Using Communications Technology to Promote Democratic Participation: Experimental Evidence from South Africa

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Abstract

We present a national-scale effort to use technology to promote political participation in an emerging democracy, South Africa. A multi-channel digital platform registering over 90,000 South African citizens conducted opinion polling, crowdsourced information on electoral activities, and enabled citizen monitoring of polling places during the 2014 general election. Different channels display starkly distinct demographic profiles and patterns of engagement. Sequential experiments with randomized extrinsic incentives illustrate complementarity with the intrinsic engagement of citizens to participate on the platform. Our results illustrate how low-cost communications technology can ethically be used to promote political participation.

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1 Introduction

Mobile technology has become a major driver of the way in which democratic elections are conducted worldwide. From the influence of new media coverage on elections (Prior, 2005) to technology's coordinating role in the development of fragile democracies (Fafchamps, Vaz and Vicente, 2020; Shirazi, Ngwenyama and Morawczynski, 2010; Tufekci and Wilson, 2012), there is no question that information and communications technology (ICT) is now a central force in the democratic process. Much of this change is positive: ICT provides new means for citizens to monitor bureaucrats (Banerjee et al., 2020), a new vehicle to understand the political process (Tufekci, 2014), and even a means to improve the conduct of elections themselves (Callen and Long, 2015). However, in recent years more attention has swung to the downsides of this change, including the potential of the echo chamber of new media to suppress voting in developed countries (Falck, Gold and Heblich, 2014; Gavazza, Nardotto and Valletti, 2019) as well as the propagation of misinformation and the amplification of extremist voices in political dialogue (Allcott and Gentzkow, 2017; Gorodnichenko, Pham and Talavera, 2021; Morozov, 2011; Rid, 2020), potentially leading to violence (Pierskalla and Hollenbach, 2013). Particularly given a recent observational literature suggesting that ICT may actually have increased participation in developing countries (Donati, 2019; Manacorda and Tesei, 2020), rigorous evidence from the Global South is critical.

In this paper we report on the results of a mass-scale effort to drive positive forms of participation in the 2014 South African general election using a novel combination of ICT tools. To test the ability of technology to promote engagement, we built a multi-channel platform called VIP:Voice that was accessible from a range of devices including a simple feature phone interface, two of South Africa's major homegrown social media networks, and connections to international social networks such as Twitter and Google Chat. We promoted the platform by sending out 50 million text messages and then conducted a series of subsequent participation experiments using the 90,000 participants who registered on the system. We aggregated polling data and distributed it through the platform, but did not allow users to post content directly. By building links to social media platforms but then strictly controlling the dissemination of information, we sought to understand how to induce constructive engagement in the electoral process while prohibiting the dissemination of misinformation. The two main contributions of the paper are a) the descriptive effort to build a national-scale platform to support electoral transparency, and b) analysis of a series of embedded incentivization experiments that let us speak to the dynamic relationship between subsidies and the intrinsic motivation to participate in political activity.

From a policy perspective, we may hope for ICT to engender a number of specific forms of democratic engagement. First, opinion polling on mobile phones can reach a mass audience and achieve more representative results (Rivers and Bailey, 2009), particularly in countries with poor landline penetration, and lacking registries of mailing addresses (Hoogeveen et al., 2014). Second, given the recent ubiquity of mobile phones even in some of the poorest countries on earth, ICT is a natural conduit for Get Out the Vote (GOTV) efforts (Grácio and Vicente, 2021; Green and Gerber, 2019). Third, a recent literature has shown how citizens armed with mobile phone apps are able to monitor polling places on election day, ensuring that the electoral commission records vote tallies in line with those posted on the ground (Callen et al., 2016). Finally, crowdsourcing techniques can be used to permit reporting of irregularities such as violence or vote-buying, providing a geographic reach difficult to achieve with professional election monitors (Findley et al., 2012; Van der Windt and Humphreys, 2016).

Our results demonstrate the promise of pro-participation ICT interventions to reach mass scale, but also show the fragility of participation as individuals move from relatively costless forms of digital participation into more costly real-world engagement with elections, such as voting or monitoring their polling places. Beginning from over a quarter million initial contacts with our platform, participation drops with every step of engagement; over 90,000 individuals sign the Terms and Conditions of the platform and complete registration, almost 35,000 provide demographic and prior voting information, 16,600 provide additional information via opinion polling or reporting of political events in the runup to the election, 2,500 volunteer to monitor their polling places on election day, 330 actually do so, and 11,000 provide information on voting conditions on election day. Hence, the platform recovers impressive numbers of citizen reporters, but also suffers attrition on the order of 50% for every additional action that users are asked to take.

The demographic profiles of users across different technology channels are starkly different; almost two-thirds of users on standard flip phone channels are Black women, while users of social media channels are predominantly male and higher fractions are Coloured (the South African term for mixed-race individuals), while Twitter slants towards white and Asian users. Hence, the details of the choice of technology channel have dramatic effects on the profile of users. Daily opinion polling in the weeks before the election shows that different channels have non-representative political preferences in a manner that is predictable based on demographics, but given the rich variety of user types across the channels we would be able to weight them so as to achieve representativeness in concert with the high-frequency of real-time ICT-based opinion polling. Our unique effort to field a comparable platform across multiple channels allows us to speak in a very straightforward way to the linkage between technology, user profiles, and the types of data that such platforms can recover.

We implemented a sequential set of incentive experiments that let us speak to the complex interplay of extrinsic and intrinsic motivation in the provision of political participation in a novel applied context. In this environment, intrinsic motives are the set of factors that induce individuals to participate in the platform or the political process in the absence of any incentivization, and the extrinsic incentives are provided through the platform in the form of free airtime, lottery incentives, and direct payments to serve as Citizen Monitors. The behavioral literature has long pointed out the potentially corrosive effect of financial incentives to undertake a task in context where individuals were already intrinsically motivated to do so (Benabou and Tirole, 2003; Gagné and Deci, 2005; Gneezy and Rustichini, 2000). Extrinsic incentives undermine the motivation to engage in pro-social activities if agents wish to be seen to be "doing good rather than doing well" (Ariely, Bracha and Meier, 2009), and have even been shown to color the way that individuals assess political candidates (Isbell and Wyer, 1999) and vote (Gonzales, León-Ciliotta and Martínez, 2022). We move this mostly lab-based conversation to the field by asking individuals to engage in a number of pro-social activities (volunteering data on themselves and the political environment in the run-up to the election, serving as Citizen Observers at their polling places on election day), with randomization both in the incentives to come on the platform in the first place and of the incentives to engage in subsequent, high-cost behavior. We have three different ways to consider how extrinsic motivation intersects with the inherent desire to participate in the political process. First, a number of lab experiments have found that small monetary incentives actually *discourage* participation (Gneezy and Rustichini, 2000) and only larger incentives are net positive. Because we offer only small incentives, if this were the case in our real-world context we would find lower participation in the incentivized arms. Second, we have randomized variation on the extensive margin arising from the fact that some of our user groups (particularly the Lottery USSD group) register at higher rates because of initial extrinsic motivation, and hence we can ask how this different composition of users then drives subsequent intensive margin sensitivity to incentives. Finally, we can use the response to our initial Engagement question on a user's level of intrinsic motivation around the election to examine heterogeneity in the response to extrinsic motivation based on the level of inherent political engagement.

Overall, we find several distinct pieces of evidence suggesting that intrinsic and extrinsic motives are complementary in this context. Small incentives never depress participation and only (weakly) enhance it, suggesting that extrinsic incentives are not crowding out inherent motives. We find that those who initially were randomized to receive incentives to participate are more malleable, in the sense that they are more responsive to subsequent incentives for digital participation than those who joined without incentives (although this interactive effect disappears as we ask individuals to take costly real-world actions). Finally, not only do incentives have no effect on individuals who report low intrinsic motivation for political activity, but the differential effect of incentives for the highly motivated are the largest for the channels where intrinsic motivation was highest in the first place (even when we control for demographic differences across channels). In this context, extrinsic incentives do not undermine intrinsic motivation and may in fact only work for those who are intrinsically motivated. We return to a discussion of this (potentially surprising) complementarity in the Conclusion.

Finally, we examine the success of the platform in engendering actual citizen monitoring of polling places on election day. We were able to recruit citizen volunteers willing to observe 12% of the polling stations in 37% of the wards in the country. Of the 1,830 individuals we invited to perform monitoring, 332 did so. Again, the crowd-sourced approach to election monitoring displays both upsides and downsides. While we are able to achieve broad geographic presence of citizen monitors at very low marginal cost, the likelihood of recruiting a monitor in any given location is low, and the data quality of the reports submitted in the absence of any training is poor. We find extrinsic incentives to be effective at increasing both response rates and data quality for citizen monitoring, however, and a cost-effectiveness analysis suggests that on the margin, incentivized citizen monitoring of polling stations can be an attractive way to achieve scaled cross-checking of local vote tallies. Overall the project suggests a path forward in terms of ways to engineer ICT-based platforms in a manner that engenders beneficial forms of political participation without becoming a conduit for misinformation.

This study joins a growing literature trying to understand how technology can induce participation in the political process. This question is key, in that fairer elections are more likely to keep leaders accountable to the electorate (Besley and Burgess, 2002; Downs, 1957; Fujiwara, 2015; Przeworski et al., 1999).[1] The rapid adoption of ICT by citizens in developing countries represents a dramatic change in their capacity to communicate and mobilize for action (Alozie, Akpan-Obong and Foster, 2011; Bratton, 2013; Shirazi, 2008). The literature on democratic engagement has shown the promise of ICT to improve electoral integrity (Bailard and Livingston, 2014; Callen et al., 2016); crowd-source information on violence, corruption, and government performance (Cecchini and Scott, 2003; DeRenzi et al., 2011; Findley et al., 2012; Pierskalla and Hollenbach, 2013; Shapiro and Weidmann, 2015; Van der Windt and Humphreys, 2014; Weidmann and Callen, 2013); and strengthen accountability between citizens and politicians (Grossman, Humphreys and Sacramone-Lutz, 2014). The broad reach of the technology has also illustrated the ability to increase the

[1] The low cost of *gathering* data through mobile phones has led to widespread use of ICT in survey research (Vicente, Reis and Santos, 2009) and crowdsourcing (Van der Windt and Humphreys, 2016), including a very important role during the COVID epidemic when face-to-face fieldwork was impossible (Gourlay et al., 2021).

political engagement of marginalized populations such as the poor, those in peripheral regions, and women (Findley et al., 2012; Grossman, Humphreys and Sacramone-Lutz, 2014).

We also complement a rich body of policy evaluations in international development focused on governance, accountability, and transparency (Ferraz and Finan, 2008; Olken, 2007), including the opportunities and challenges of democracy promotion through electoral assistance (Hyde, 2007, 2011; Kelley, 2012). Donors and governments commit significant resources to support elections especially as an important mechanism for state-building, building inclusive institutions, and spurring economic growth in conflict-affected, transitioning societies. Problems of election administration to deliver a credible results continue to undermine many races (Donno, 2013).[2] The South African Independent Election Commission (IEC) had to hire, train, and deploy 250,000 poll workers simply to run the election. We therefore view platforms like VIP: Voice as important instruments to bolster and complement the efforts of other groups and organizations.

2 Context and Motivation

2.1 Setting: The 2014 South African Election

South Africa provides a compelling setting for a study of technology-driven political participation in an emerging democracy. It is a diverse and highly unequal country, with a technology landscape that spans a high-income urban population using technology as in the Global North, alongside a large rural population whose use of flip phones closely resembles the rest of Sub-Saharan Africa. The country is also an innovator in the use of ICT in the African context, providing strong in-country counterparts and making it an important test case for the use of ICT in democratic engagement.

1994's transformative elections brought an end to Apartheid, allowing universal franchise and energizing democratic participation on the part of the non-white majority (Johnson and Schlemmer, 1996; Reynolds, 1994). Since then, the ruling African National Congress (ANC) has won national contests with consistently wide margins, greatly outpacing its nearest competitor, the Democratic Alliance (DA); other smaller parties had not gained much traction by 2014, at the time of this study (Ferree, 2011). The ANC's dominance limits political competition, potentially discouraging participation since elections are seen as foregone conclusions. Turnout for national elections dropped nearly 30 percentage points from 1994 to 2014, with lowest rates in the youngest groups of eligible voters (Schulz-Herzenberg and Southall, 2014). But while election turnout may be in

[2] For example, the international community spent over $250 million to administer Afghanistan's 2010 election, $147 million on the 2014 election, and parliamentary and presidential elections slated for 2018-19 were each projected to cost at least $210 million (Adili and van Bijlert, 2017). The Kenyan government spent upwards of 1 billion USD to purchase a new computerized results transmission system in 2017 to guard against hacking into the commission's reporting mechanisms.

decline, South Africans have a long tradition of political activism. Demonstrations and riots were common features of the anti-apartheid era (Lodge, 1983; Lodge and Nasson, 1991). More recently, South Africans staged widespread protests against the state for its poor record of delivering basic services (Alexander, 2010; Southall, 2014). Since 2008, more than two million South Africans have participated in service delivery protests (Plaut and Holden, 2012). Thus, South Africa, like many emerging democracies, has a record of uneven political participation.

The South African Independent Election Commission (IEC) has been vulnerable to fraud and electronic results "hacking" in previous elections (Harris, 2011). Today, however, South Africa's election environment is largely viewed as free and fair and a model for other developing countries. The IEC is considered one of the best performing election commissions in Africa (Ndletyana, 2015) and citizen election monitoring is protected by law (Ndulo and Lulo, 2010). Nonetheless, in approving VIP:Voice, the IEC expressed the need to improve their administrative functioning over election duties at the country's roughly 23,000 voting stations, operated by nearly 250,000 temporary workers, given managerial and technological limitations to oversight and monitoring even in the absence of industrial-scale fraud.

In technological development, South Africa has enjoyed a tech boom in recent years. It boasts the highest cellular phone connections per capita in Africa[3] and the fifth highest internet access rate. Cell phone saturation was almost 90% in the 2011 census and has since risen to almost 100%. Web-enabled feature phones and smartphones currently have a saturation rate of 70%. More economically developed areas of South Africa have higher usage rates, as do younger and more male populations (see Table **??**). The fact that the country combines a large poor population with access to the same technology as most of the continent (flip phones) in concert with a wealthier, urban population that use smartphones and social media makes it an ideal environment for the multi-channel intervention we host. In terms of the mix of devices used by its citizens, South Africa in 2016 had a technology blend that looks like much of the rest of Sub-Saharan Africa today.

2.2 The VIP:Voice Platform

We worked with Praekelt, a South African technology firm, to design and promote a system called VIP:Voice on three distinct channels. First, it could be linked to and promoted via international social media channels such as Twitter and GTalk (Google's Talk platform, in relatively widespread use among wealthier South Africans at that time). Second, we built an interface and a promotion strategy to link into two South African social media networks. The first of these, Mxit, was the dominant indigenous social media platform at the time, with over 7 million subscribers in 2013.

[3] As of 2014, 149 connections per 100 citizens; Nigeria had 77.84 per 100 (World Bank, 2014).

The second, Mobi, was a more specialized mobile platform focusing on the youth market. Finally, and most importantly in terms of its potential reach, was a platform designed to work over feature (non-smart) phones. Because the large majority of South Africa's poor did not use smartphones at the time of the study, it was key to design an interface to work with standard handsets. We used the typical technology for these phones, which is Unstructured Supplementary Service Data (USSD). This opens a 90 second window to the user during which they can navigate through a decision tree by entering numbers on their phone and respond to prompts using either drop-down menus or free-form text responses. While USSD is less convenient to use than a smartphone app, it was in widespread use by telcom and mobile money providers and was very familiar to flip-phone users in South Africa.

While there were inevitable differences in the appearance and operability of VIP:Voice across channels, we made every effort to keep the user experience as similar as possible. The most technologically sophisticated channels (those that required feature or smartphones) were also the easiest to use; in contrast, the more rudimentary SMS/USSD channel, available on even the most basic phones, was the clunkiest. Difference across these channels thus operationalize the concept of technology change: the SMS/USSD channel represents a high cost/hard to use technology channel and Mxit or Twitter represents a low cost/easy to use technology channel. This range of user costs is relevant to the technology landscape in many developing countries today feature a similar range of user devices, with poorer citizens interacting with ICT using channels that impose higher costs than internet-enabled smartphones.

2.3 Research Design

The operation of the platform took place in three distinct phases that transpired over the course of 40 days in April and May of 2014 (the platform launched on April 7th, and the election was May 7th). These phases were: (1) promotion of the VIP:Voice and user registration in VIP:Voice; (2) surveys of political engagement, voter preferences, and electoral issues in the run-up to the election; (3) inducement to participate as an election monitor on election day, as well as surveys of voting and voter experience on and after election day. Phases 1 and 2 can be considered periods of low-cost,"digital" participation (ICT recruitment in Phase 1 followed by digital engagement with ICT in Phase 2), and Phase 3 is high-cost, "real-world" participation. Figure **??** provides a summary timeline of the sequence of phases relative to election day, and Figure 1 displays the research design of the overall project, showing the temporal division of the study into phases with blue lines representing experiments, including incentives to register in Phase 1 and additional experimental components in Phase 3.

2.3.1 Phase 1: ICT Recruitment

In Phase 1, starting on April 7, 2014 (one month before the election), we began recruitment of citizens into VIP:Voice. Unlike the large number of ICT studies that rely on pre-drawn samples, we attempted to recruit a user pool entirely by digital means. To reach the largest possible group of potential participants in Phase 1, we focused heavily on SMS/USSD interactions, which have the widest penetration, including in rural areas where other digital media did not have the same reach. We recruited people to this channel primarily through advertising with so-called "Please Call Me" (PCM) messages. Facilitated by telecom providers, South Africans send an average of 14 million overall unique PCMs per day. Senders text a PCM to a recipient, requesting a return phone call. The recipient of a PCM sees the number requesting a call as well as an ad. Advertisers pay for PCMs, not senders. As far as we know, VIP:Voice is the first major platform of its kind to use PCMs as a recruitment tool. We purchased ad space for VIP:Voice for 49.8 million PCMs.

The PCM outreach was used to conduct an experiment in user recruitment. The "standard" arm encouraged registration but required users to pay full messaging costs; the "free" arm removed the user fees so that interaction with the platform bore no cost, and the "lottery" arm offering a chance to win R55.[4] See Appendix **??** for the exact text of the PCM message in English, Afrikaans, and Zulu. Within the USSD channel, then we have an extensive margin experiment in terms of user groups that were engaged with different extrinsic incentives, and then retained different costs for some parts of their subsequent interaction with the platform (to be described in more detail in Phase 2).

We also anticipate the cost and lottery treatments may affect participation in different ways. Both are forms of extrinsic reward, and we expect both to increase participation relative to the "standard" USSD treatment (barring net crowd-out). However, the free treatment offered a cost reduction (R0.2, about 1.5 US cents per USSD session) with certainty while the lottery treatment offered a probabilistic reward of R55 or 5.17 US Dollars, where participants were not explicitly given a probability but told 'enter for a chance to win'. The research team assigned a budget to cover lottery payments but we do not know the exact probability of payouts *ex post*. For the lottery treatment to supersede the free treatment in expected value, agents would have to assume a relatively high probability of lottery payout (greater than 1 in 275). As this is arguably an unrealistic assumption for most real-world lotteries, a rational agent might respond more to the offer of free service. On the other hand, R0.2 is a trivial amount, even for relatively poor participants, and many

[4] The text of the PCM message always read *"Join VIP:Voice to help make elections 2014 free and fair. Dial ..."*. The standard treatment said *"Standard rates charged,"* the free treatment said *"participate for free,"* and the lottery treatment said *"stand a chance 2 win R55 airtime"*.

prior studies in behavioral economics have shown that agents tend to over-weight small probabilities (Camerer, 2004; Kahneman and Tversky, 1979). For these reasons, a lottery, even or especially one without the odds given, may have a stronger effect on behavior. We treat this an empirical question.

Then, over the social media channels and the Twitter/GTalk channel, the platform was promoted through the purchase of standard advertising (see Figure ??), and users could enroll into VIP:Voice through native links within the apps. Users entering through these channels by definition had smartphones and so the platform was easier to operate, did not 'time out' after 90 seconds as the USSD channel would, and could more easily find parts of the platform that required user-directed navigation rather than 'push' messaging from SMS. There were no recruitment experiments performed on these channels, and so the study user groups are most naturally thought of as consisting of three experimental strata (USSD Standard, USSD Free, USSD Lottery), and two endogenous strata (Social Media, Twitter/GTalk). The USSD channel was only offered in English, but the Social Media channel also had a Zulu and an Afrikaans option that users could select on entry to the platform (English was the default). Because this option is universally observed for users of Social Media channels and generates a very distinct profile of users, in much of our analysis we further break out the Social Media channel into its linguistic sub-groups.

On entering the system, users from all channels were asked a teaser "engagement" question about their voting intentions in the election. See Figure ?? for a screenshot of how the engagement question appeared on the USSD interface.[5] They were then asked to sign Terms and Conditions for the platform. The Terms and Conditions for the platform were a combination of the standard commercial language that would be used by Praekelt for digital platforms, and the Institutional Review Board language required for a research study, identifying this as a project being conducted by the University of California and providing information on anonymity of data and contact information in case of concerns. Having signed the Terms and Conditions, users were considered 'registered' and handed off to Phase 2 activities.

2.3.2 Phase 2: Digital Engagement

Phase 2 invited registered individuals to participate in three types of digital engagement, each of which had distinct outreach and incentivization structures. The first of these was a short *Demographic* survey. Immediately upon registering and answering the Engagement question, all users were directed to these questions via a splash page that said 'Answer and Win!', meaning that a

[5] "It's election time! Do u think ur vote matters?" Response options included, "YES, every vote matters," "NO, but I'll vote anyway," "NO, so I'm NOT voting," "I'm NOT REGISTERED to vote," and "I'm TOO YOUNG to vote;".

lottery incentive was provided to all users for the Demographic questions regardless of channel or original PCM treatment status. This survey attempted to capture the gender, race, and age of respondents as well as whether they had voted in the 2009 general election (see Appendix **??** for text). At the end of this survey, individuals who had entered from the social media/Twitter channels were also asked if they wanted to provide their phone number. Those who did were then included in all subsequent ‘push’ treatments sent out via SMS, along with all USSD users.

The second Phase 2 activity was a set of passive *What's Up* survey questions that could be answered by any user at any time, but were never pushed to the user via SMS or on the smartphone apps. These questions asked about the performance of national and local governments, whether users were attending protests or rallies, trust in different political parties, incidence of voter intimidation, and intention to vote (see Appendix **??**). These questions were never incentivized for users regardless of channel or PCM treatment status. Only a vanishingly small fraction of USSD users ever navigated to these questions, and so the overwhelming fraction of responses to these questions come from social media users.

The third cluster of activities in Phase 2 consisted of a set of *Push* questions sent out to all users by SMS, regardless of the channel on which they entered. We had the telephone numbers for all USSD participants by definition, and for registered Social Media users we solicited their phone numbers and included the 11,528 or 26% of them who did so. The Push survey consisted of five sequential questions sent every other day over the course of nine days with the initial start date randomized; the second and fourth question was always an opinion polling question about the party for whom the user intended to vote, and the remaining questions were randomly selected from a bank including information about political rallies, political violence, vote buying, voter intimidation, campaigning, and protest activity (see Appendix **??**). For these questions all users retained their original randomized incentivization structure (standard rates for the Standard and social media users, free for the USSD Free arm, and lottery for the Lottery arm).

2.3.3 Phase 3: Real-world Participation

In Phase 3 we sought to enlist citizens into meaningful and costly real-world forms of political participation; namely voting, performing citizen monitoring of polling places, and reporting on irregularities that had been observed while voting. Again, this phase consisted of several distinct components with multiple layers of experimentation. The first of these was a Get Out the Vote (GOTV) campaign that randomized the message used to induce individuals to go to the polls. Because we do not have a credible measure of actual voting at the individual level, we do not emphasize this GOTV experiment in the discussion of results.

The most pivotal Phase 3 activity was an effort to recruit a group of engaged users of the VIP:Voice platform to monitor their polling places on election day. We began with a group of "high compliers" who had interacted with the platform during Phase 2, and from within this group we asked a subset of individuals to serve as Citizen Observers (COs). The tasks expected of COs involved returning to polling stations on the day after the election to observe whether or not a declaration of results form (tally sheet) had been posted, submitting information about the tally via SMS, and taking a photo of the tally if equipped with a camera-enabled phone via photo quick count, all protected by South African law (see Appendix ?? for text, and ?? for a screenshot of the appearance of the solicitation on USSD).[6] By reporting information from the tally sheet, a CO also makes it possible to evaluate whether local posted results match centrally reported results (Callen and Long, 2015). This represents a tangible election observing activity a citizen can reasonably (and safely) participate in that provides useful information about the adherence of local polling stations to electoral procedures. Hence, these activities provide valuable ways in which ordinary citizens can participate meaningfully in observing electoral quality. This is a form of real-world participation and consequential citizen monitoring of government actions.

We randomized an extrinsic incentive to volunteer as a CO, randomized as either a token amount of R5 to cover phone fees or a more substantial inducement of R50. Those who indicated an interest in serving as COs received a new set of Terms and Conditions (T&Cs) to accept and provided personal information to allow us to identify their polling stations. We subsequently refer to "CO volunteers" as those who volunteered as COs, signed new T&Cs, and provided personal information. We invited 50,995 participants to volunteer as COs, of which 2,507 agreed, signed T&Cs, and provided all relevant location information required to identify their polling place. We were thus able, through the platform alone, to recruit citizens willing to observe 12% of the polling stations in 37% of the wards in the country.[7] This experiment is particularly interesting given that it is cross-cut against the PCM experiment, which generates extensive margin variation in the degree of extrinsic motivation of users on the platform, and comes after the Engagement question which can be used as a measure of intrinsic motivation.

Our original design was to field these volunteers on the day after the election through additional messaging and instructions. Due to a data error, however, the platform sent these additional messages and instructions to an entirely different group of 1,899 individuals (who had not previously volunteered to be CO volunteers but were still registered in the VIP:Voice platform) asking them

[6]Similar to many countries, electoral law in South Africa requires posting of tally sheets by polling center managers. Posting of sheets improves electoral transparency, allowing voters to observe their local result.

[7]We purposefully limited this activity's reach as way to demonstrate proof of concept of citizen-monitoring and photo quick count. We also required locational information, which was hard to process at the time (see also Erlich et al. (2018)).

to observe the voting tallies the day after the election; of these unwitting volunteers, 350 submtted information via SMS about their polling stations. This second group were almost exclusively registered USSD participants in the USSD Standard arm. These COs were also offered one of two different incentives to complete their tasks (R5 or R50), and assignment to these incentives was as-if random.[8] This variation arose as a result of a data error and was not strictly controlled by the researchers, however it does not appear to be correlated with user attributes within the USSD Standard arm. We therefore present results on the randomized impact of incentives in the invitation to volunteer, and on the non-experimental effects of the actual request to monitor on actually monitoring, which should be interpreted with more caution.

Finally, in the days after the election we used SMS to push out a Voter Experience survey that asked voters about the time they waited to vote, whether they encountered correct voting materials at their polling places, any intimidation or violence, and their confidence in South Africa's Independent Electoral Commission (see Appendix **??** for survey questions and Figure **??** for the phone interface). These questions retained the original incentivization treatment status of Phase 2. VIP:Voice stopped contacting users one week after the election.

3 Results

3.1 The Waterfall of Participation

The overall waterfall of participation in the platform is summarized in Table 1. The total Phase 1 recruitment effort, including close to 50 million PCM messages, logged roughly 263,000 individuals contacting the platform, 134,047 responding to the initial teaser engagement question, and 90,646 completing the Terms and Conditions. The 'Free' treatment had a registration rate very similar to (in fact slightly lower than) the 'Standard' arm, suggesting that the cost of interacting with a USSD platform is sufficiently low that it does not impose a meaningful barrier to participation. The 'Lottery' arm, on the other hand, more than doubled the enrollment rate to .12%, or 1 per 800 PCMs.[9]

Just under half of registrants entered through the PCM-linked USSD channels. A similar number entered via Mxit, and the remainder of those we term 'social media' users came in through Mobi.

[8] See Appendix Table **??**.

[9] Because multiple PCMs may be sent to the same person, we cannot define uptake in the usual way for this experiment. Rather, we divide registered users by the number of PCMs sent under each treatment to calculate a yield rate, implying an average yield rate of .053% per PCM for the USSD channel when users had to pay the full cost of the interaction, or 1 in 1,900 PCMs. This cannot be interpreted as a standard yield rate because PCMs may be sent many times to the same person and the same individual may have received PCMs with different treatment statuses. What we show here is the yield *per PCM*, not the rate *per person sent a PCM. These effects are internally valid but the treatment effect of one intervention may be altered by the presence of the other PCMs being sent at the same time.*

Only a very small number entered via GTalk or Twitter. USSD users who enrolled in the program directly rather than by PCM may have come from print advertising or heard about the platform through other channels but registered on a phone. This self-enrolled USSD group is not used in any experimental analysis because PCM treatment status cannot be assigned. The default English social media channel comprises 80% of the users on Mxit and Mobi, but 13% of social media users elected to interact with the platform in Zulu, and 7% in Afrikaans.

Attrition continued in Phase 2. Of the 90,646 people registered, 34,727 (38%) completed the four demographic questions and 15,461 (17%) answered the demographic questions and one of the other four Phase 2 surveys. 1,775 individuals volunteered to serve as Citizen Observers at their polling places, and 331 actually did so. Almost 7,000 individuals filled out post-election surveys on conditions at their polling places.

These participation numbers are impressive and sobering in equal measure. On the one hand, after the Phase 1 recruitment drive, more than a quarter million South African citizens initiated contact with the platform; more than 100,000 of these citizens provided information of some sort and over 90,000 registered into the system (in Phase 2), and 2,500 people completed all the required information and registered as COs (activated for Phase 3 monitoring). On the other hand, this represents a tiny fraction of the individuals originally approached with PCM messages, and attrition at every step of the process—from contact initiation, to the enthusiasm question, registration, answering any of the Phase 2 questions, and volunteering as a CO—is on the order of 50% per step. No matter how large the sample of participants, and even in the absence of any subsequent attrition, this type of purely digital sample recruitment is likely to yield a sample of users that is not rigorously representative of the population.

3.2 Demographics of Participation

The advantage of our PCM recruitment strategy is that it allowed us to reach a wide base of potential participants throughout South Africa—in essence anyone with at least a standard cell phone. A major disadvantage is that we only have information about participants if they provided it to us within the platform in Phase 2. Hence, even in the simple descriptive endeavor of comparing demographic characteristics across technology channels, attrition across responses presents a challenge: we can only compare attributes of those who agreed to give us their demographic information, which we cannot assume is random across channels and therefore may differ from the true (unobserved) distribution. Recognizing this issue in advance, we put the demographics questions immediately after enrollment and always incentivized their responses for all users. In the end we recovered demographic data for 35,000 people, and we can compare this pool to the overall

South African population as a validation check on the efficacy of ICT recruitment with respect to represenattiveness.

Table 2 begins with a comparison of the overall platform average across all channels; here we see that while the age and gender of users closely match the national average, we have dramatically under-recruited White users. While 8.9% of the national population is White, only 1% of platform users who enter demographics self-identify as White. Because the census data is from 2011, despite our close match to the national average age, given the very young population of the country we have a dramatically smaller share of the platform who report having voted in the 2009 election; 38.5% on the platform versus 77.3% in the census.

In the lower panel of this table we break out the demographics by channel, and show that different technologies generate sharply distinct user groups. While the population is just less than half female, two thirds of the USSD users in all arms were women. In contrast, the English and Zulu-language social media channels skew male, at over 60%. Most striking is the dominance of Black users on the USSD channels; roughly 94% for every USSD arm. The language chosen on the social media platform conforms in the way we would expect to the underlying ethnic groups, with the Zulu-language version being overwhelmingly Black (96%), Afrikaans being dominated by Coloured (72%) and White (11%) users, and the English-language version (which was the default) being the most diverse. The confirmation that language proxies for demographics in the expected way is useful because the language choice is observed for all social media users (even those who did not answer the demographic questions); consequently in most of what is to follow we break out the three languages separately in our analysis of the social media channel. Twitter is the only channel with meaningful levels of Asian participation (8%). The final column gives voting rates in the prior election; however these are not directly comparable in that the only available population data is turnout amount registered voters, while on our platform we cannot distinguish those registered in the prior election. Given an average age of 24 on our platform in 2014, it is not surprising that only 39% had voted in the prior election.

These results, in combination with a multi-channel outreach strategy that is otherwise comparable across devices, imply that we must be very careful to use terms such as 'ICT-driven participation' in any simple way. The technology interface on the user side is critical; the USSD platforms provide meaningful outreach to groups otherwise marginalized in South African politics; fully 60% of the users on this channel are Black women. As we move towards technologies that require smart phones (South African social media networks or Twitter) the demographics of users become dramatically more male and less Black. The implication is that the device gateway required to access ICT platforms plays a very fundamental role in driving the pool of participants.

3.3 Crowdsourcing Data through the Platform

What do we actually learn about South African politics from the nature of the responses on the platform? A natural starting point is to look at opinion polling, since this is a unique opportunity to observe the evolution of support for the different political parties in near real-time in the weeks leading up to the election. Figure 2 plots the results of all questions asked on the platform about support for political parties across platforms and days, comparing them to the actual outcome of the election (a 62.1% vote share for the ANC). In large part these channel-specific polling results flow from the demographic differences we have shown across the channels; the strong overall Black support for the ANC manifests itself in all Black-dominated channels (USSD and Zulu social media), while the pro-DA tilt of the Coloured and White communities is clear in the results for Afrikaans social media. Interestingly, the English social media channel, which is our most demographically diverse, closely resembles the national vote total on election day (60%). The channels that are not consistently pro-ANC all see a strong swing towards support of the ANC in the 10 days prior to the election. Critically for the issue of representativeness, because we have channels that err on both sides of the correct vote total, given a nationally representative pre-election poll it would be possible to weight our channels to give the correct national average while still being able to exploit the temporal granularity of our data.[10]

A different advantage of mass-scale crowdsourcing can be seen in the spatial breadth of the responses we recover. Presenting participation in terms of the enormous rates of non-compliance relative to the initial sample illustrates a glass half-full; alternatively we can ask about the number of places in which we *are* able to recover survey responses. Figure **??** presents a map illustrating the number of different Phase 2 responses across South Africa. As we will discuss further in our analysis of election monitoring, this suggests that crowdsourced data may be particularly useful when we desire information on geographically dispersed events, but do not need more than one reporter in each location. To the extent that the composition and the durability of the reporter is important then ICT techniques are at a disadvantage; if we seek a single reporter in many locations to provide simple objective information, then crowdsourcing becomes increasingly attractive.

We provide a detailed look at the actual answers from the various surveys of political activity in Tables **??**, **??**, **??**, **??**, and **??**. For all these tables, the three USSD experimental arms serve as the omitted category, so the coefficients on USSD Non-Experimental and the social media channels give the observational differences in response rates (first column) and actual responses (subsequent columns) across technology channels.[11] We provide a detailed analysis of the experimental difference

[10] While overall average changes across time blend compositional changes with actual shifts in support, the extensive margin effects can be limited by using only the sample of users who respond each time queried to calculate the weights.

[11] For outcomes where there are sufficient responses over Twitter/Gtalk to include this channel in the regression results

in response rates across treatment arms in subsequent sections.

Several features of these tables merit particular mention. First, as we will discuss in the subsequent section, there are strong differential response patterns across channels, with those navigating through a web interface the most likely to engage with passive content that must be navigated to, and mobile phone users most likely to respond to push messages that are sent out by text. Secondly, the levels of political engagement, trust in the national government and the ANC, and satisfaction with South African democracy are highest on the Zulu social media channel and lowest among the Afrikaans users. Similar patterns hold in terms of opposition to the use of violence in politics, but Zulu users are also much more likely to have reported personally engaging in non-violent political protest. English social media users report lower levels of voter intimidation, vote buying, political intimidation, and protests, and are substantially less supportive of the justifications for using violence, but nonetheless report very low levels of satisfaction with democracy and lower levels of support for both political parties. In all our platform recovers 1,021 reports of political violence and 961 cases of politicians buying votes with food in the run-up to the election, and 1,737 reported cases of voter intimidation on election day. While we did not design the platform to enable real-time reporting of these events to the Independent Electoral Commission, our results suggest that ICT-based crowdsourcing platforms can be a meaningful way of uncovering information about voter preferences, politician behavior, and electoral irregularities at a national scale.

3.4 Observational Analysis of Participation

We now focus on participation itself as the key outcome of the study. Figure 3 shows the participation rate across different forms of engagement, with the y-axis in a log scale and participation defined as the fraction of those who answered the initial engagement question who subsequently participate in each type of activity. While registration rates are similar across channels, when we focus on the Phase 2 digital forms of engagement we see that participation remains substantially higher among the users of social media channels with their greater ease of interacting with digital content on a smartphone interface. However, once we move to asking individuals to volunteer to serve as election monitors (an activity which entails substantially higher costs and whose costs are no longer differentiated by channel), participation rates are now substantially higher for the USSD users (5.1% for USSD, 3.5% for social media).

A second way of addressing this point is to use the response to the initial engagement question, asked just before registration, to measure heterogeneity in levels of intrinsic motivation.[12] Table

we do so.

[12]This question asked "It's election time! Do u think ur vote matters?" Response options included, "YES, every vote matters," "NO, but I'll vote anyway," "NO, so I'm NOT voting," "I'm NOT REGISTERED to vote," and "I'm TOO

?? illustrates in a different way that users of higher-cost technological channels indeed have a higher average level of intrinsic engagement in the political process. The most arduous path to enter our platform is the USSD non-experimental arm, who did not click through a PCM but manually contacted the system and enrolled. This group has the highest intrinsic engagement, with 84% reporting that 'every vote matters'. The Experimental USSD arms, that enrolled using a click-through PCM but had to interact with the system on USSD, have the next-highest levels of engagement. Users of the social media channels, which lowered the cost of participation, have the lowest levels of engagement. Interestingly, engagement is lowest among users of the Zulu social media channel, whose demographic makeup is most similar to the USSD channels.

3.5 Experimental Analysis of Participation

Table ?? provides estimates of the treatment effects from the initial PCM randomization.[13] To conduct a statistical analysis, we inflate the dataset to contain the correct number of millions of PCMs sent by arm, with the observed success rates by arm included. This generates a data structure that has the correct take-up rate per PCM sent, and permits a statistical test of significance across arms. As would be expected given the enormous number of observations these tests have high statistical power; even the tiny -.002 percentage point difference between the Free and Standard arms is significant at the 5% level, and the more than doubling of response generated by the Lottery incentive is strongly significant. The PCM experiment generates two initial take-aways. First, mobile airtime charges do not serve as a significant barrier to registration on the system. Second, more than half of those who entered in the Lottery arm can be thought of extrinsically motivated in the sense that they would not have participated had they not been offered the lottery incentive.

Next we turn to the analysis of responses to the polling questions that were pushed out during Phase 2. For these questions, USSD users retained the treatment status they were assigned at entry (none, Free, or Lottery) for all questions answered, and social media users were never incentivized. We further randomized the sequence of questions, and the day on which questions were asked. Table 3 presents an analysis of these overlapping experiments. Column 1 presents the most basic experimental comparison using only the USSD sample, and shows that there is a similarly higher response rate for both the Free and Lottery arms (who do not pay for each response), suggesting that the cost of interaction begins to become salient once interaction is repeated. Nonetheless, this effect is small, at just over half of a percentage point or 10% of the control group response rate.

YOUNG to vote."

[13]Note that we are not able to conduct any type of balance tests on the PCM randomization because we have no information on the numbers to which these were sent or the characteristics of those individuals.

All of the social media channels display lower rates of responding to these push questions, despite the fact that we restrict this analysis to the subset of users who volunteered phone numbers and hence to whom we were able to push questions via SMS. The implication is that text is not a good way to interact with people who initiated contact online. The depression in social media response rates is, however, much smaller for Zulu and Afrikaans users than it is for English users.

Moving to Column 3 we see that the response rate is similar on weekdays and weekends, and that while the second question has similar response rates to the first, by the third question there is a significant drop, and by the fourth and fifth the drop is almost 1.5 percentage points. So there is a fatigue effect. Dummies for the question type are insignificant, suggesting that individuals are not deterred from responding by the nature of the question being asked. Column 4 re-runs the regression in Column 3 on the sample for whom we have demographic data, and Column 5 then includes the demeaned demographics as controls (but does not report coefficients). Inclusion of these demeaned demographic variables removes the differences across channels on observed attributes, and gives the differential treatment effects for a regression-adjusted average age, sex, race, and 2009 voting probability. Given that the incentive treatments influenced the probability of answering the demographic variables, these results should be treated with caution as they involve including a 'bad control'. They do however give a sense of the extent to which observable demographic differences drive the response differentials across channels. The sample that reported demographics displays less of a difference across channel than the full sample, the invariance to the inclusion of the demographic controls suggests that cross-channel differences are not driven by observably different user composition across channels.

Next we turn to the analysis of the experiment that randomly incentivized users to volunteer as citizen election monitors. Table **??** shows that the monitoring invitations were well balanced over variables observed at the time of the experiment. Of those invited to monitor, 2,507 agreed to volunteer, signed the new TCs, and provided all relevant location information required to identify their polling place. We were thus able, through the platform alone, to recruit citizens willing to observe 12% of the polling stations in 37% of the wards in the country.

Column 1 of Table 4 shows that 5.1% of those asked to volunteer without incentives did so, and the incentive pushed the rate to 6.7%, with the difference strongly significant. So even when we move to this higher-cost form of action, incentives provided through ICT continue to be effective. Once in Column 2 we break out the (experimental) USSD arms and the (observational) social media arms, however, we see a more complex pattern. The Free arm volunteers at much higher rates, suggesting that USSD costs may be a barrier to mobile phone users being willing to navigate the system to volunteer. The overall rate of volunteering in the social media arm is lower, but this effect is restricted to the default English user group, with Zulu and Afrikaans users volunteering at similar rates as the USSD Standard control group. More surprisingly, we find that the largely extrinsically motivated Lottery arm of the USSD and the largely intrinsically motivated USSD Non-experimental group volunteer at similar rates as Standard, and the Free arm is actually more likely to volunteer. In Column 3 we estimate the same regression on the sub-sample for whom demographic data are available, and in Column 4 include the demographic determinants of volunteering. The (unreported) results on demographics suggest that older individuals and those who voted in the prior election are much more likely to volunteer, and White and Coloured respondents are weakly less likely to do so. Nonetheless actually controlling for those demeaned variables makes almost no difference to the coefficients, suggesting that the differences across platforms are not arising from observable demographic differences. Hence we find current incentives to have the expected effect, but the relationship between prior incentives and volunteering is more complex than expected. We return to this relationship in the subsequent section.

3.6 The Dynamics of Extrinsic Motivation

Turning to the dynamic impact of incentives, we expect the marginal effect of incentives will be stronger in the group recruited through external incentives because this group includes more extrinsically motivated individuals. To test this, we employ a difference in differences design: the effect of incentivization should be larger for those who have already shown sensitivity to incentives. We exploit the fact that the Demographics questions in Phase 2 were incentivized via lottery for all participants, while the 'What's Up' questions were not incentivized for any participants. We can look at the differential response rates to these two sets of questions for initially incentivized (Free and Lottery) and un-incentivized (Standard) groups to understand how recruitment incentives alter the differential efficacy of subsequent incentives. We expect that the differential participation rate between incentivized and un-incentivized questions will be larger in the group that was recruited using extrinsic incentives than the group that was not. Because the lottery treatment was the most effective at inducing participation, we are particularly interested in differential effects in this arm as being unequivocally composed of more extrinsically motivated individuals than the standard arm.

Column (1) of Table 5 shows the Free and Lottery groups are about 8 percentage points more likely than the Standard group to answer incentivized questions. Column (2) shows that the difference in the willingness to answer un-incentivized questions is either zero or very small relative to Standard. Consequently, when in Column (3) we show the difference in differences between incentivized and un-incentivized questions, both incentive treatments result in differential response rates on the order of 6.7 points (Free) to 8.4 points (Lottery). Thus, the drivers of response rates to crowd-sourced data collection include not only contemporaneous incentives, but the history of incentives that has shaped that user group over time. In this sense our evidence is doubly positive on the use of enrollment incentives (higher overall subsequent participation plus higher subsequent responsiveness to extrinsic incentives). As above, in Column (4) we first restrict the sample to those with demographics, and then in Column (5) control for demeaned demographics, and we find that the best-motivated result (greater differential sensitivity for the highly extrinsically motivated Lottery group) survives these controls. Hence, those who were incentivized once respond most strongly to subsequent incentives in their responsiveness to survey questions.

Table 6 then brings together all of these sources of variation into a single analysis of dynamics, exploiting differences across channel, across initial subsidy status, and across extrinsic motivation to study heterogeneity in the response to the monitoring incentive. Column (1) uses only the experimental USSD sample, and finds that the differential effect of these small initial incentives disappears as individuals are asked to engage in real-world activities that bear much larger costs than the magnitude of the randomized incentives. That is, once the cost of the action exceeded the differential costs across channels and across incentives, the differential participation probabilities generated in the recruitment process are no longer important in determining who engages in the real-world. The logic for this apparently surprising result is that while incentives for costly forms of participation are effective across all channels, they are not differentially so across the extensive margin variation generated by the PCM experiment because none of those who were induced to register by small PCM incentives will engage in the high-cost activity anyway.

In Column (2), we incorporate the role of intrinsic motivation (the dummy for reporting 'every vote matters' in the initial Engagement question), and its interaction with extrinsic incentives to volunteer. Here we see that not only does extrinsic motivation strongly predict the willingness to volunteer, but that extrinsic incentives actually have a *stronger* effect among the intrinsically motivated. Indeed, by looking at the first row in this column we see that incentives have only a weak effect among those who don't report being intrinsically motivated. Consistent with this logic, when in Column (3) we examine the Social Media users (who have lower overall engagement, as shown previously), we see that while there is still some role of intrinsic motivation in driving volunteering, extrinsic incentives have no effect, either alone or in interaction with intrinsic motivation. So, far from finding a crowd-out, it appears that a kind of complementarity exists between the intrinsic desire to engage with political action and the responsiveness to extrinsic motivation. In Column (4) we then pool the USSD Experimental sample with the Social Media users, and formally test for the difference in the differential effect of incentives for the intrinsically engaged across USSD and Social Media. Here we again find evidence of complementarity in that extrinsic incentivization is significantly less effective on the channel that has lower levels of intrinsic motivation (social media). Comparison across columns (5) and (6) again suggest that observable demographic differences across channels are not driving our results.

Some dimensions of these results are strongly intuitive: incentives matter, intrinsic motivation matters, and the USSD channel that imposed the highest user cost has both higher overall intrinsic motivation and higher willingness to participate in costly political action. Some dimensions are more surprising; the Lottery arm, which should contain the most extrinsically motivated individuals among the USSD users, is not the most responsive to subsequent incentives, as we would expect. Instead it is the Free arm, which did not appear to have induced additional participation in the first place, that sees the greatest volunteering. One explanation for this result is that while cost of interacting with the platform is not an inhibitor to initial registration, over the dynamic period of interaction required to volunteer several weeks later, USSD usage costs do become important to willingness to continue to engage. It is also surprising *prima facie* that incentives are so much less effective on the social media channels where overall motivation is lower. However, once we recognize the complementarity between extrinsic and intrinsic motivation that runs through the results in Table 6, it appears to square many of these findings. For user groups like the USSD Lottery arm and the social media users where we might otherwise expect intrinsic motivation to be low and hence extrinsic incentives to be important are dampened by their lack of complementarities, leaving the strongly intrinsically motivated groups like USSD Standard and Free as the ones most responsive to incentives. The lack of crowd-out, and indeed direct complementarity, between incentives to participate is an important policy result, suggesting that efforts to promote participation through extrinsic means will in fact reinforce underlying desires to engage.

4 Citizen Election Monitoring

4.1 Incentives and Monitoring Quality

We now turn our attention to the actual monitoring of polling places conducted by platform participants on election day. As described in Section 3, the actual invitations to monitor were subjected to a data error, and were almost exclusively confined to individuals in the USSD Standard arm. Nonetheless, the data let us recover a well-defined control group (invited individuals were either assigned the low incentive of R5 or the high incentive of R55), and the individuals assigned to the high-powered incentive within this group appear to be random. Table **??** examines a set of pre-defined characteristics, including Phase 2 response rates, whether they were included in the original volunteer sample, and then their responses to the engagement and demographic questions, and finds no significant differences between the high- and low-incentive groups. Nonetheless, this comparison is not randomized in a controlled way and we therefore consider this component of the study to be quasi-experimental.

Invitations and instructions to monitor were sent to 1,830 individuals (who had not previously volunteered to be CO volunteers) asking them to observe the voting tallies the day after the election; of these unwitting volunteers, 322 submitted information via SMS about their polling stations. The invitation to monitor was comprised of several elements. Those who had smartphones were invited to photograph the tally of the polling precinct results which must by South African law be posted at the end of voting. Figure **??** provides an example of a photograph provided by a VIP:Voice user. For those without smartphones, they could use the platform to record the information on the sheet, providing the precinct number and the vote totals for each party via SMS. As shown before, the geographic coverage that we achieved from the platform was impressive; Figure **??** shows a map of the country and Figure **??** a map of the Durban area, illustrating the wards in which we had a citizen observer provided a report.

The results of the invitations to monitor are presented in Table 7. Incentives are similarly effective in the CO volunteer experiment in Phase 3. When offered payment of R5, only 17.6% of those deployed to observe entered any data on their polling places. In contrast, among those offered the more substantial payment of R55, this rate jumped to 27.4%. Unfortunately the data quality of the SMS-based tallies was poor; a large majority of the users who provided this information did not do so in a manner that would have generated machine-readable data formats on the vote totals along with a recognizable precinct number. Within the sample that observed, the rate of successful entry of ANC voting data via SMS more than doubled, from 2% to 4.7% for those offered the larger incentive.[14] Hence while incentives are effective at improving both the response rates and the data quality, it is clear that quality control and lack of training are in practice a constraint on the ability of this type of crowd-sourced approach to provide a meaningful check on electoral malfeasance.

Nonetheless, we successfully garnered a set of volunteers to serve as election monitors. We received data from actual observers, who returned to polling stations on the day after the election to observe whether or not a declaration of results form (tally sheet) had been posted, submitting information about the tally via SMS, and taking a photo of the tally if equipped with a camera-enabled phone. The results from citizen and actual volunteering shows us that with no training or previous contact other than through the platform, we were able to generate good polling station coverage. This suggests potentially powerful form of citizen-based monitoring, and could achieve monitoring

[14]We do not control for demographics in this table because of data limitations. However, 100% of COs who provided demographic data were Black. We also do not control for entry strata as virtually all of the actual observers came from the standard USSD treatment group.

at scale. We therefore proceed to conduct a cost-effectiveness analysis of this form of unstructured, zero-training citizen observation as compared to several other modalities for monitoring polling places.

4.2 Comparative Cost Effectiveness

We can benchmark crowd-sourcing as a means to achieve successful monitoring relative to other, more direct techniques. To do so, we can use cost per successfully monitored polling station to yardstick our citizen crowd-sourcing approach relative to standard and well-documented alternatives for election monitoring.[15] The rows of Table 8 compare potential ways of scaling our platform nationally. Based on the results presented here, we simulate costs for three variants of platform: where all users are unincentivized, where all users are incentivized both in enrollment and in monitoring (thus creating the feedback loop described above), and a counterfactual scenario where all platform users who volunteered to monitor actually did so. To broaden the comparisons, we also provide costs from a parallel field exercise where we worked with a local organization to hire and train South African monitors to observe stations using pen-and-paper techniques, and from Callen et al. (2016) with locally trained and paid monitors using a mobile-phone application and international election monitoring costs in Uganda.

The first column in Table 8 shows the recruitment and training cost per user, where we amortize the platform development costs over the number of monitors that would have materialized had we run the entire national platform under each of these scenarios.[16] The second column gives the number of stations to be monitored per individual, the third column the rate at which successful monitoring occurs, and the fourth column gives the final cost per station monitored. Low overall participation on an unincentivized platform makes the cost per station very high at more than $7,000. Incentives improve participation enough to more than pay for themselves in cost-effectiveness terms, driving the cost per station to about $5,400. However, under a counterfactual scenario in which all those who volunteered to monitor successfully did so, costs per user would fall to just $166, slightly higher than the figure for our locally trained professional monitors ($101) or similar local monitors employed in Uganda per Callen et al. 2016 at $40 (but significantly cheaper than international monitors in Uganda at $6,200).

[15]It is worth noting that our platform had other purposes, and crowdsourced information on many more outcomes than polling results alone, and so in this sense the cost-effectiveness comparison is conservative in our case.

[16]We calculate a cost per invited observer on our platform by multiplying the number of volunteer citizen observers (2,507) times the rate at which those whom we invited to monitor did so (12% and 22% for unincentivized and incentivized observers, respectively) to calculate the number of citizens who would have agreed to monitor if all who had volunteered had been invited. We then apportion the total VIP:Voice costs ($420,507), which aggregates platform development ($383,256) and media costs ($37,251), to these citizen monitors' share of the total cost in column (1), and include the cost of the incentive ($4) in the second row.

The promise of crowd-sourcing to achieve mass coverage is seen in the last column of Table A-4, which shows a marginal cost per additional station of only $15 once the VIP: Voice platform fixed costs are sunk, 85% lower than the marginal cost of professional monitors. Overall, the crowd-sourcing approach is not cost-effective with only a few monitored stations, but with viral adoption and as coverage of stations grows, citizen-based ICT observation achieves cost effectiveness relative to a similar scale of professional work either by local or international monitors.

We read these results as suggesting that platforms such as VIP:Voice are best thought of as a way to supplement (rather than replace) structured user bases from non-governmental and international organizations. One of the important promises of crowd-sourced, ICT-based monitoring of elections is its potential to achieve relatively inexpensive and broad national coverage through scaling and viral adoption. Citizens have the potential to provide eyes and ears in every polling station in all corners of a country. Nonetheless, it is clear that this type of unstructured data feedback suffers from quality issues, and the presence of international election observers may inherently serve as a check on electoral corruption in a way that domestic citizen observation is unable to replicate.

5 Conclusion

This paper presents the results from VIP:Voice, a nationally-scaled ICT election platform built to recruit citizens across a variety of digital channels in order to encourage political participation in democracy-enhancing activities. Our study examines how ICT recruitment interacts with digital participation and engagement in real-world political activity. While recent research finds ICT interventions can increase political participation, our study is unique in providing comparable access across multiple technological channels, along with a rich set of randomized extrinsic incentives to participate. Understanding the intersection between channel costs, incentives, and the types of political engagement that can be engendered is critical for a better understanding of how ICT can be used to promote beneficial forms of political engagement.

Despite impressive overall recruitment in VIP:Voice, we find attrition across time and activities forms a critical component to the story. ICT-generated crowds are both fragile and malleable. Requiring users to bear the costs of digital interaction may not be important to initial engagement, but becomes increasingly important over the course of time as we seek to retain users and particularly to engage them in more costly forms of political activity. Initial incentivization makes users more malleable in the sense that they then respond more strongly to subsequent incentives to enter crowdsourced information through the platform. Critically, we uncover a number of pieces of evidence that extrinsic incentives are actually complementary to intrinsic motivation to participate. Indeed, our study finds not only low willingness to engage in high-cost participation for those who initially report being disengaged, but also that incentives are completely ineffective among the disengaged and strongly effective among the engaged. Only the politically engaged respond to extrinsic incentives. We believe that several factors may explain this surprising lack of crowd-out in our study. First, few of the forms of political behavior we were inviting people to participate in would have been externally observable, which may have limited the scope for the kinds of image-based motivations that are discussed in Ariely, Bracha and Meier (2009). Second, the extrinsic incentives were similarly not externally observable, limiting the extent to which they would inhibit the appearance of 'doing good'. Finally, the fact that incentives to serve as a Citizen Observer are only effective for individuals who report being motivated about the election may simply indicate that there is a threshold level of motivation below which individuals are too far from the participation constraint to be motivated by small monetary payments. In any case, this complementarity is an important result of the study.

Our results also inform discussions within the ICT community about the implications of technology channel choice. Starkly different demographic profiles across channels suggests there is no simple answer to the question "Can technology improve participation by under-represented groups?" Rather, the relevant question is: "Which blend of technologies will yield the final user profile that we want?" Ultimately, the transformative potential of ICT depends on how citizens use technology. We show that with appropriate channel choice, an ICT approach can achieve outreach far beyond the young, male demographic that dominate smartphone-based social media, broadening participation further using extrinsic incentives. Political engagement initiated in the digital realm, including participation incentives delivered via ICT, *do* cross over to activity in the real world. ICT can therefore play a central role increasing citizens' participation and their contribution to the quality of democracy.

Finally, our findings offer guidance on the practical possibility of using ICT platforms to promote democracy-enhancing activities such as election monitoring. The strength of our crowd-sourced approach lies in its very broad geographic reach and low marginal costs of acquiring additional users. The weakness is the difficulty of retaining users via this indirect type of interaction, and consequently issues with data quality as well as with guaranteeing the presence of a citizen reporter in any specific place. However, our results show that extrinsic incentives are not only strongly effective at driving participation, but actually enhance data quality as well (potentially, such incentives should be based on submitting usable data to allow them to drive quality more directly). This suggests that strategically targeted incentives to users in specific locations, on top of a pre-existing ICT platform of this type, may on the margin be a very cost-effective way to generate reporting on political behavior. While recent years have given social media a bad name in generating political misinformation, this study illustrates the ways in which careful curation of information feedback pathways can allow ICT to engender new forms of mass-scale political participation and provide an effective check on malfeasance in the electoral process without becoming a conduit for misinformation.

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Tables and Figures

Table 1: **Waterfall of Study Participation**

	Mobile Phone Channels:				Social Media			Smartphone	
Phase 1 Recruitment.	USSD Standard Arm	USSD Free Arm	USSD Lottery Arm	USSD Non experimental	English Social Media (default)	Zulu Social Media	Afrikaans Social Media	Twitter/ Gtalk	**Total**
Total # Solicited via PCM	13.8m	16.1m	19.9m		.		.	.	.
Any Initiation	23,552	29,996	73,107	13,000	102,059	12,028	5,191	4,030	262,963
Any answer to Engagement Question	11,284	14,955	39,146	6,816	44,597	11,042	4,592	1,615	134,047
Registration (T&C) Initiated	9,078	11,558	31,416	5,426	41,535	10,088	4,103	1,254	114,458
Registration Completed	**7,258**	**8,146**	**24,765**	**4,277**	**36,172**	**5,898**	**3,190**	**940**	**90,646**
Registered as % of PCMs	0.053%	0.051%	0.124%						
Phase 2 Participation Waterfall.									
Demographics Completed	1,581	2,341	7,416	1,142	18,045	2,754	1,304	140	34,723
Demographics + Any Other Phase 2	686	1,063	3,106	481	9,013	1558	732	25	16,664
Demography as % of Registered:	21.78%	28.74%	29.95%	26.70%	49.89%	46.69%	40.88%	14.89%	38.31%
Phase 3 Monitoring Invitations.									
Invited to Volunteer as Monitor	5,632	7,125	22,487	3,885	8,779	2,057	862	168	50,995
Volunteer & Provide Relevant Info	285	364	1,127	212	420	65	27	7	2,507
Volunteer *Monitors as % of Invited:*	5.06%	5.11%	5.01%	5.46%	4.78%	3.16%	3.13%	4.17%	4.92%
Phase 3 Actual Monitoring.									
Asked to Monitor	1,808	3	6	50	5	0	0	27	1,899
Conducted Any Monitoring	327	3	1	9	2	0	0	8	350
Monitors as % of Actually Asked:	18.09%	100.00%	16.67%	18.00%	40.00%			29.63%	18.43%
Phase 3 Post Election									
Responded to any post-election survey	1,658	939	5,549	879	1,894	289	142	1	11,351

Notes: Table provides the waterfall of study participation, beginning from initial contact with the system and moving through the activities in the three phases of the project.

Table 2: **Demographics by Channel**

	Age	Male	Black	Coloured	White	Asian	Voted in 2009
National Average	**24.9**	**51.00%**	**79.20%**	**8.92%**	**8.86%**	**2.49%**	**77.30%**
Platform Average	**23.995**	**51.01%**	**85.76%**	**10.20%**	**1.02%**	**1.84%**	**38.51%**
SD	6.90	0.50	0.35	0.30	0.10	0.13	0.49
By Channel:							
USSD Standard	25.1	35.19%	94.21%	3.23%	0.83%	0.25%	53.00%
USSD Free	25.9	34.27%	93.77%	3.81%	0.87%	0.87%	51.58%
USSD Lottery	26.4	35.27%	93.60%	4.28%	0.89%	0.47%	59.67%
USSD NonExp	26.8	34.74%	93.86%	3.19%	1.48%	0.11%	59.83%
English Social Media	22.7	60.77%	85.20%	10.37%	1.83%	1.34%	29.34%
Zulu Social Media	23.1	60.49%	95.86%	2.01%	0.61%	0.57%	30.09%
Afrikaans Social Media	24.0	53.76%	12.92%	72.46%	10.82%	0.89%	31.50%
Twitter	26.5	40.71%	73.03%	7.87%	10.11%	7.87%	45.28%

National average data comes from the 2011 South African Census. Remaining cells give the averages among the sample that entered under each platform/status *and* answered the demographic questions in the platform. First row gives the means and the second row the standard error of the outcome for each stratum.

Table 3: **Response rates to Push and Thermometer questions in Phase 2**.

	(1) USSD Experimental	(2) Whole Sample	(3) Question timing	(4) Sample with demog	(5) Controlling for demog
USSD Free Arm	0.008**	0.007**	0.007**	-0.012	-0.013
	(0.003)	(0.003)	(0.003)	(0.009)	(0.009)
USSD Lottery Arm	0.006**	0.006**	0.006**	-0.009	-0.012
	(0.003)	(0.003)	(0.003)	(0.008)	(0.008)
USSD Non-Experimental		0.007**	0.007**	-0.020*	-0.024**
		(0.004)	(0.004)	(0.010)	(0.010)
English Social Media		-0.077***	-0.078***	-0.138***	-0.131***
		(0.002)	(0.002)	(0.007)	(0.007)
Afrikaans Social Media		-0.002***	-0.002***	-0.005***	-0.010***
		(0.001)	(0.001)	(0.002)	(0.003)
Zulu Social Media		-0.001**	-0.001**	-0.004***	-0.006***
		(0.001)	(0.001)	(0.001)	(0.001)
Weekday			0.001	-0.007***	-0.007***
			(0.001)	(0.001)	(0.001)
Second question			-0.001	-0.004	-0.004
			(0.001)	(0.003)	(0.003)
Third question			-0.003***	-0.008***	-0.009***
			(0.001)	(0.002)	(0.002)
Fourth/Fifth question			-0.014***	-0.016***	-0.016***
			(0.001)	(0.002)	(0.002)
Question is Poll			0.001	-0.002	-0.002
			(0.001)	(0.002)	(0.002)
Question is Rallies			0.001	0.005*	0.005*
			(0.001)	(0.003)	(0.003)
Question is Violence			-0.001	0.002	0.002
			(0.001)	(0.003)	(0.003)
Question is campaigning			0.001	0.000	0.000
			(0.001)	(0.003)	(0.003)
Observations	167121	364376	364376	105822	105822
Mean for USSD standard	0.085	0.085	0.085	0.085	0.085
R squared	0.000	0.036	0.037	0.068	0.071

Notes: Table provides the response rates to the Push and Thermometer polling questions, analyzed in a long panel where the unit of analysis is the attempt to solicit each answer from each user. The USSD Standard arm is the omitted category, so the first two rows estimate experimental differences for the randomly incentivized USSD groups, and the remaining rows are the observational differences across technology platforms. Column (1) contains only the experimental sample while remaining columns use all available data. Column (4) is estimated only for the users who provided demographic data, and Column (5) controls for (but does not report) demeaned demographic variables and so gives the impact on an average person, having removed observable demographic differences across channels. Robust standard errors in parentheses, clustered at the level of the individual respondent. Each individual was asked to answer five questions.

Table 4: **Volunteering to Monitor**.

	(1) Monitor Volunteered	(2) Monitor Volunteered	(3) Sample with demog	(4) Controlling for demog
Incentivized to monitor	0.016***	0.016***	0.016***	0.016***
	(0.002)	(0.002)	(0.004)	(0.004)
USSD Free Arm		0.012***	0.057***	0.056***
		(0.004)	(0.014)	(0.014)
USSD Lottery Arm		-0.000	-0.013	-0.017
		(0.003)	(0.011)	(0.011)
USSD Non-Experimental		0.003	0.004	-0.003
		(0.005)	(0.015)	(0.015)
English Social Media		-0.014***	-0.074***	-0.065***
		(0.004)	(0.010)	(0.010)
Zulu Social Media		-0.005	-0.005	-0.007
		(0.004)	(0.004)	(0.004)
Afrikaans Social Media		-0.007	-0.007	-0.001
		(0.006)	(0.006)	(0.008)
Twitter/Gtalk		0.101	0.040	0.037
		(0.062)	(0.063)	(0.064)
Observations	50814	50814	18781	18781
Mean for USSD standard	0.051	0.051	0.111	0.111
R squared	0.001	0.003	0.029	0.035

Notes: Table estimates the probability of volunteering to monitor in Phase 3 as a function of the arm and channel of the study, estimated only for the sample invited to monitor. The USSD Standard arm is the omitted category, so both the 'incentivized to monitor' and Free/Lottery comparisons are experimental, while the remaining differences in the table are observational. Column (1) presents the simple experimental analysis, while Column (2) includes channel-specific fixed effects. Column (3) is estimated only for the users who provided demographic data, and Column (4) controls for (but does not report) demeaned demographics and so gives the impact on an average person, having removed observable demographic differences across channels. Robust standard errors in parentheses.

Table 5: **Incentivized versus Unincentivized Phase 2 Responses**.

	(1) Answered Incentivized	(2) Answered Unincentivized	(3) Diff Prob (Inc - Uninc)	(4) Sample with demog	(5) Controlling for demog
USSD Free Arm	0.079***	0.019***	0.067***	-0.016	-0.017*
	(0.007)	(0.004)	(0.007)	(0.010)	(0.010)
USSD Lottery Arm	0.082***	-0.003	0.084***	0.031***	0.026***
	(0.006)	(0.003)	(0.005)	(0.008)	(0.008)
Age					0.003***
					(0.000)
Male					-0.022***
					(0.006)
Coloured					-0.064***
					(0.016)
White					-0.066**
					(0.031)
Asian					-0.022
					(0.039)
Voted 2009					0.012**
					(0.006)
Observations	40339	40339	40339	8579	8579
Mean for USSD Standard	0.067	0.018	0.057	0.057	0.057
R squared	0.005	0.001	0.005	0.006	0.019
Ftest Free vs Lottery	0.562	0.000	0.002	0.000	0.000

Notes: Table uses only the experimental USSD sample. Column (1) analyzes the probability of any responses to Phase 2 questions that were incentivized, and Column (2) the probability of any responses to Phase 2 questions that users were not incentivized to answer. Column (3) takes as the dependent variable the difference between these two dummies (Incentivized - Unincentivized). column (4) repeats this analysis for the users who provided demographic data, and Column (5) controls for (demeaned) demographics and so gives the impact on an average person, having removed observable demographic differences across channels. Robust standard errors in parentheses.

Table 6: **The Dynamics of Extrinsic and Intrinsic Motivation**.

	(1) USSD Only	(2) USSD Only	(3) SM Only	(4) Pooled	(5) Sample with demog	(6) Controlling for demog
Incentivized to monitor	0.023***	0.015**	0.002	0.013**	-0.017	-0.015
	(0.006)	(0.006)	(0.005)	(0.006)	(0.020)	(0.020)
USSD Free Arm	0.019***	0.018***		0.018***	0.061***	0.061***
	(0.005)	(0.005)		(0.005)	(0.019)	(0.019)
USSD Lottery Arm	-0.001	-0.005		-0.005	-0.026*	-0.029**
	(0.004)	(0.004)		(0.004)	(0.014)	(0.014)
Free*Incentive	-0.013	-0.013		-0.013	-0.009	-0.012
	(0.008)	(0.008)		(0.008)	(0.028)	(0.028)
Lottery*Incentive	0.000	-0.002		-0.002	0.011	0.010
	(0.007)	(0.007)		(0.007)	(0.021)	(0.021)
Engaged		0.026***	0.017***	0.023***	0.022***	0.015***
		(0.003)	(0.005)	(0.003)	(0.005)	(0.005)
Incentive*Engaged		0.012**	0.000	0.015***	0.062***	0.061***
		(0.005)	(0.007)	(0.005)	(0.013)	(0.013)
SM*Incentive				-0.007	0.022	0.019
				(0.007)	(0.021)	(0.021)
Social Media user				-0.004	-0.061***	-0.053***
				(0.004)	(0.013)	(0.013)
SM*Incentive*Engaged				-0.021***	-0.067***	-0.066***
				(0.006)	(0.013)	(0.013)
Observations	35379	35379	11528	46899	18045	18045
Mean for base group	0.051	0.051	0.035	0.051	0.111	0.111
R squared	0.003	0.007	0.002	0.007	0.035	0.040

Notes: Table analyzes the probability of volunteering to serve as a Citizen Election Monitor, conditional on having been invited. Columns (1) and (2) use only the experimental USSD sample, (3) only the Social Media channels, and the remainder pool these two together. Column (5) is estimated only for the users who provided demographic data, and Column (6) controls for (demeaned) demographics and so gives the impact on an average person, having removed observable demographic differences across channels. 'Engaged' is a dummy for answering 'Yes every vote matters' to the initial Engagement question asked at Registration. The Incentive is a dummy for receiving a financial incentive of 5R to serve as a Monitor. Robust standard errors in parentheses.

Table 7: **Actually Performing Monitoring**.

	(1) Monitoring Performed	(2) Entered Usable Data, whole sample	(3) Entered Usable Data, among respondents
High Incentives	0.098***	0.027***	0.104***
	(0.017)	(0.006)	(0.031)
Observations	1830	1830	322
Mean for Low Incentive	0.176	0.020	0.116
R squared	0.016	0.009	0.022

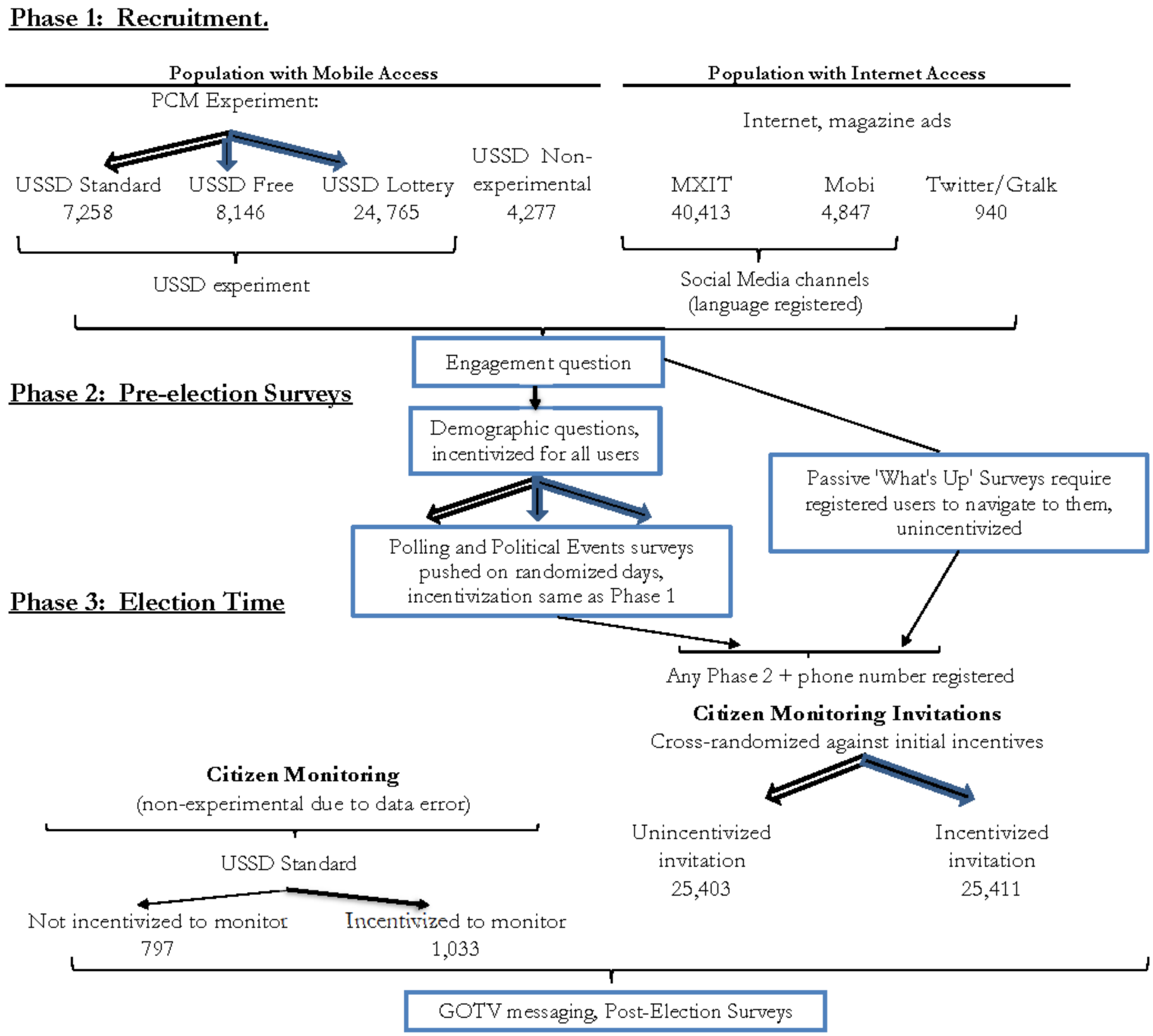
Notes: Table analyzes an outcome for actually performing monitoring (Column (1)), and entering usable monitoring data (Columns (2) and (3)), with the final column estimated only among those who entered any monitoring data. The dummy 'High incentive' is an indicator for having been offered the 50R (rather than 5R) incentive to perform monitoring. This treatment was not directly randomized. Robust standard errors in parentheses.

Table 8: Comparative Cost Effectiveness

Monitoring Modality	Recruitment & Training Cost per Monitor	Number of Stations per Monitor	Fraction of Stations Effectively Monitored	Cost per Effectively Monitored Station	Marginal Cost of Additional Station
South Africa:					
Citizen Monitors, unincentivized	$1,381.50	1	4.2%	$7,635.42	
Citizen Monitors, incentivized	$764.46	1	14.2%	$5,383.52	
Citizen Volunteers, if perfect compliance rate	$165.78	1	*100.0%*	*$165.78*	$14.69
ICT-enabled Local Monitors	$293.99	3.3	88.0%	$101.24	$101.24
Uganda (Callen et al. 2015):					
Traditional Professional Monitors				$6,220.00	
CT-enabled Local Monitors				$40.00	

Note: the ‘South Africa’ results provide cost estimates from our own intervention. The cost of a Citizen Volunteer is calculated by multiplying the number of volunteer monitors times the rate at which those we invited to monitor to get the number of successful citizen monitors we would have yielded if all were invited under each treatment status. We then apportion the total platform development costs ($420,507) to these citizen monitors’ share of the development cost to get column (1). The third row is a counterfactual exercise assuming that every volunteer citizen monitor was able to effectively monitor the station. The fourth row uses numbers from a parallel experiment in which we worked with a non-governmental organization to train local college students to use the platform for election monitoring (these monitors were paid and had expenses reimbursed). The Uganda results are from Callen et al. (2016), and report the costs for international monitors based on the European Union Election Observation Mission to the country, and for ICT-enabled local recruits are based on the use of a simpler, feature phone-based election monitoring system.

Figure 1: Study Design



Note: Arrows represent content pushed to users, block arrows represent randomized sub-experiments with black fill indicating incentivization. The first row of numbers gives the number of registered users who signed Terms & Conditions for each channel and so were formally incorporated in the study. Subsequent numbers give the sample sizes for experiments conducted among registered users.

Figure 2: Daily Opinion Polling

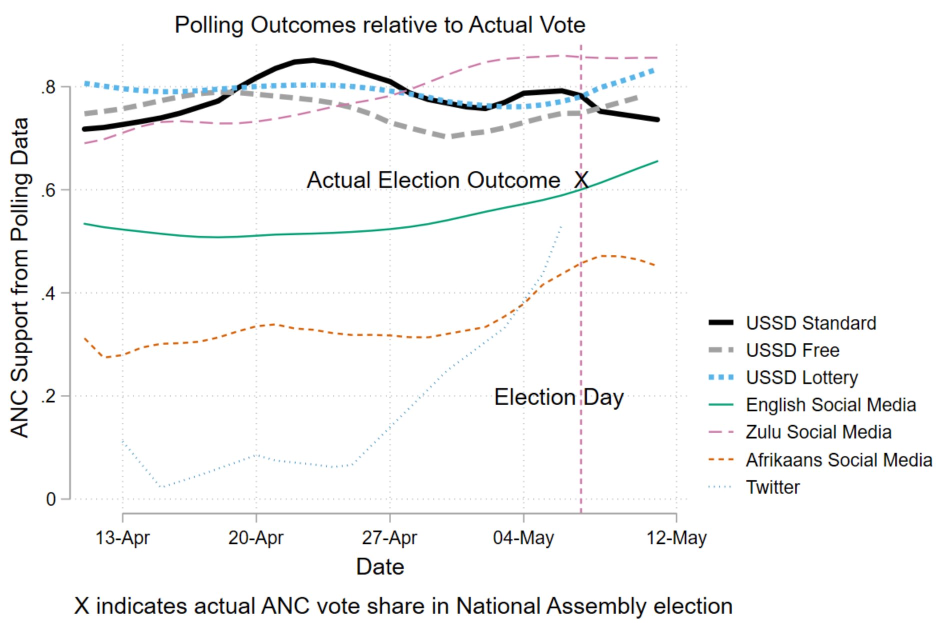


Figure 3: Participation Rates by Activity and Channel