have been exposed to these ads even if they were not among their top 3, since the chosen radio stations were not unpopular and the ads were played frequently.

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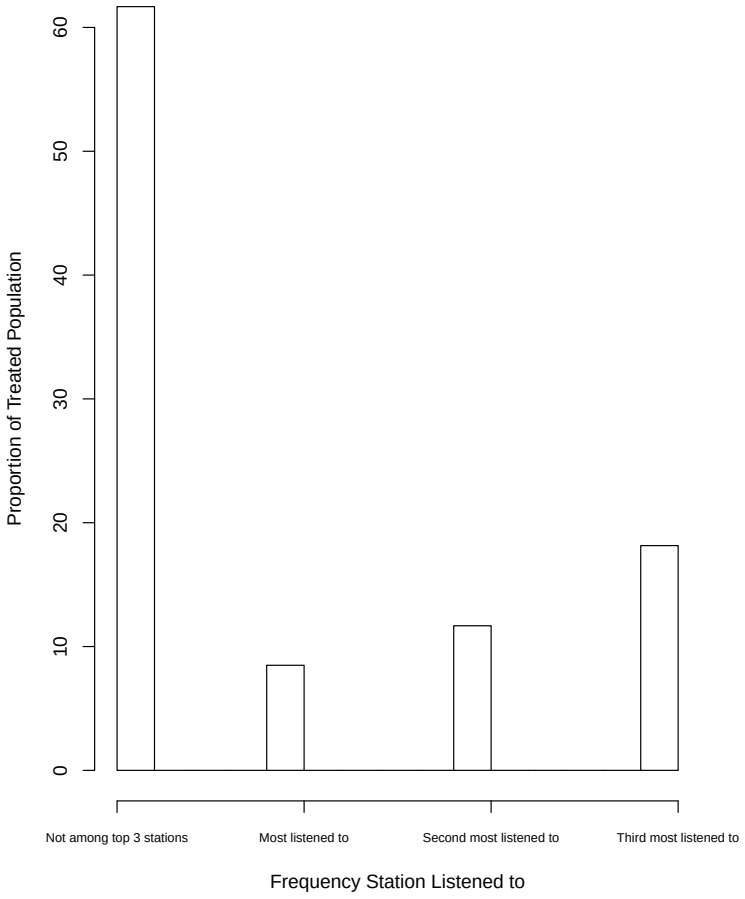
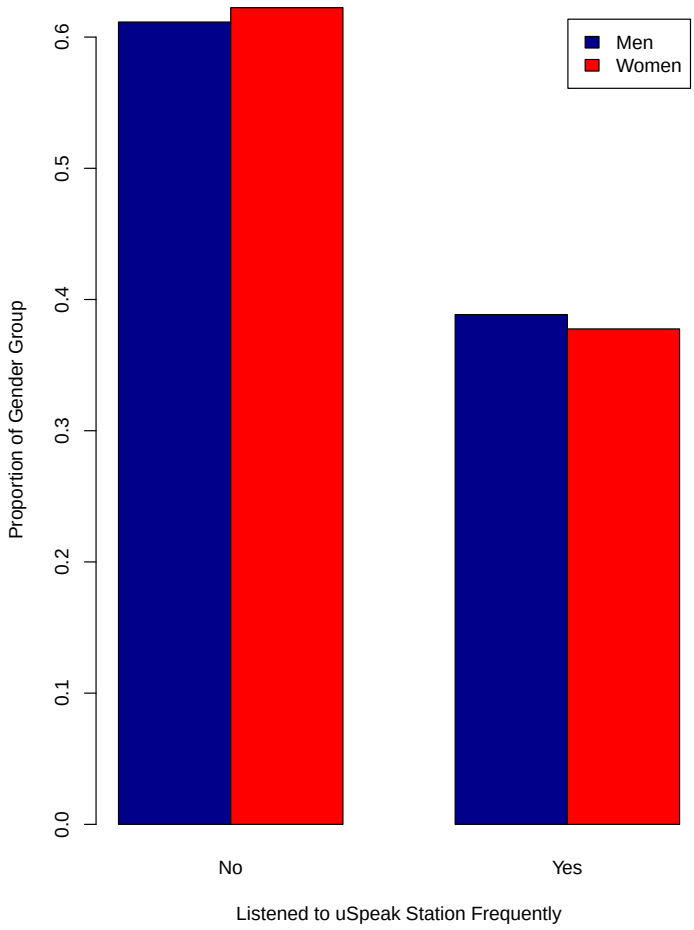
Figure 6: **Relative popularity of uSpeak radio stations**



Note: The figure displays information culled from the endline citizen survey on the correspondence between the radio stations that were hired to play uSpeak ads, and respondents' most frequently heard radio station. 62 of respondents did not list the uSpeak marketing radio station among their top three most popular stations. Among the 38% of respondents who reported listening to the uSpeak station frequently, the uSpeak station was more likely to be their second or third most popular station.

Figure 7: **Listenership by Gender**



Note: Radio Listenership by Gender. Source: citizen endline survey.

6 Differences between FFE and NFE

In Table 4 below we summarize the main differences between the controlled experiment that was led and implemented by the research team and the nationwide scaled-up intervention, which was implemented by NDI and the Ugandan Parliament.

Table 4: **Differences Across Controlled Experiment and the Scaled-Up Intervention**

		Pilot	**uSpeak**
Subject Population		Randomly selected individuals, drawn in equal numbers from each constituency in Uganda	Voters with access to radio in constituencies where the MP volunteered for the pilot program (186/350 constituencies)
Treatment Frequency		Single interaction	6 months, 2 times per day
Treatment Variation		Across subjects	Across constituencies and months
Treatment Mode		In-person introduction	Radio Ads
Variation	*Access*	x	x
	Price	x	x
	Feedback		x
Hypotheses	*Access*	x	x
	Price	x	x
	Users	x	x
	Political Efficacy		x
	Political Satisfaction		x
Data	*User callback survey*	x	x
	Individual-level baseline survey	x	x
	Messages	x	x
	Individual-level endline survey		x

7 Mechanism Experiment: UBridge

UBridge was designed to open a new channel of communication from citizens to district local government officials to specifically report public service deficiencies. Based in the Arua district, it is a voluntary program, where citizens actively register to participate in the sending and receiving of text-messages. Using the UBridge technology, citizens can engage with Arua district government officials in three ways. First, they can send unsolicited anonymous messages to the UBridge short code, at *no cost*. District officials, in both technical and political positions, are equipped with 3G tablets that enable them to access the messages anywhere, provided they have Internet access. Second, citizens can respond to short weekly polls (usually a single question) solicited from UBridge registered members by the research team. The polls are conducted on weekends using a robocall system operated by VotoMobile. Third, citizens have an opportunity to attend community meetings, implemented and organized by GAPP, where they received information about national service standards, the performance of their own district and community, and learn about the actions they can take to communicate with local officials. The first round of meetings was held by GAPP in September to October 2014 as part of the service launch.

At the time of our 'mechanism' experiment there were 4,568 UBridge registered users, the majority (3,947) selecting into the program through a door-to-door registration campaign that took place between October and November 2014 (all such users have provided explicit consent to participate in the program). An additional 373 users registered following GAPP's community meetings, where sign-up sheets were passed between attendees. Finally 248 system users have registered with UBridge independently; for example, by following registration instruction on flyers that were distributed in cluster areas during the registration campaigns and the community meetings.

In order to verify which of the UBridge registered numbers are valid, a team of local enumerators was hired by UBridge to personally call registered numbers. The enumerators, who called each number up to three times, were able to positively verify $2,810$ mobile numbers: out of which 2,335 completed the survey, 75 began talking to one of the enumerators but the phone disconnected before the poll was completed, and 400 refused to complete the phone survey. Additional $1,750$ numbers were not 'purged out' of the system since they at least answered the phone in one of UBridge's past weekend polls, for a total of 4,568 UBridge registered users. The verification exercise was completed on June 8, 2012.

7.1 Messages

The experiment entailed randomly selecting the pool of registered users into two treatments groups: a control group that received general (placebo) text-messages, and a treatment group that received the following three encouragement messages in advance of the second UBridge poll:

- SMS 1: Please look out for Friday's poll! Knowing the opinions of people from [constituency] is very important to ensure politicians make the right choices.
- SMS 2: We have just selected you to participate in Friday's poll and we strongly encourage you to respond to it. Let your voice be heard!
- SMS 3: Remember we selected you specially to participate in today's poll and we strongly encourage you to respond to it. Let your voice be heard!

Then all voters received the same polling question:

> Voter Poll: Many people in Arua have been receiving SMS messages and polls from 8500 UBridge as part of an effort to improve communication between citizens and district officials. Results of these polls are shared with Arua district local government officials and with your MP. Uganda's national budget for 2015/2016 is currently being debated in Parliament. Part of government financing comes from taxes collected from ordinary citizens, through for example taxes on imports and on goods and services. In your opinion, is the tax collected from ordinary citizens too low, about right, or too high? Press one for too low, Press 2 for about right or press 3 for too high.

> UBridge would like to remind you that you can SMS 8500 any time and report service provision issues to your local government. The service is at absolutely free! Thanks for your participation in this survey.

All subjects receive the voter poll. In addition, treated subjects receive SMSs 1 and 2, both two days before and one day before the poll and they receive SMS 3 the morning of the poll. We report the results of this experiment in the main text.

Summary results were shared with MPs from Arua district after the poll was conducted. We highlight that the intervention and poll involved no deceit and were implemented with subjects that are consented into the panel. IRB approval has been obtained from all participating universities.

8 Flattening: Differential uptake by marginalized groups

In the main text we focused on explaining the overall low uptake witnessed in the scaled-up national experiment, especially when compared to the (relatively) high demand observed in the FFE. We now build on the theoretical framework developed above (and summarized in Table 2) to explore some of the reasons that may account for the lack of "flattening" effect; namely, that when brought to scale, marginalized populations used the ICT platform to articulate interests at significantly lower rates as compared to more powerful populations.

Scale effects and differential uptake

Returning to the logic described in the text, scale can affect not simply per capita information provision but also the profiles of providers. Most simply, reduced flattening could result from increases in scale if substitution effects were stronger within more marginalized groups.[2] While a theoretical possibility, the generally weak evidence for any scale effects suggests it is unlikely that scale could explain differences in flattening.

Differential Uptake: Agent effects

It is also theoretically possible that agent effects explain the differences in flattening effects. This could arise if marginalized voters are more doubtful of government willingness to engage and are encouraged more by the presence of NGOs. As NGOs often provide services to marginalized communities where governments fail to prove, this explanation has face validity. The data reported in Figure 5 of the main paper (top row), do not bear this out however. Although less educated voters were marginally more likely to doubt MP responsiveness, the difference is not large and trends in the opposite direction for poorer citizens.

Differential Uptake: Treatment compliance

Recall that to test for compliance effects, we asked respondents in our endline survey whether they have ever heard about uSpeak. Treatment compliance can help account for differential uptake if more marginalized populations have lower awareness of the new political communication service. Figure 8 thus breaks down the overall awareness of uSpeak by sex, education, and wealth. The figure demonstrates clearly that, marginalized groups, such as women, less-educated, and less well off groups (denoted in black), are significantly less likely to be aware of the uSpeak program, compared to less marginalized groups (denoted in gray). We note that these differences are least pronounced for education.

To further assess whether a treatment compliance effect can be responsible for the large gaps in participation, we asked survey respondents about radio ownership. Starting with gender gaps, we find that 0.71 of female respondents reside in a household that owns a radio in good working condition, compared to 0.76 of men. Since owning and listening to radio are distinct, we further asked our representative sample about their

[2]In the model, marginal gains from providing more information can be weaker for more marginalized groups and in some cases can be weaker the more informed politicians are about other groups.in principle, information provision from other groups may differentially reduce the incentives for marginalized groups to provide information, leading to a reduction in flattening. There are conditions however in which this cross partial can take the opposite sign, resulting in an ambiguous prediction.

frequency of radio consumption on a five-point scale (from "never" to "daily").[3] Figure 8, which provides information on the distribution of responses broken down by gender, indicates that women listen to radio much less frequently than men. Moving to another form of marginalization, poverty, we find that poorer respondents were only marginally less likely to have heard of uSpeak though they were significantly less likely to listen to the radio (see also Supplemntary Materials, Section 4.2).

While we have demonstrated above that treatment compliance cannot fully account for the difference in take-up rates between the NFE and FFE, the findings reported in Figure 8 provide evidence of treatment compliance effect as one explanation for the relatively low participation rate of marginalized groups in the uSpeak program.

Design Effects II: Invitational effects and differential uptake

In our final analysis we assess whether 'invitational' effects can help account for the differential uptake across more or less marginalized groups. The intuition is that personal invitation to participate in politics may have a larger marginal effect for marginalized populations who may have, on average, lower political (internal) efficacy to begin with.

Recall that to assess the role of invitations in political communication we implemented a third "mechanism" experiment, using an existing political IT communication platform, UBridge. Recall also that in this experiment our key outcome of interest is whether UBridge users responded to an opinion poll. It is important to note that in implementing the "mechanism" experiment, we were limited by the amount of information we had on registered UBridge users. Specifically, the only marginalization information the research team had on UBridge users is their gender.

Consistent with past findings demonstrating gender gaps in participation in Africa, we find that, at baseline, 6.6% of women responded to the poll compared to 12.3% of men. Thus in the baseline setting in which ICT is used to communicate with elites one's preferences, but invitations are weak and impersonal, we find evidence of a large and significant gender gap in participation, similar to the one observed in the uSpeak program.

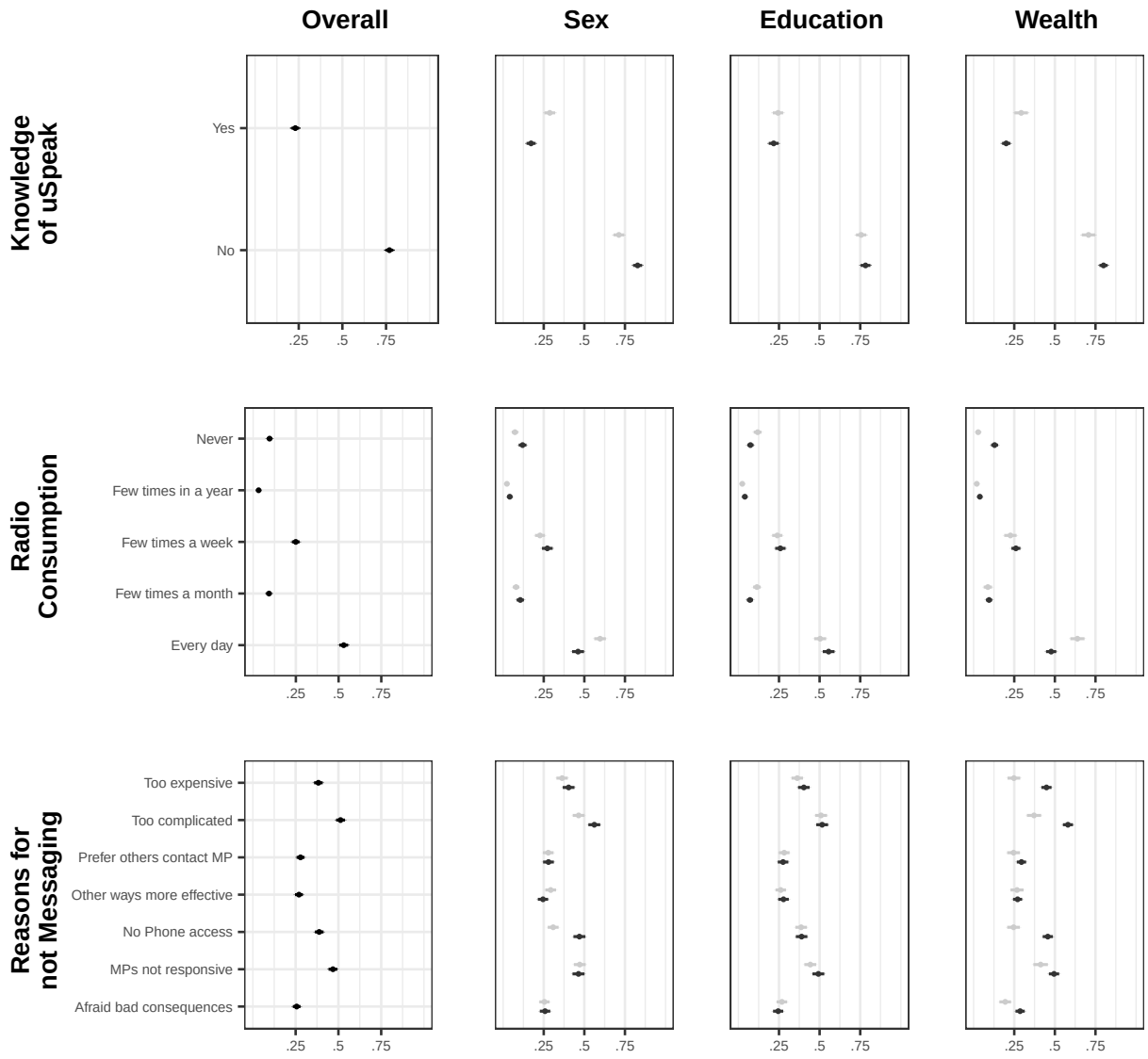
Moving to the experimental setting, we begin with a simple cross-tabulation of the raw data by treatment and gender for our verified users subsample. We find that in the control condition, the response rate of registered male users was almost double that of female users (11.2% as against 5.7%). Moving to the personalized invitation treatment, for both male and female UBridge registered users, overall response rate has increased by about 2 percentage points (13.4% against 7.5%). In order to more formally test whether there is a differential effect of the invitational treatment by gender we implement analyses pre-registered at EGAP's registration web page.[4] Results, reported above in Table **??** (columns 2 and 3), confirms that the invitation effect was almost identical across men and women.

We conclude that though personal invitations can have a powerful effect on rates of participation, there is no evidence here that they have a differential effect by gender. It remains to be explored in future work whether invitational effects have a differential effect for other forms of marginalization.

[3]The question verbatim was: *How often do you get news from the following sources?*.

[4]Note the primary and secondary analyses are as well registered. The base column (1) is added to provide information on the unconditional invitation effect; i.e., without including heterogeneous gender effects.

Figure 8: Possible causes for non-engagement across population categories



Note: Differences between more privileged (grey dots) and more marginalized (black dots) respondents in possible reasons for not engaging with USpeak. Means and 95% confidence intervals, N= 1436)