How Technology Shapes the Crowd:
VIP:Voice and Participation in the 2014 South African Election

Karen Ferree (UCSD)
Clark Gibson (UCSD)
Danielle F. Jung (Emory)
James D. Long (University of Washington)
Craig McIntosh (UCSD)

February 2015

Abstract: Can technology help citizens overcome barriers to participation in emerging democracies? We argue that, by lowering costs, technology can bring new participants into the political process, but in so doing generates a 'crowd' of participants that is both more responsive to incentives (malleable) and more sensitive to costs (fragile). We illustrate these dynamics using VIP:Voice, a platform we engineered to encourage South African citizens to engage politically through an ICT/DM platform. VIP:Voice recruited South Africans through a variety of methods, including over 50 million 'Please Call Me' messages, and provided a multi-channel platform allowing citizens to engage via low-tech mobile phones and high-tech social media. VIP:Voice generated engagement of some form in over 250,000 South Africans, but we saw large attrition as we asked people to switch from low-cost digital forms of engagement to high-cost real-world engagement. The implementation of a standard platform across multiple technology channels, as well as a set of experiments in the role that incentives and framing play in driving participation, reveal how the technology shapes the very nature of the crowd that forms.

Acknowledgements: We acknowledge generous funding from the US Agency for International Development, Development Innovation Ventures grant. We thank Mike Callen, Aaron Erlich, Michael Kremer, Maura O'Neill and seminar participants at the University of Washington, George Washington University, and US Agency for International Development for comments. Kate Blackwell, Grant Buckles, Aaron Erlich, and Alex Verink provided excellent research assistance. All mistakes remain with the authors and all any opinions, findings, and conclusions or recommendations expressed in this paper are those of the authors and do not necessarily reflect the views of USAID.

1. Introduction

Healthy democracies require that citizens actively participate in political life, from turning out to vote to monitoring government performance. However, individuals in emerging democracies confront numerous institutional and personal obstacles to participation that can marginalize them from political processes. Governments engineer exclusion by purposefully limiting information or controlling media, constraining efforts to organize, and subverting institutions, like elections. Low education levels, limited financial resources, geographic remoteness, and unfamiliarity with formal institutions create additional challenges. Local activists, non-governmental organizations, and international donors pursue a variety of strategies to help citizens overcome barriers to action, including rallying support for mass action, educating voters, monitoring elections, and reporting corruption. Because these efforts seek to increase the extent and quality of citizen participation, they underscore fundamental issues in political behavior, including the socio-demographic background of participants, the costs and benefits of engagement, and the interaction between intrinsic and extrinsic motivations for political engagement.

Recently, the spectacular growth of information and communications technology (ICT) and digital media (DM) has fundamentally altered the technological landscape of developing countries. Unlike traditional media, ICT/DM allows a relatively inexpensive means for communication, facilitating information-sharing and collective action across a large and dispersed user base. In places unconnected to landlines and other modern infrastructure, the introduction of ICD/DM represents a particularly significant change. By lowering the costs of engagement, this revolution in technology helps citizens in emerging democracies overcome barriers to participation. ICT/DM played a central role catalyzing spontaneous citizen-generated forms of protest and subsequent political change in the Arab Spring and Color Revolutions (Tufekci and Wilson 2012, Breuer et al. 2014). Organizations and donors also increasingly fund ICT/DM projects to promote democracy and governance in the developing world across a number of applications like improving electoral integrity (Bailard and Livingston 2014; Goldstein and Rotich 2008); crowd-sourcing information on violence, corruption, and government performance (Aker et al. 2011, van der Windt and Humphreys 2013, Findley et al. 2013, Callen et al. 2015; Cecchini

and Scott 2010; DeRenzi et al. 2011; Findley et al. 2014); and strengthening accountability between citizens and politicians (Grossman et al. 2014).

However, in the process of drawing in new participants, technology also alters the composition of "the crowd." Some of this composition shift may be desirable, if for example, it makes participation more demographically representative (Grossman et al. 2014). The composition may shift in other less obvious ways as well. The pool of participants may now include people whose intrinsic motivations to participate are lower than the pool of participants who would engage in the absence of lowered costs. These selection effects can have important consequences for how the crowd responds to incentives for action as well as to rising costs of action. By bringing in people more extrinsically motivated, further action can be more easily manipulated through incentives. However, participation will then be more sensitive to costs, and may rapidly decay as these increase. Thus, by lowering costs ICT encourages participation, but it is participation of a particular sort: malleable to incentives and fragile to rising costs.

To explore the possibility of encouraging political participation through ICT/DM, and to evaluate how selection through ICT affects the composition of participation, we designed and deployed a unique ICT/DM platform during South Africa's 2014 national election. To our knowledge, this platform, called "VIP:Voice," forms the largest, built-from-scratch, free-standing ICT/DM platform developed to date in an emerging democracy's election. Implementation of VIP:Voice proceeded in four phases. Phase 1 began with the launch of the platform four weeks before the election, employing five channels to recruit participants: USSD, a standard phone (not internet capable) channel; and Mobi, MXIT (South Africa's largest social network), GTalk and Twitter channels (available via internet on feature or smartphones).[1] Within the USSD channel, we experimented with the effectiveness of free usage, paid usage, and participation lotteries as means to enhance registration. Phase 2 consisted of a set of surveys collecting demographic information and voting intentions, conducting rolling opinion polls, and crowd-sourcing information on local political activity in the weeks leading up to the election. Phase 3 experimented with incentives to recruit and field volunteer citizen election monitors who

[1] VIP:Voice had no prior participant base. Because it does not rely on any pre-existing platform or defined set of users, it allows an unusually pure proof of concept as to whether and how ICT tools can engender political participation.

would incur the real-world costs of reporting vote totals from their polling places the day after the election. Phase 4 encouraged citizens to vote through a series of randomized messages and polled voter perceptions of the process on election day.

VIP:Voice enabled us to explore three types of cost. The first two relate to the technology itself: the ease of use, where social media channels were easier to use and basic mobile phones harder; and the cost of interaction (for example, the price of sending an SMS message). The third relates to the nature of the action itself. Some actions were inexpensive and digital (registering on the platform, opinion polling, crowd-sourcing information on protests and violence, and reporting on voter experiences). Others involved costlier real world behavior (voting, volunteering to be a Citizen Observer, and recording data from posted declaration of results forms, or tallies, the day after the election). We experimentally manipulated the price of interaction; the other two costs varied observationally.

We examine how costs affect the size and composition of the crowd. Through a series of observational and experimental analyses, we show that, not surprisingly, decreasing costs lead to greater participation. Even very small reductions in the price of interaction increase participation, and participation drops sharply in shifting from relatively costless digital engagement to costly participatory activities. More novelly, we also show that changes ease of use and price of interaction affect the composition of the crowd. Different technology channels draw in different demographic profiles of users. Furthermore, users drawn in through "easy" technology channels experience the greatest attrition as the costs of action rise, suggesting a less intrinsically motivated, more fragile crowd than that generated by harder technology channels. Finally, users drawn in through extrinsic rewards (a lottery) prove to be more responsive to later external incentives, suggesting a more malleable crowd than that generated in the absence of rewards. In sum, the costs of interaction affect both the size and the nature of the crowd.

South Africa's institutional and ICT/DM environment create an excellent setting and establish important scope conditions and for a comparative study of participation in emerging democracies. 1994's transformative elections brought an end to apartheid, allowing for universal franchise and energizing democratic participation on the part of the non-white majority for the first time. But recent factors potentially erode the quality of

extent of political engagement. The ruling African National Congress (ANC) has received strong majorities in all of the country's post-apartheid elections, limiting competition where elections are seen as foregone conclusions. The 2014 election took place during rising dissatisfaction with the ANC and incumbent president Jacob Zuma, who faced numerous allegations of corruption and perceptions of poor performance regarding South Africa's rising income inequality and crime rates. All swaths of South African society continue to feel the lasting economic and social remnants of apartheid that remain salient across people's interactions with institutions and markets. Therefore, despite many South Africans' intrinsic belief in the democratic system, countervailing factors and external constraints suggest varying levels of voter mobilization. This reflects common assumptions about political behavior across emerging democracies where citizens participate at different rates given variation in institutional and individual factors. Moreover, similar to many developing countries, South Africa has enjoyed a "tech boom" in recent years and South Africa boasts the highest per capita cellular phone connections in Africa and the fifth highest rate of internet access, although access varies significantly across the country. Technological development in South Africa outpaces other parts of Africa, increasing the feasibility of our project: given the rapid rate of ICT/DM growth, South Africa represents where much of Africa will be in a few years' time.

Our study contributes to three distinct literatures. First, we provide micro-foundations to a rich set of studies on political participation in developing democracies by examining how variations in incentivization, cost, and framing can drive engagement with politics and the public sector (Dal Bó et al. 2013). Beyond simply looking at how these factors affect the size of the participant pool, we also rigorously examine selection effects generated by them. Second, we contribute to the growing empirical literature addressing the comparative effectiveness of different ICT/DM platforms at driving uptake and adoption across a wide variety of contexts such as health (Chi et al. 2010, Lester et al. 2010, Dupas 2014), agriculture (Jensen 2007, Aker 2010, Fafchamps and Minten 2012), and bureaucratic performance (Callen et al. 2013, Hellström and Karefelt 2012). Third, we lend insights, methods, and data to studies concerned with using new techniques to address improving electoral processes (Callen and Long 2015; Callen et al. 2015; Ichino and Schundeln 2012; Collier and Vicente 2014; Hyde 2011; Kelley 2012).

We structure the paper as follows: Section 2 motivates our theory underlying political participation, and Section 3 describes the context and design of the study, and presents an overview of participation and representivity. Section 4 presents the empirical results, beginning with the hypotheses for which we have observational variation and proceeding to experimental tests on the role of incentives. In Section 5, we discuss the implications of our results for future efforts to induce electoral participation using ICT/DM.

2. Theoretical Motivation

2.1. Participation in Developing Democracies

Social scientists have long studied the factors driving political participation in consolidated democracies (Verba et al. 1978; Powell 1980; Wolfinger and Rosenstone 1980). But the determinants and contours of participation in emerging democracies are likely distinct. Imperfect and incomplete regime transition curtail citizen involvement and strengthen marginalization. The public may only have weak associations with inchoate democratic institutions, and those institutions sometimes create severe constraints on participation. Political actors motivate or discourage the extent and nature of citizen action, taking advantage of individuals more vulnerable to external pressures or rewards (such as vote-buying) and weak enforcement of electoral safeguards (such as ballot secrecy) (Nichter 2008; Gans-Morse, Mazzuca, and Nichter 2014; Ferree and Long 2015; Stokes 2005; Stokes et al. 2013; Kramon 2009).

Individual level factors also affect participation. Citizens vary in their intrinsic and extrinsic motivations to participate. Intrinsic motivation – a desire to engage in politics driven by internal factors like a commitment to democratic principles – may be especially high in new democracies since the ability to vote provides a new experience to express voice and act in the public realm. At the same time, many individuals face significant costs to participation driven by a lack of information about electoral processes or candidates; low literacy rates; remote, inaccessible, or overcrowded polling stations; or living far from the capital. Individuals facing such costs may fail to participate in meaningful ways even if they possess the intrinsic desire to do so.[2] Moreover, citizens with resource constraints

[2] We note, however, that standard markers of marginalization like low education and rural domicile tend to correlate with *higher* levels of participation in many consolidating democracies (Kasara and Suryanarayan 2014; Kuenzi and Lambright 2010; Wade, Groth, and Lavelle 1993).

may be especially sensitive to extrinsic benefits, such as gifts offered in exchange for participation (Wantchekon 2003; Chandra 2004; Posner 2005). Together, an individual's intrinsic and extrinsic desires may interact in additive ways, or potentially crowd each other out, making it difficult to predict the likelihood of taking action. [3]

Faced with these realities, the widespread adoption of ICT and digital media (ICT/DM) by citizens of developing democracies presents a particularly promising new set of opportunities to engender participation (Shirazi 2008; Alozie, Akpan-Obong, and Foster 2011; Bailard 2012; Bratton 2013). Mobile phones alter the costs of communication and consequently reduce the barriers to information sharing between actors and individuals—including governments, political parties, civil society groups, and ordinary citizens. The low cost of cellphones encourages broad usage in the exchange of information across all types of demographics and over long distances (Aker and Mbiti 2010). The concomitant increase in internet access via feature and smartphones, and the popularity of social networking further enhance the range of communication modalities available to citizens.[4] ICT/DM's ability to reduce barriers to information-sharing also facilitates collective action and can therefore radically shape who, how, and when citizens participate; including communities in remote areas with a lack of infrastructure.

Alongside numerous evaluations in economics[5], evidence suggests that ICT/DM affects political processes in developing contexts as well. ICT/DM powerfully facilitated engagement and organic political movement associated with the Arab Spring and the Color Revolutions (Breuer 2012, Tufekci and Wilson 2012; Shirazi 2008); and impacts

[3] Evidence from multiple disciplines examines the interplay between intrinsic and extrinsic motivations, including how they affect candidate selection (Isbell and Wyer 1999), principal-agent relationships (Benabou and Tirole 2003), and motivations to work (Gagné and Deci 2005).

[4] Access to the internet via computer, feature, or smartphone enables plausibly more efficient forms communication compared to standard phones. Cellphones and internet access each provide channels to "push" and "pull" information content to users, such as real time "crowd-sourced" reports on various activities as they unfold (these reports are often geolocated and can generate immediate actions in response, such in the case of humanitarian disaster). ICT/DM allows individuals to obtain and share information in a new, radically decentralized way that is fundamentally different from the top-down structure of traditional media controlled by providers – often the state -- like radio, television, or newspapers.

[5] Economists document impacts of ICT/DM on agricultural markets (Jensen 2007; Aker 2010;; Aker and Fafchamps 2013; Kiiza and Pederson 2012; Muto and Yamano 2009; Zanello 2012); health (Chang et al 2011; Dammert, Galdo and Galdo 2014; Garfein et al 2012; Jamison, Karlan, and Raffler nd; Leong et al 2006; Lester et al 2010; Lund et al 2012; Pop-Eleches et al 2011); uptake of social benefits (Blanco and Vargas 2014); education (Aker, Ksoll, and Lybbert 2010); and mobile money (Jack and Suri 2011, 2014; Mbiti and Weil 2011; Morawczynski and Pickens 2009; Blumenstock, Eagle, and Fafchamps 2011).

corruption (Bailard 2009), civil conflict (Pierskalla and Hollenbach 2013; Shapiro and Weidmann 2014), and election monitoring (Callen et al. 2015; Goldstein and Rotich 2008; Bailard and Livingston 2014) in emerging democracies. These studies emphasize that the technology facilitates sharing information and collective action within existing movements. Technological change helps already existent groups do what they were doing before, but do it better.

More radically, a number of studies employ ICT/DM to *engineer* participation in the absence of pre-existing organizations or platforms (Aker, Collier, and Vicente 2011; Findley et al. 2013; Grossman, Humphreys, and Sacramone-Lutz 2014). These projects expressly attempt to increase political engagement and action of those citizens typically marginalized by standard political processes like the poor, those in peripheral regions, and women. While this research shows some success in generating participation, weak involvement in ICT platforms and high rates of attrition from original intake samples present challenges. These patterns especially hold for projects that require action (not just passive absorption of information) like submitting reports to a crowd-sourcing platform. Despite its low cost, citizens' use of ICT/DM may still encounter significant barriers in developing countries, and issues such as literacy, connectivity, and the costs of ICT/DM may ironically limit the participation of precisely those citizens who already face exclusion from political activity.

Prior studies regarding the relationship between ICT/DM and participation have primarily focused on how factors like incentives and cost of action shape the size of the crowd. One exception is Grossman, Humphreys, and Sacromone-Lutz (2014), who show that an ICT platform in Uganda drew in participants from traditionally under-represented groups (women, the poor) and therefore not only affected the size of the crowd, but also its demographic composition. We build on this insight, but look beyond demographic selection. We argue that technological advances that reduce costs affect the mixture of people engaging in the activity, drawing in more extrinsically motivated participants. When participation is costly, difficult, and risky, the set of participants who engage likely have deep intrinsic motivations for doing so. Only the deeply motivated show up. In contrast, when costs fall, a less intrinsically motivated crowd emerges. The composition of the crowd in turn has implications for how it responds to future costs and incentives. A

less intrinsically motivated crowd responds well to external incentives; it is therefore malleable. But it is also more sensitive to rising costs, and is likely to evaporate as the types of activities escalate in demands.

Prior studies also make salient several unresolved issues that we seek to address in our study. Despite the fact that cost effectiveness is a primary justification given for ICT/DM, many studies have started from research-sampled phone lists that required 'boots on the ground' in order to draw the initial contacts (such as via household surveys). This is very expensive and does not provide information on the types of samples that would be generated by an ICT-recruited sample. Second, most existing studies have only launched using a single channel and therefore cannot speak broadly to ICT/DM participation but rather just to that of a specific medium. Finally, while several studies manipulate intrinsic and extrinsic motivations by experimentally varying the cost of interaction (Grossman, Humphreys, and Sacramone-Lutz 2014; Findley et al 2013), most feature a single cost and incentive structure. They therefore do not fully illuminate the dynamics of how costs and extrinsic incentives interact with each other over the course of time to determine the evolution of participation.

Our study features variation in three key parameters that help us to understand how the channel of participation shapes the crowd that emerges. First, we have observational variation in *actions* that are low-cost and digital, versus those that impose real costs on citizens (such as volunteering to be citizen election monitors). Second, we have observational variation across technology *channels* that present greater or lesser obstacles to interacting digitally. Finally, we have experimental variation in the *incentives* that were provided to individuals to enroll in and subsequently engage with the platform. We now develop a simple model explaining how these three parameters should drive the attributes and dynamic responsiveness of the population that remains engaged with the platform over time.

2.2. Hypotheses on Motivating Participation

We now develop the primary theoretical parameters that we argue are critical to understanding the drivers of political participation when technology changes net costs. First, individuals vary in terms of their intrinsic motivation to participate in politics, where

some have a high internal drive and desire to participate in politics and others do not. Individuals on the higher end of the intrinsic motivation spectrum will participate in an election oriented ICT/DM platform even if the technology is cumbersome and costly.. Second, the key role of ICT is to lower the cost of participation, but the magnitude of these cost reductions will depend upon the ease of use of a specific channel. Our project featured a common platform launched across multiple channels, and so created systematic variation in this ease of use. Third, additional external inducements like economic incentives may enhance participation rates (analogous to parties buying votes, giving gifts, or lowering the costs of voting by providing free transportation etc.).

Consider the decisions of citizens *i* who will first be assigned to a technology channel *j*, and then will then be asked to participate in two different types of political activity. In period one, they will be asked to engage with a digital interface, which is low-cost and has differential costs across channels. In the second period, citizens will be asked to engage in a 'real-world' political action that bears a constant cost regardless of the channel on which a citizen entered. The key difference across individuals is the extent of their intrinsic motivation to engage politically.

Assume that citizens have intrinsic motivation to participate in a political activity equal to η_i, distributed as $Unif\left[0,\overline{\eta}\right]$. In stage 1, citizens are recruited through an ICT/DM channel *j* to engage digitally, which bears costs c_j. We initially assume this channel-specific ease of use to be uncorrelated with individual-level intrinsic motivation. Financial participation incentives $\beta_{i1} > 0$ (free or lottery) are directly randomized, so the net cost of participation for an individual offered a specific channel and incentive is $c_j - \beta_{i1}$. Digital participation is explained by the indicator function $P_{ij1} = 1\left(\eta_i + \beta_{i1} - c_j\right)$, requiring that the sum of intrinsic and extrinsic incentives exceed the cost of digital participation on a channel.

The participation *rate* for each channel $E(P_{j1}) \equiv \rho_{j1}$ will be $\frac{\overline{\eta} + \beta_{i1} - c_j}{\overline{\eta}}$, and the average intrinsic motivation on a channel as a function of the costs and extrinsic incentives

is $E(\eta \mid P_{ij1}=1)=\bar{\eta}-\left(\frac{\bar{\eta}+\beta_{i1}-c_j}{2}\right)$. These equations define the 'crowd' that forms as ICT and subsidies drive down the net costs of political participation: it is larger, but less engaged.

In the second stage, agents are asked to engage in a real-world political action that bears a cost R, which is invariant regardless of the digital channel through which a citizen was recruited to engage. We assume that $R > c_j$ for all channels. Agents are only present to be incentivized in stage 2 if they participated in stage 1, so it is natural to define real-world participation as*:*

$P_{ij2}=1$ if $\left(\left(\eta_i+\beta_{i1}>c_j\right)\ \&\ \left(\eta_i+\beta_{i2}\geq R\right)\right)$, $P_{ij2}=0$ if $\left(\left(\eta_i+\beta_{i1}>c_j\right)\ \&\ \left(\eta_i+\beta_{i2}<R\right)\right)$.

Given this, a shift in stage 2 incentives β_{j2} will only have an effect on real-world participation rates if it operates on a subset of individuals who are present among participants based on the digital costs and incentives. Thus,

$$\frac{d\rho_{j2}}{d\beta_{i2}}=\begin{cases}\frac{1}{\bar{\eta}} \text{ if } (R-\beta_{i2})>(c_j-\beta_{i1}) \\ 0 \text{ else}\end{cases}$$

Consequently, the higher are the incentives in the first stage (β_{j1}), the higher is the probability that the type of individual for whom incentives are effective on the margin is still in the user group to whom second stage incentives β_{j2} are offered.

If we calculate real-world participation rates as a fraction of those who participated in the first, digital round (as is done in the empirics), then the fraction of first-stage participants that also participate in the second stage will be $\frac{\bar{\eta}-R}{\bar{\eta}-c_j}$, ignoring incentives. Thus the lower were first-stage costs of digital recruitment, the lower is the share of the recruited crowd per channel that is willing to engage in real-world political action.

<u>Hypotheses based on *action* and *channel* costs:</u>

H1a: Participation will fall as individuals are asked to move from low-cost digital participation to high-cost real world participation ($E(\rho_1)>E(\rho_2)$ because $R>c_j$).

H1b. The drop in participation as we move to real-world actions will be largest for the lowest-cost channels ('real world' participation as a fraction of 'digital' will be $\frac{c_j}{R}$).

H1c: The drop in participation as we move to real-world actions will be largest for individuals who were the least engaged to begin with.

Hypothesis based on *incentives*:

H2: Participation will increase with extrinsic incentives ($\frac{d\rho_{j1}}{d\beta_{j1}} = \frac{1}{\bar{\eta}} > 0$).

Hypotheses based on the *dynamics* of incentives:

H3a: The marginal effect of incentives on participation in the second round will be larger for the group given incentives to enroll in the first stage. (likelihood that $\frac{d\rho_{j2}}{d\beta_{i2}} > 0$ is increasing in β_{i1}).

H3b: The differential response to later incentives for the initially extrinsically motivated group will disappear as individuals are asked to undertake actions with high costs (as soon as $R > c_j + (\beta_{i2} - \beta_{i1})$, $\frac{d\rho_{j2}}{d\beta_{j2}} = \frac{1}{\bar{\eta}}$ in both groups there is no differential effect).

H3c: Appeals to extrinsic factors such as visibility of political activity will be more effective in the group initially given extrinsic incentives.

We test H1 in Section 4.2 using observational variation in costs across channels, and H2 and H3 in Section 4.3 using experimental variation in incentives. Because the hypotheses involving c_j are tested observationally, it is important to recognize the limitations of this analysis. The extant crowd to whom we were able to offer our platform of course differs in many ways across channels, from the largely black and female USSD users to the more diverse, male group of social media users. In this sense, differences that our model ascribes to costs across channels may be caused by other, unobserved factors

that lead to systematic variation in the user groups.[6] We also do not know the full size of the crowd on each channel, and hence cannot speak to participation rates among the universe of potential users, simply among those who initially enter the platform. Even with this caveat, the systematic variation that we see across users of the different technologies (from a basic phone to Twitter) represents the actual population diversity in a national-scale platform. It therefore provides important information on the relative effectiveness of different technology channels in a large, diverse developing democracy.

This simple model of repeated attempts to engage citizens illustrates the dynamics that will shape the crowd across technologies, actions, and time. When we use ICT to engage people in digital, low-cost forms of political engagement, participation will be forcefully driven by the technology at hand. However, once we try to induce participation in more traditional, high-cost political action, these benefits from technology are likely to fall away and the differential effect of ICT on participation rates will decrease. Similarly, incentives to participate will generate dynamic effects. Because the initial use of incentives will retain a less motivated group, more people will participate subsequently only if offered incentives. Hence, the marginal effectiveness of subsidies increases with prior use.

3. Setting and Research Design

3.1. Setting: The 2014 South African Election

South Africa provides an excellent setting for a study of political participation in an emerging democracy. The 2014 national and provincial elections represented its fifth set of general elections since the transition from apartheid in 1994, allowing for democratic participation in South Africa for the first time. The ruling African National Congress (ANC) has won national contests with wide and consistent margins, greatly outpacing its nearest competitor, the Democratic Alliance (DA), a largely regionally-based party. Other smaller parties have not gained traction consistently. The ANC's dominance limits political competition, potentially discouraging participation since elections are seen as foregone conclusions. The 2014 contest had the lowest voter turnout in the post-apartheid era.

[6] For example, a variety of evidence presented suggests that the small group of users who entered the platform through Twitter is unusually engaged subsequently at all stages.

Beyond the party system, the economic and social remnants of apartheid still affect South African society and could plausibly impact participation. Although they are now in the political majority, many blacks do not feel that the ANC's performance lives up to the promises made as apartheid ended. The 2015 unemployment rate of 26% is the highest in a decade. Over half of black youths are jobless. While whites retain many economic privileges, they lack representation in the ANC. Regardless of race, many voters perceived the ANC, and the incumbent president Jacob Zuma, as increasingly corrupt. South Africans reflect characteristics of voters in other emerging democracies where variation in a host of institutional and individual factors results in differential rates of participation.

Election monitoring groups generally rate South Africa's Independent Electoral Commission (IEC) highly. Because elections lack significant competition, baseline incentives for citizens to engage in the types of activities we study were likely to be low compared to what it might have been in a first or second election, or where competitive pressures raise interest in politics. At the same time, South Africa represents a large category of cases in which elections, while relatively new, are also routinized. Should ICT have a broad impact on political participation, it must do so in places like South Africa, where natural incentives to participate might be relatively low.

Many developing countries have enjoyed a "tech boom" in recent years. South Africa boasts the highest per capita number of cellular phone connections in Africa[7], and the fifth highest rate of internet access. Although most South Africans are not users of social media platforms, cell phone saturation was almost 90 percent in the 2011 census and has risen to almost 100 percent. Feature phones and smartphones currently have a saturation rate of 70 percent. More economically developed areas of South Africa have higher usage rates, as well as among younger and more male populations (see Table 4 for more information). Given the rapid rate of ICT/DM development in Africa, South Africa lends insights into middle range developing countries while foreshadowing where many countries will arrive shortly.

3.2. Research Design

[7] 118 connections per 100 citizens; Nigeria has 96/100.

The project involved four stages: (1) registration in VIP:Voice, and then engagement (2) before, (3) during, and (4) after the election. Here, we provide a summary overview of the sequence of events and then more detail on each phase in the next section.

We worked with Praekelt, a major South African technology firm, to design our multi-channel ICT/DM platform and to recruit and register as broad a spectrum of the electorate as possible. Unlike other studies that build ICT/DM platforms from a pre-existing database of prior users or conduct door-to-door surveys to enroll participants, we recruited participants directly from the overall population via the platform. While this created operational challenges, it meant that every South African voter could potentially enter the system.

In **"Phase 1,"** beginning on the 7th of April 2014 (one month before the election), we started recruitment of South African citizens into the ICT/DM platform. Users could interact with VIP:Voice through five channels, including SMS/USSD, MXIT, Mobi, GTalk, and Twitter. Standard phones without internet required interaction via short message services (SMS or "text messages") and unstructured supplementary service data (USSD), an interactive text-based system that can reach users of all types of phones. MXIT is South Africa's largest social media site, and works on feature and smartphones; Mobi is a provider of smartphone platforms; GTalk and Twitter could be accessed by feature or smart phones. This variation in the ease of use of the interface, in combination with an underlying platform that was built to be as homogeneous as possible, provides systematic variation in the ease of use.

Splash ads and banners advertised recruitment on Twitter, MXIT, and Mobi. We also reached people under Livity Africa's Voting Is Power (VIP) campaign, leveraging their existing reputation as a respected non-partisan youth-oriented media outlet. We heavily targeted SMS/USSD interactions given the widespread penetration of mobile phones in rural areas, but where other digital media may not reach. We attracted people to this channel primarily advertising with Please Call Me (PCM) messages. Facilitated by telecoms, subscribers send an average of 14 million overall unique PCMs per month in South Africa. A person texts a PCM to another person to request a phone call. The people who buy advertising space on the messages pay for them, not the senders. We purchased advertising space for VIP:Voice for 49.8 million PCMs and randomized the PCM message

with a 'standard' arm encouraging registration, but paying full messaging costs to interact with the platform; a 'free' arm with all interaction fees covered; and a 'lottery' arm offering a chance to win 55R.[8] On entering the system, users were asked an 'engagement' question about their voting intentions in the upcoming election[9] and then asked to sign the Terms & Conditions to register in the system.

The total recruitment effort, including close to 50 million PCM messages, logged 263,000 individuals contacting the platform, 129,308 responding to an initial engagement questions, and 90,646 individuals completing the Terms and Conditions to register for the platform.[10] Just under half of those registered entered through the USSD channels associated with the PCMs; a similar number entered via MXIT. The remainder was brought in through Mobi or print advertising, and a very small number entered via Gtalk or Twitter.[11] We define the strata for the study as the intersection of the channels and the USSD recruitment randomization groups, meaning that some comparisons are experimental (the USSD PCM recruitment groups) and some are observational (across channels). The three experimental USSD strata and the MXIT stratum contain almost 94 percent of all registered users.

Table 1 'Recruitment and Participation Numbers' provides the total number of individuals at various stages on the participation waterfall, broken down by the study strata. Because many PCMs may be sent to the same person, we cannot define 'uptake' in the usual way for this experiment. Rather, we divide the number of registered users by the number of PCMs sent under each treatment to calculate a yield rate, implying an average

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

[9] The text of engagement question was as follows: "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."

[10] Appendix A1 shows the anticipated recruitment numbers provided by Praekelt; these were roughly four times the number that actually enrolled.

[11] USSD users who enrolled in the program directly rather than by clicking through a PCM may come from print advertising, or may have 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.

yield rate of .08% per PCM sent for the USSD channels, or 1 in 1900 PCMs.[12] Only one third of those who initiated contact with the system completed registration.

Figure 1 displays a schematic of the overall design of the project, showing the temporal division of the study into the four phases. Blue lines represent experiments conducted at different stages. The first of these experimentally varied incentives to register conducted within the PCM recruitment (that is, varied β_{j1}).

In **"Phase 2,"** the platform invited registered individuals to provide their demographic data and report on election-related events with information pushes and pulls leading up to election day. Participants continued engagement through their initial enrollment channel. In practice, Phase 2 involved completing five separate pre-election surveys. The first survey asked a brief set of demographic questions. Completion of the demographic questions was monetarily incentivized with a lottery for all participants. Participants also were asked to complete two election-related surveys. The "What's Up?" survey asked a set of questions on local campaign activities, while "VIP" posed a set of relatively standard polling questions on participation in local events, evaluation of ANC performance, and probability of voting.

In addition to these surveys, which were presented via drop-down menus, the system pushed questions designed to track real-time shifts in political opinion and incidents of political activities in the month prior to the election. One set of these questions, called the "Push" survey, asked about local political activities at three different times prior to election day, randomizing the day on which an individual received the survey. A second set of questions, called "Thermometer," asked about voting intentions and party support. We sent thermometer questions out two weeks and one week before the election. Users could complete surveys in any order, and failure to complete one survey did not preclude answering questions on another. Phase 2 thus consisted of digital forms of engagement as all activities involved interacting with the platform.

[12] This cannot be interpreted as a standard yield rate, in that 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 yield rates are inline with our expectations based on previous PCM campaigns conducted by our implementing partners.

Attrition continued in Phase 2. Of the 90,646 people registered, 34,718 (38 percent) completed the four demographic questions and 15,461 (17 percent) answered the demographic questions and one of the other four Phase 2 surveys.

"Phase 3" sought to evaluate whether ICT/DM could recruit citizens into a more meaningful and costly real-world form of participation: observing and reporting on electoral outcomes at polling places. From the group of "high compliers" in Phases 1 and 2 (those who completed all or most questions), we recruited a set of volunteers to serve as Citizen Observers (COs). The set of tasks expected of Citizen Observers (COs) involved returning to polling stations on the day after the election to observe whether or not a tally sheet had been posted, to submit information about the tally via SMS, and, if equipped with a phone that could take photos, to take a photograph of the results sheet.[13]

We randomized an extrinsic incentive to participate 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 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.

Phase 3 included two experiments, one randomized and one better thought of as a natural experiment. Unfortunately, due to a data error, the platform actually invited COs to report on election tallies that were not drawn from the initial CO volunteers. In our design the volunteer and invited-to-monitor groups were supposed to be the same, but in practice they were different. Instead, we inadvertently recruited actual COs almost exclusively from registered USSD participants in the "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.[14] However, given that this variation arose as a result of a data

[13] Electoral law in South Africa requires the posting of tally sheets by polling center managers. Posting of sheets improves electoral transparency, allowing voters in an area to observe their local result. Observing whether or not a sheet has been posted represents a tangible election observing activity a citizen might reasonably (and safely) participate in that could provide useful information about the adherence of local polling stations to electoral procedures. 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). Hence, these activities represented valuable ways in which ordinary citizens can participate meaningfully in observing electoral equality.

[14] See Appendix A2.

error and was not strictly controlled by the researchers, we consider this latter incentive to form a natural experiment in the spirit of Dunning (2012).

In Phase 3, we invited 41,863 individuals to volunteer as community observers (COs). Of these, 2,498 agreed, signed the new T&Cs, and provided all relevant location information required to identify their polling place. Using the platform, we were able to recruit citizen volunteers willing to monitor 12 percent of the polling stations in 38 percent of the wards in the country. Due to a data transfer error, we then asked a *different* group of 1,863 individuals (who had not previously volunteered) to actually monitor the voting tallies the day after election day; of these 332 submitted information via SMS about their polling stations.

In **"Phase 4,"** we implemented a Get Out the Vote (GOTV) experiment and two surveys, one of voter experience at polling stations on election day (with free participation), and a second post-election survey to gauge satisfaction with the electoral process (incentivized with a lottery). We conducted the GOTV experiment and both surveys on all 78,108 individuals who had completed registration in the system. In the GOTV experiment, we randomly assigned individuals to either a control group or one of two treatments. An 'intrinsic' message consisted of a reminder to vote in the election, and motivated the 'voice' dimension of political participation. The 'extrinsic' treatment included the reminder plus a message reminding citizens that their inked finger would show others that they had voted, designed to activate considerations of social pressure to vote (Jung and Long 2015).[15] On May 8 (the day after the election), we texted participants asking whether or not they had voted. Those who responded affirmatively were asked to verify their vote by providing information on ballot color and sending a photograph of their inked fingers.

In Phase 4, we invited 77,878 registered participants to respond to the GOTV message and the election experience survey. Of these, 5,038 (6 percent) responded to the GOTV questions on participation, and 6,978 (9 percent) submitted information regarding their "Voter Experience" on the day of the election (a checklist modeled after those of official election monitors).

[15] *Control:* no GOTV text message. *'Intrinsic' Treatment:* received the text message "Make a choice, have a voice, vote!" *'Extrinsic' Treatment:* received the text message "Make a choice, have a voice, vote!" Your inked finger will show everyone that you have."

Participation levels across stages (summarized in Table 1) are impressive and daunting in equal measure. On the one hand, the platform saw a quarter of a million people initiate contact, solicited information on political engagement from more than 100,000 citizens, registered 90,000 into the system, and two and a half thousand people completed all the required information and registered to serve as COs. 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, answering any Phase 4 questions, and volunteering as a monitor---is on the order of 50% per step. Out of the individuals who registered in the system, roughly half never engaged again.

4. Hypothesis Testing

4.1. How Technology Shapes the Crowd.

A natural place to begin understanding how technology drives differences in participation is with a simple comparison of demographic characteristics across channels. Unfortunately, even in this apparently simple endeavor the issue of attrition across responses rears its head: we can only compare the attributes of those who agreed to tell us their demographic information, and the rate of doing so differed across channel. Nonetheless, we can use the 35,000 people who did provide this data to provide a comparison to the overall South African population.

Table 2 shows that different platforms clearly generate user groups with radically different gender and racial compositions. While the population of the country is just less than half female, almost two thirds of the USSD users were women. In sharp contrast, almost two thirds of the MXIT sample was male. The USSD group was also more black (94 percent) than the national population (79 percent), while the Twitter/Gtalk group was less so (60 percent). Mobi, building off of social networks that focus on relationships and sexual health, is equally black and female but has an average age almost three years younger than the USSD channels. The MXIT group, in contrast, was more coloured (14 percent) and male (62 percent) than the general population. Voting in the 2009 elections is everywhere much lower than the actual turnout rate in 2009, most likely due to the fact that a large share of our users were not of voting age in 2009, and indeed the MXIT platform

with the youngest average age also has a low reported 2009 voting rate. Within the USSD group, the demographic profiles of the standard, free, and lottery groups were mostly similar; the lottery group was slightly older and slightly less black.

Given the sharp demographic differences across channels, it is only natural to ask whether it is age, gender, and race that are driving participation in the platform rather than something inherent to the technology itself. As a way of addressing this, Table 3 first provides summary statistics on participation across the phases of the study for each platform, and then moves to a regression specification where we control for the (demeaned) demographic variables. This answers the following question: if we removed the observable effects of age, race, and gender, would participation across channels vary for this regression adjusted 'average' citizen on the platform? For each outcome the first column shows the average participation rate among registered users for each platform, the second column shows the same statistic within the sample on whom we have demographic data, and the third column controls for the demeaned demographics. Despite very strong differences in participation across platforms, the coefficients in the second and third columns are remarkably stable, boosting our confidence that the differences in participation across channels arise from some attribute of the technology itself and not from the characteristics of the users.

It is also important to understand the extent to which the channels deliver a crowd with an unrepresentative political orientation. To study this, we conducted daily opinion polling, asking a randomized subset of registered participants about their voting intentions each day between the launching of the platform and several weeks after the election. Figure 2 plots the results of these 'Push' questions across platforms and days, and compares them to the actual outcome of the national election. Interestingly, all three platforms for which we have a sufficient number of responses to reliably plot averages have a user base that is more pro-ANC than the national population of voters. On election day itself, the more ethnically diverse user base on MXIT had voting intentions closest to the national average, followed by USSD with an 11 point and MOBI with more than a 20 point pro-ANC bias relative to the election outcome. While we do not have enough responses from Twitter users to confidently plot them over time, only 17% of responses on this channel are pro-ANC, making it the sole technology channel with a pro-opposition slant in this context.

The overall platform support on the day of the election is 69.8% and 12.9% for the ANC and DA, respectively, while the actual election outcome was 62.1% and 22.2%, respectively.

4.2. Observational Tests of H1.

We now evaluate how participation responds to a shift from low-cost, digital participation into higher-cost forms of real-world participation (H1a). H1a predicts that users of the high-cost channel (USSD) should display greater intrinsic motivation than users of the lower-cost social media channels, and that the USSD group who entered without receiving a PCM should be the most intrinsically motivated of all. A simple way of testing whether the ease of use of a channel creates systematic variation in the intrinsic motivation of participants is to exploit the engagement question, which asked participants prior to registration "Do you think your vote matters?" We consider participants who answered with an optimistic "yes, every vote matters!" as those most inclined toward engagement, and respondents who did not feel their vote mattered and those not registered least inclined toward engagement. Table 4 indicates that indeed the USSD group that received no experimental inducements to participate is highly engaged, the experimental group less so, and the large population of MXIT users were by far the least likely to fall in the enthusiastic camp.[16]

Early stages of this project involved simple and relatively costless tasks like answering an engagement question and signing a brief Terms and Conditions statement. Phase 2 continued with more intensive but still completely digital forms of engagement, answering anonymous survey questions. Phase 3 represented a departure into more costly forms of real world participation: CO volunteers provided personal information about their geographic location and signaled their willingness to serve as a citizen observer. Those who actually deployed engaged in the costly action of returning to their polling station the day after the election to enter detailed information about the presence and content of the

[16] The smaller group of Mobi and particularly Twitter users appear very highly engaged; this may suggest non cost-based determinants of participation on these channels, such as the fact that Mobi advertising was directed in large part at the audience available on Young Africa Live, predominantly young, engaged population.

tally sheet. We anticipate that participation should decay as tasks shift from easy, low cost, and digital forms to harder, higher cost, real world forms of engagement.

At the same time, we do not expect participation to decay constantly across all participants. As noted, participants vary in their innate underlying inclination to engage in political action. Those with higher predispositions to engage should be more likely to continue participating in the platform even as the costs increase. In contrast, those with weak predispositions to engage should respond more acutely to increasing costs.

To capture underlying predispositions towards engagement, we exploit selection effects generated by the different technology channels. Because digital engagement through MXIT and Mobi proved easier than through USSD (Table 3), we expect these platforms to have pulled in participants disproportionally more likely to drop off the platform as we shifted from digital to real world engagement (H1b).

The data support both of these hypotheses. (Figure 3). Across all technology channels, participation was lower in Phase 3, as expected (H1a). However, the decline in participation was steeper for the social media participants who faced lower initial barriers to enrollment in the platform than for the USSD participants (H1b). We do not believe this effect is simply due to time, as MXIT users return to participation in Phase 4 after the election. Like Phase 2, Phase 4 involved digital, not real world, engagement.

Looking back at Table 3, we can evaluate this point more systematically. MXIT generates a much higher number of Phase 2 responses than any other platform, but has a lower fraction of users volunteering in Phase 3 and less than a third as many users responding in Phase 4 compared to USSD. This remains true even controlling for demographic factors (age, gender, and race). Thus, MXIT users participated more extensively when participation involved only digital engagement; otherwise, their commitment proved more brittle than USSD users with real world action. Again, the participation of the smaller group of MOBI and Twitter users evidences an enthusiasm that is in excess of what we would have expected based solely on the costs of using the channels.

We also more directly explore the relationship between attitudes toward participation and attrition over the course of time by looking at answers to the engagement question across rounds (H1c). Table 5 presents these results. We split the answers into two different dimensions: first, *'does my vote matter'* (consisting only of the group that

answered “Yes, every vote matters”) and second, *‘will I vote’* (including the “No, but I’ll Vote Anyway” group). Understanding what kinds of real world engagement relate to digital engagement, the “No, but I’ll Vote Anyway” group plays an important discriminating role identifying people disengaged in terms of enthusiasm but nonetheless planning on voting.

Table 5 shows that the perception of ‘does my vote matter’ does not have any strong relationship with subsequent participation. Those who respond ‘Yes, every vote matters’ versus ‘No but I’ll vote anyway’ respond at relatively similar rates to all phases of the study. The second dimension, however, which is ‘will I vote’, strongly predicts the willingness to volunteer to monitor and respond to post-election questions. These two groups respond at similar rates to registration and Phase 2 questions as those who will not vote, but volunteer to monitor at rates 3-4 times higher as those who say they do not intend to vote. Post-election response rates remain twice as high for the group that intended to vote as the group that did not.

These results provide important linkages between ‘participation’ in the virtual world and in real political activity. Engagement in the election does not predict digital participation when costs are low, but becomes strongly predictive once we use the digital platform to recruit real-world engagement. Put another way, the crowd recruited through extrinsic rewards was more fragile to subsequent increases in costs than the crowd not recruited this way. This relationship, arising from observational and not experimental data, offers a number of interpretations. For example, perhaps individuals always intending to vote face lower monitoring costs of their polling place, or perhaps common factors such as proximity to polling places drive them both. Nonetheless, the monitoring activity was to take place the day *after* the election, requiring a return visit to the polling place whether or not one had voted. Hence voting intentions does not directly reverse-cause willingness to monitor, and our results accord with the idea that those with high initial engagement are the most likely to remain involved as the costs involved in political actions move into the real world.

4.3. Experimental Tests of H2 & H3

The original PCM recruitment experiment randomly assigned people to standard texting rates, free texting, or lottery incentives to participate. The standard rates treatment

offered no financial incentive to join. In contrast, both the free or lottery treatments offered an incentive. We expect a positive level of participation in the standard arm, but anticipate it will be higher in no cost and lottery treatment arms (H2a). We also anticipate that 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 certain cost reduction (R0.2 per USSD session) while the lottery treatment offered a probabilistic reward of R55, where participants did not know the probability itself. 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 strictly rational agent might respond more to the offer of free service. On the other hand, R0.2 (about 1.5 US cents) is a trivial amount, even for relatively poor participants. Moreover, many prior studies in behavioral economics have shown that agents tend to over-weight small probabilities (Kahneman and Tversky 1979, Camerer 2004). For these reasons, a lottery, even or especially one without the odds given, may have a stronger impact on behavior.

Comparing the USSD Standard, Free, and Lottery columns of Table 6, we see that 1 in every 1900 PCMS without an incentive attached resulted in a registered user. Thus, it does appear that some fraction of the population will participate without incentives. Incentives are nonetheless effective; the yield rate jumps to 1 in every 1111 PCMs when some kind of incentive (free service or the lottery) is offered.

Incentives are similarly found to be effective in the CO volunteer experiment in Phase 3, which randomized incentives (R5 or R55) to join (see Table 7). We conducted this experiment on 41,863 people. In the absence of incentives, 3.4 percent of the Standard USSD users invited to serve as COs volunteered (approximately 1600 people). Incentives bumped up participation by close to 2 percentage points (significant at the .01 level), nearly 900 people. We emphasize that R5 is a very small sum of money and the literature generally suggests that net crowd-out of intrinsic incentives will be particularly strong when extrinsic incentives are minimal (Gneezy and Rustichini 2000).

Actual monitoring also responded to incentives (see Table 8). When offered the payment of R5, only 12 percent (or 232 people) of those deployed to monitor entered any

data on their polling places. In contrast, among those offered the more substantial payment of R55, this rate almost doubled to 21.9 percent (433 people). Within the sample that monitored, the rate of successful entry of ANC voting data via SMS almost tripled, from 4.2 to 14.6 percent for those offered the larger incentive.[17]7

While our data unambiguously show the effectiveness of incentives, we are struck more by the evidence suggesting substantial numbers of intrinsic participators. Many of our participants were relatively poor people using the most basic cellular technology. Yet a substantial number were willing to participate in all stages of our platform without incentives of any kind, in many cases paying the full cost of submitting information. Our platform was built from scratch, without the backing of an on the ground organizational presence. We offered little feedback to participants and zero face-to-face interaction. The willingness of South Africans to engage with such a system, providing information about themselves and their political environment, and even in some cases volunteering to serve and actually serving as citizen election observers, highlights the importance of intrinsic motivations to participation.

Turning to the dynamic impact of incentives as discussed in H3, we expect that the marginal effect of incentives will be stronger in the group recruited through external incentives because this group includes more extrinsically motivated individuals. In the language employed earlier, the crowd generated by lowering costs (or increasing benefits) will be more malleable than the one created in the absence of these external motivators: it will respond more strongly to further incentives.

Because the Lottery treatment was clearly effective at inducing participation, we focus our attention on this arm unequivocally more composed of extrinsically motivated individuals than the Standard arm. To test H3a, 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 some phase 2 questions were incentivized via lottery for all participants (the 'Demographics' questions) while others were un-incentivized for all participants (What's up, VIP). We can look at the differential response

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

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 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.

Column (1) of Table 9 shows that 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 percentage points (Free) to 8.4 percentage points (Lottery), confirming H3a. 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 crowd 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).

Column (4), Table 9 tests H3b; moving from digital forms of participation whose (low) costs vary across channels, to real-world forms of participation such as serving as a citizen observer whose (high) costs are less related to the technology used in recruitment. The key insight here is that once the cost of the action has exceeded the differential costs across channels and across incentives, then the differential participation probabilities that were generated in the recruitment process will no longer be important in determining who engages in the real world. We expect incentives for costly forms of participation to be effective across all channels, but not differentially so (because none of those induced by low net cost to participate digitally are engaged in the high-cost activity anyways). As predicted, Table 9, Column 4 shows that the incentive is strongly effective in all three groups but not differentially so across initial recruitment arms once the cost of the action becomes sufficiently high.

Finally, Columns (5) and (6) in Table 9 test H3c returning to the domain of digital engagement and examining how the incentivized and un-incentivized groups responded to

different GOTV treatments. The GOTV exercise sent a message to people prior to the election telling them to vote, as well as providing a randomized reason to do so. The two treatments were: 'Voice,' in which citizens were urged to make their voices heard; and 'Visibility,' in which they were also reminded that their neighbors would be able to tell whether they voted by their inked fingers. We take the 'Voice' treatment as an intrinsic one, and the 'Visibility' treatment as extrinsic[18], and expect the 'Visibility' GOTV treatment will have a stronger effect in the group induced to enter by incentives (Lottery, Free) and the 'Voice' GOTV treatment will have a stronger effect in the group intrinsically motivated in the first place (Control). The outcome variable is a dummy indicating that they responded when we asked them the question 'did you vote?' (5), and a dummy for 'I voted' (6). We can use the cross-randomized experiments of initial incentives and 'extrinsic' or 'intrinsic' GOTV messages to examine differential response rates.

Interestingly, neither the intrinsic nor extrinsic message, nor the interactions with PCM treatment, had any effect on the probability that individuals respond to the GOTV question. The responses, however, strongly correlate with treatment status: both the Free and Lottery arms are significantly more likely than the Standard PCM arm to report having voted. The 'intrinsic' message is strongly significant, increasing the probability that individuals report having voted by more than 8 percentage points (off of a control mean of 86.4%). Column (6) provides some confirmation for H4c; the intrinsic cue of emphasizing 'voice' improves voting overall, while the effect is near zero for groups that got the extrinsic financial incentives to enroll. While participants overall responded negatively to the 'Visibility' GOTV treatment, the disproportionately extrinsically motivated 'Lottery' group has the highest participation under this treatment. We do not find significant evidence that the control responded more strongly to the intrinsic 'Voice' GOTV treatment.

Overall, we find a fair amount of support for the idea that, by initially incentivizing a voluntary activity, we create a participant group that subsequently responds more favorably to incentives. Incentivization creates a positive feedback loop for itself by selecting in a set of participants that is subsequently more sensitive to incentives.

5. Conclusion

[18] Add some hand waving here about social sanctions being a type of extrinsic reward/punishment.

This paper presents the results from a nationally scaled ICT/DM election platform that we built de novo using modern methods to advertise and recruit participants across a variety of cellular and digital channels. 90% of our final users come through MXIT, a feature and smartphone social media site, and basic mobile phone users interacting via menu-driven USSD interface. Users vary across a number of dimensions, explained by a simple model of the economic benefits of participating (extrinsic inducements to participate, the effect of past incentives on the marginal incentives in a given user group) as well as ones that are less straightforward (how the intrinsic incentives to participate vary across user group and across political action). Our study attempts to shed light on the ways in which digital participation interacts with engagement in real-world political activity.

Despite impressive overall numbers of participants in VIP:Voice, we find attrition across time and across activities that is so large as to make selection itself the key story. At a simple observational level, we confirm that those who intended to vote in the election at the time of registration are more likely to remain involved in our platform during the course of the electoral cycle, particularly as they are asked to engage in election-related activities with real-world costs. Smartphone-based platforms make digital communications easy and help to retain participants for activities such as entering information about themselves and local political events, but they also recruit a user base that is particularly prone to attrite when asked to undertake more costly political actions. Overall, digital participation is highly correlated with real-world participation.

Our experimental results provide insights important policy implications for actors concerned with improving democracy and governance in developing countries. First, intrinsic and extrinsic motives drive participation. Contrary to a literature suggesting that small extrinsic incentives may crowd out intrinsic motivation, we find relatively small financial inducements to be effective at every stage in the platform. This is particularly true of lotteries. Our results suggest a set of dynamic benefits of the initial use of incentives: the subsequent user group is larger in absolute size, is no more recalcitrant when asked to do things for free, and is more responsive to incentives on the margin. The incentive to monitor tripled the probability that an individual entered usable voting data from their polling station. We therefore see little downside to these incentives in our data.

Second, the results of our platform help inform discussions within the ICT/DM community about the implications of the choice of technology channels. The starkly different demographic profiles of users across channels suggests that 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." Our user demographics map in a fairly straightforward way onto the technological platform, and we discuss the outcomes for which a reweighting scheme could recover correct national averages (ANC support) versus those which it could not (voter turnout, for which all platforms display voting levels higher than the national rate).

Third, our results provide information on the practical possibility of using citizens as election monitors and whistleblowers for political acts such as vote-buying or campaign violence. ICT/DM can prove a useful tool for organizations that are already interacting with constituents in a wide variety of ways, including in health, banking, and agricultural sectors. But citizen participation has been a stumbling block in numerous ICT/DM applications to date, most notably those that require action rather than simply passive absorption of information. We provide evidence on strategies to encourage citizen engagement in some very real-world political activities, including monitoring polling places. We provide large numbers of reports of vote-buying and electoral violence in a very large number of different locations, suggesting that the crowdsourcing platform can provide a meaningful way of understanding political events that would otherwise be difficult to observe.

The ICT/DM monitoring delivers a large absolute number of polling places with volunteer monitors, but the quality of the actual monitoring data is low. This signals a meaningful potential change in citizen engagement in the election, but questions whether ICT-enabled citizens can provide a useful way of gleaning vote tallies from a large number of polling places. The quality of the voting data recovered through the system is poor overall. We note that as a part of separate election-monitoring experiment, we provided some training to a group of college students and asked them to use the VIP:Voice platform to monitor a specific set of polling places. These slightly-trained individuals were paid 200 Rand and achieved a 90% success rate at monitoring polling places, suggesting that a very

light-touch intervention combined with an ICT platform can achieve widespread monitoring at low cost.

The evolution of engagement on VIP:Voice illustrates the promise and perils of ICT/DM platforms to engender political participation. From 50 million text messages to promote registration and advertisements in print and social media, more than a quarter million contacts initiated with our platform; 134,000 answered an initial 'engagement' question; 91,000 registered; 35,000 gave demographic information; 2,500 volunteered to serve as election monitors; and 5,000 responded to the GOTV experiment. The USSD channel on standard phones generates a user base that is largely female and black, while the social media channels are more male, coloured (mixed race), and younger. From a sample of registered users, we recruited citizen monitors in 38% of the wards of South Africa and deployed 347 citizen monitors to polling places. Seen in a positive light, the platform promoted low-cost digital engagement in addition to costlier, real-world forms of participation in the electoral process and operated at a national scale. More skeptically, we yielded a non-randomly selected sample and the platform suffers rates of attrition of roughly 50% for every subsequent act of engagement that we ask of individuals over the course of the election period. The platform therefore produces a questionable sample on which to draw strong population inferences, but also provides a rich environment to understand the effects of incentives on national participation rates.

Ultimately, the transformative potential of ICT/DM depends on how citizens use technology. We show that with the appropriate choice of channel, an ICT/DM approach can achieve outreach far beyond the young male demographic that may dominate smartphone-based social media, broadening participation further using extrinsic incentives. Political engagement that is initiated in the digital realm can cross over to activity in the real world. ICT/DM can therefore play a central role increasing citizens' participation and their contribution to the quality of democracy in countries across the developing world.

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TABLES.

Table 1. Recruitment and Participation Numbers

	Mobile Phone Channels:		Feature Phone	Smartphone/ Social Media Channels:			
Phase 1 Recruitment.	USSD Experiment	USSD Other	MXIT	Mobi	Twitter/ Gtalk	Advertising/ Other	Total
Total # Solicited via PCM	49.8m		.	.	.	.	.
Total # Registered	40,165	4,277	40,416	4847	101	840	90,646
Registered as % of PCMs	0.08%						
Phase 2 Participation Waterfall.							
Any Initiation	126,647	12,999	114,358	4,923	317	3,735	262,979
Any answer to Engagement Question	65,381	6,816	55,352	4,882	131	1,485	134,047
Registration (T&C) Initiated	52,048	5,426	50,862	4,867	119	1,136	114,458
Registration Completed	**40,165**	**4,277**	**40,416**	**4,847**	**101**	**840**	**90,646**
Registration & Demographics Completed	11,338	1,143	20,078	2,019	66	74	34,718
Reg, Demo, and Any Other Phase 2	3,859	367	10,215	995	23	2	15,461
Registered + Demography as % of Initiated:	8.952%	8.793%	17.56%	41.01%	20.820%	1.98%	13.20%
Registered + Demography as % of PCMs:	0.02%						
Phase 3 Monitoring Invitations.							
Invited to Volunteer as Monitor	34,640	3,805	2,635	766	16	1	41,863
Agreed & Provided All Relevant Information	1,772	212	462	47	5	0	2,498
Potential Monitors as % of Invited:	5.12%	5.57%	17.53%	6.14%	31.25%	0.00%	5.97%
Phase 3 Actual Monitoring.							
Asked to Monitor	1,780	49	1	5	0	28	1,863
Conducted Any Monitoring	315	8	1	0	0	8	332
Monitors as % of Actually Asked:	17.70%	16.33%	100.00%	0.00%	NA	28.57%	17.82%
Phase 4 Participation.							
Invited to Participate in Phase 4	37,501	4,043	35,370	72	78	814	77,878
Respond to GOTV questions	3,314	352	1,365	7	0	0	5,038
Respond to Voter Experience Survey	5,577	636	740	24	1	0	6,978
Voter Experience as % of Phase 4:	14.87%	15.73%	2.09%	33.33%	1.28%	0.00%	8.96%

Table 2: Demographics of Participants, by Channel

	Age	Male	Black	Coloured	White	Asian	Voted in 2009
National Average	**24.9**	**0.51**	**0.792**	**0.0892**	**0.0886**	**0.0249**	**77.30%**
Platform Average	**23.995**	**0.510**	**0.858**	**0.102**	**0.010**	**0.018**	**38.51%**
SE	6.90	0.50	0.35	0.30	0.10	0.13	0.49
By Channel:							
USSD	26.146	0.350	0.938	0.039	0.009	0.005	57.31%
SE	7.91	0.48	0.24	0.19	0.10	0.07	0.49
MXIT	22.764	0.622	0.816	0.137	0.023	0.013	28.15%
SE	5.92	0.48	0.39	0.34	0.15	0.11	0.450
Mobi	23.718	0.350	0.890	0.056	0.015	0.007	46.46%
SE	6.72	0.48	0.31	0.23	0.12	0.09	0.50
Twitter/GTalk	25.453	0.485	0.639	0.098	0.131	0.115	40.6%
SE	5.98	0.50	0.48	0.30	0.34	0.32	0.50

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

Table 3: Participation, Controlling for Demographics

Outcome:	Number of Phase 2 Responses (other than Demographics)			Volunteers to Monitor in Phase 3			Number of Phase 4 Responses		
Sample:	All	Demographic Data Observed		Volunteer Recruitment Sample	Volunteer Recruitment Sample, Demographic Data Observed		All	Demographic Data Observed	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
USSD	0.530***	1.727***	1.620***	0.0505***	0.104***	0.0866***	0.801***	1.436***	1.313***
	(0.01)	(0.04)	(0.05)	(0.00)	(0.00)	(0.00)	(0.01)	(0.03)	(0.03)
MXIT	3.366***	6.372***	6.446***	0.0486***	0.0490***	0.0607***	0.250***	0.419***	0.485***
	(0.03)	(0.05)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mobi	0.255***	3.695***	3.591***	0.0535***	0.448***	0.434***	0.0332***	1.661***	1.592***
	(0.01)	(0.77)	(0.77)	(0.01)	(0.09)	(0.09)	(0.01)	(0.39)	(0.39)
Other (Twitter, Gtalk)	0.372***	2.966***	2.898***	0.235**	0.250**	0.253**	0.00956	0	-0.0464*
	(0.07)	(0.57)	(0.57)	(0.10)	(0.11)	(0.11)	(0.01)	0.00	(0.02)
Age			0.0189***			0.00257***			0.0177***
			(0.01)			(0.00)			(0.00)
Male			-0.700***			-0.00163			-0.0888***
			(0.08)			(0.01)			(0.03)
Coloured			0.294**			-0.0281***			-0.155***
			(0.14)			(0.01)			(0.03)
White			0.148			-0.0602***			-0.215***
			(0.30)			(0.02)			(0.07)
Asian			-0.501			-0.0416			-0.195**
			(0.41)			(0.03)			(0.10)
Voted in 2009 Election			-0.397***			0.00911			0.170***
			(0.08)			(0.01)			(0.03)
Engagement: too young to vote			-0.374***			-0.0209***			-0.0308
			(0.13)			(0.01)			(0.03)
Engagement: Enthusiasm			0.0920*			0.0244***			0.0949***
			(0.06)			(0.00)			(0.01)
Observations	90,646	28,747	28,747	41,863	9,749	9,749	90,646	28,747	28,747
R-squared	0.217	0.405	0.407	0.051	0.102	0.112	0.11	0.16	0.167

OLS regression with robust standard errors. *** p<0.01, ** p<0.05, * p<0.1. Colums 1-3 and 7-9 use the entire registered sample, while columns 4-6 use the entire sample invited to serve as Citizen Observers. Regressions include an exhaustive set of dummies for channel and no constant, so the coefficients in the first four rows give the average unconditional outcome in each cell. Individual covarieates are demeaned before interaction, so the coefficients on channels in columsn 3, 6, and 9 give the outcome for a constant average individual type.

Table 4: Engagement by Channel

Answer to Engagement question: "It's election time! Do u think ur vote matters?"

	Yes, every vote matters	No, but I'll vote anyway	No so I'm not voting	Not Registered
	(1)	(2)	(3)	(4)
USSD Experimental	79.19%	9.05%	1.91%	9.84%
USSD non-experimental	83.54%	8.59%	1.12%	6.75%
MXIT	66.92%	9.11%	7.26%	16.71%
Mobi	80.29%	6.53%	4.46%	8.72%
Twitter/Gtalk	85.57%	5.15%	2.06%	7.22%
Other	77.54%	9.78%	1.59%	11.10%

Cells give fraction of each channel (rows) that give each response to the engagement question (columns) from the VIP:Voice data among those who answered the question and were of voting age.

Table 5. Engagement and Participation

Sample:	**All**	**All Registered**				
Answer to question: "It's election time! Do u think ur vote matters?"	Registered	Any Phase 2	Gave Demographics	Volunteered Phase 3	Any Phase 4	Answered Voting Question
	(1)	(2)	(3)	(4)	(5)	(6)
Yes, every vote matters	0.693***	0.455***	0.384***	0.0350***	0.144***	0.0629***
	(0.0016)	(0.0020)	(0.0020)	(0.0008)	(0.0014)	(0.0010)
No, but I'll vote anyway	0.609***	0.433***	0.362***	0.0283***	0.142***	0.0660***
	(0.0045)	(0.0059)	(0.0057)	(0.0020)	(0.0041)	(0.0029)
Not Voting/Not Registered	0.669***	0.460***	0.397***	0.0115***	0.0834***	0.0402***
	(0.0033)	(0.0043)	(0.0042)	(0.0009)	(0.0024)	(0.0017)
Observations	118,093	80,344	80,344	80,344	80,344	80,344
R-squared	0.6810	0.4540	0.3840	0.0330	0.1370	0.0610
F-Test: Yes=No, Vote Anyway	308.3***	13.44***	12.77***	10.01***	0.224	1
p-value	0	0.000246	0.000353	0.00156	0.636	0.317
F-test: Not Voting = No, Vote Anyway	115.98***	13.94***	24.77***	60.5***	150.1***	58.24***
p-value	0	0.000189	0.000000647	0	0	0

OLS regressions with robust Standard Errors. Regressions estimated with no intercept so coefficients give fraction of each initial engagement level (rows) that engage across phases of the project (columns). Estimated only on the sample that answered engagement question other than 'skip' or 'too young to vote'. Column (1) estimated in entire remaining sample, and columns 2-6 estimated in remaining sample that also registered for the VIP:Voice platform. *** p<0.01, ** p<0.05, * p<0.1

Table 6. PCM Recruitment Experiment.

	PCM Experiment		
Phase 1 Recruitment.	USSD Standard	USSD Free	USSD Lottery
Total # Solicited via PCM	13.8m	16.1m	19.9m
Total # Registered	7,257	8,146	24,762
Registered as % of PCMs	0.0526%	0.0506%	0.1244%

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Table 7. Impact of Incentives on Volunteering to Observe

	Volunteers to Monitor in Phase 3		
	All	All w/ Demographics	
	(1)	(2)	(3)
Incentivized to Monitor	0.0198***	0.0322***	0.0327***
	(0.00)	(0.01)	(0.01)
USSD Free	0.0111***	0.0439***	0.0416***
	(0.00)	(0.01)	(0.01)
USSD Lottery	0.00637*	0.0135	0.00781
	(0.00)	(0.01)	(0.01)
USSD non-experimental	0.00979**	0.0275*	0.0193
	(0.00)	(0.02)	(0.02)
MXIT	0.00464	-0.0373***	-0.0207*
	(0.01)	(0.01)	(0.01)
Mobi	0.00915	0.351***	0.351***
	(0.01)	(0.09)	(0.09)
Twitter/Gtalk/Other	0.191*	0.164	0.184*
	(0.10)	(0.11)	(0.11)
Age			0.00287***
			(0.00)
Male			-0.00171
			(0.01)
Coloured			-0.0280***
			(0.01)
White			-0.0612***
			(0.02)
Asian			-0.0392
			(0.03)
Voted in 2009 Election			0.0162**
			(0.01)
Constant (average in USSD Standard)	0.0340***	0.0697***	-0.00861
	(0.00)	(0.01)	(0.01)
Observations	41,863	9,749	9,749
R-squared	0.003	0.017	0.025

OLS regressions with robust Standard Errors, regression estimated within the sample sent invitations to volunteer as Citizen Observers. *** p<0.01, ** p<0.05, * p<0.1

Table 8: Impact of Incentives on Actual Citizen Observing

	Monitoring performed	Entered usable Vote data, whole sample	Entered usable Vote data, among those who responded
	(1)	(2)	(3)
Incentivized to Monitor	0.099***	0.027***	0.104***
	(0.017)	(0.006)	(0.031)
Outcome in Unincentivized Group	0.120***	0.005**	0.042**
	(0.012)	(0.003)	(0.020)
Number of observations	1,829	1,829	322

OLS regressions with robust Standard Errors, regression estimated within the sample actually invited to serve as Citizen Observers. *** p<0.01, ** p<0.05, * p<0.1

Table 9 Differential Impact of Subsequent Incentives on Participation

	Answers Survey Questions on Entry into System:					
	Answers **Incentivized** Questions	Answers **Unincentivized** Questions	**Differential Probability,** (Incentivized - Unincentivized)	**Volunteers to Monitor**	**Responds to 'Did you Vote?'**	**Voted, if responds to 'Did you Vote?"**
	(1)	(2)	(3)	(4)	(5)	(6)
"Free" Treatment	0.0787***	0.0187***	0.0670***	0.0104**	-0.004	0.0521*
	(0.007)	(0.004)	(0.007)	(0.005)	(0.009)	(0.030)
"Lottery" Treatment	0.0819***	-0.003	0.0839***	0.001	-0.0136*	0.0770***
	(0.006)	(0.003)	(0.005)	(0.004)	(0.007)	(0.027)
Incentivized to Monitor				0.0245***		
				(0.006)		
Monitor Incent * "Free"				-0.011		
				(0.008)		
Monitor Incent * "Lottery"				(0.002)		
				(0.007)		
"Voice" GOTV Treatment					-0.011	0.0826***
					(0.009)	(0.030)
"Visibility" GOTV Treatment					-0.007	0.049
					(0.010)	(0.033)
"Voice" * "Free"					-0.007	-0.110***
					(0.012)	(0.041)
"Visibility" * "Free"					0.004	-0.032
					(0.012)	(0.041)
"Voice" * "Lottery"					0.015	-0.105***
					(0.010)	(0.033)
"Visibility" * "Lottery"					0.010	-0.0662*
					(0.011)	(0.036)
Constant (Control mean)	0.219***	0.0588***	0.186***	0.0376***	0.0988***	0.864***
	(0.005)	(0.003)	(0.005)	(0.004)	(0.007)	(0.025)
Number of observations	40,335	40,335	40,335	34,717	37,653	3,329
R-squared	0.005	0.001	0.005	0.002	0.000	0.005
F-test: Free = Lottery	0.311	43.340	9.158	5.028	2.298	1.576
Prob > F	0.577	0.000	0.002	0.025	0.130	0.209

note: *** p<0.01, ** p<0.05, * p<0.1

OLS regressions with robust SEs. All regressions use only the sample experimentally recruited in to USSD by PCM.

FIGURES

Figure 1: Waterfall of Recruitment and Experimentation.

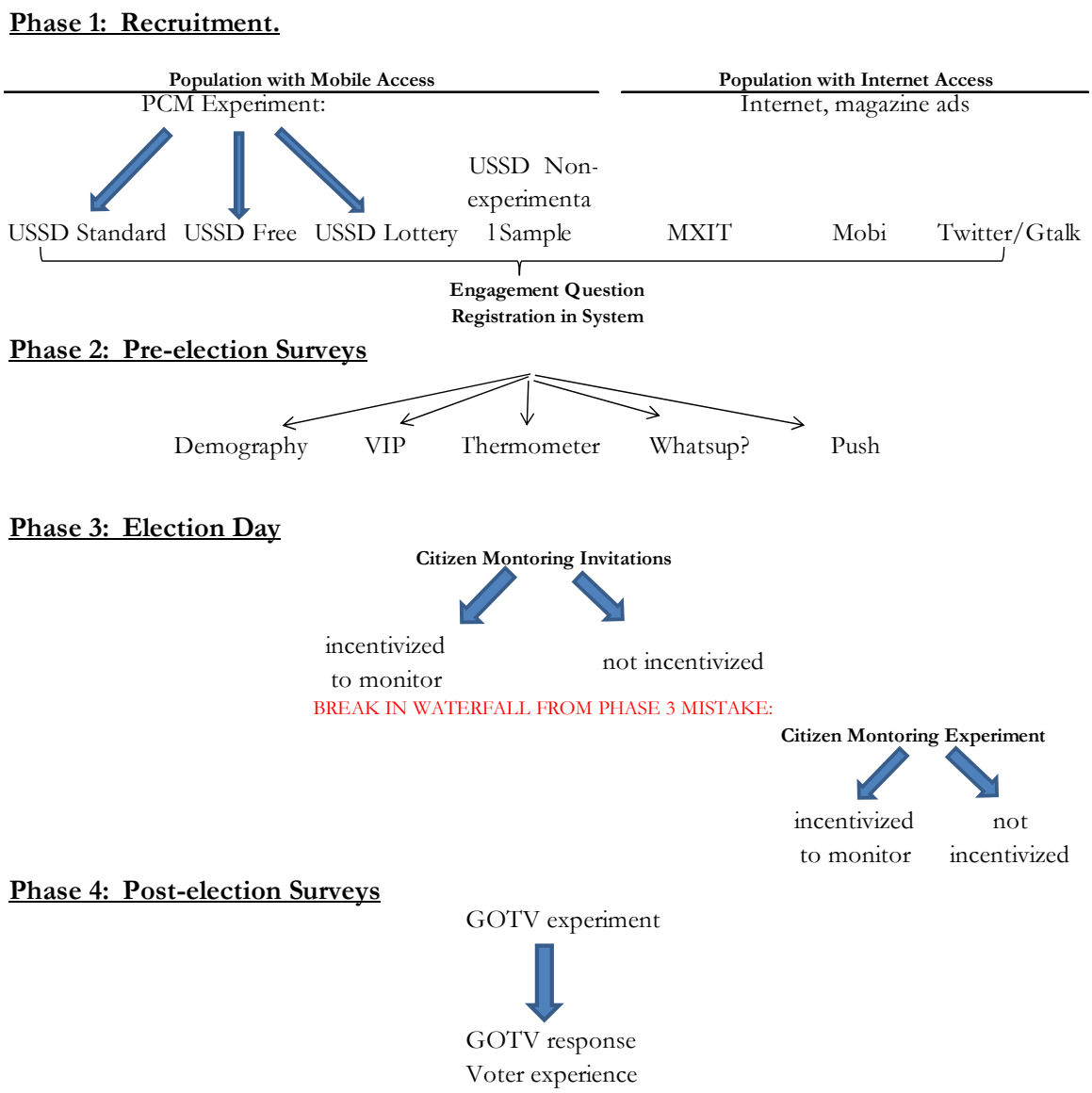


Figure 2: Daily Opinion Polling

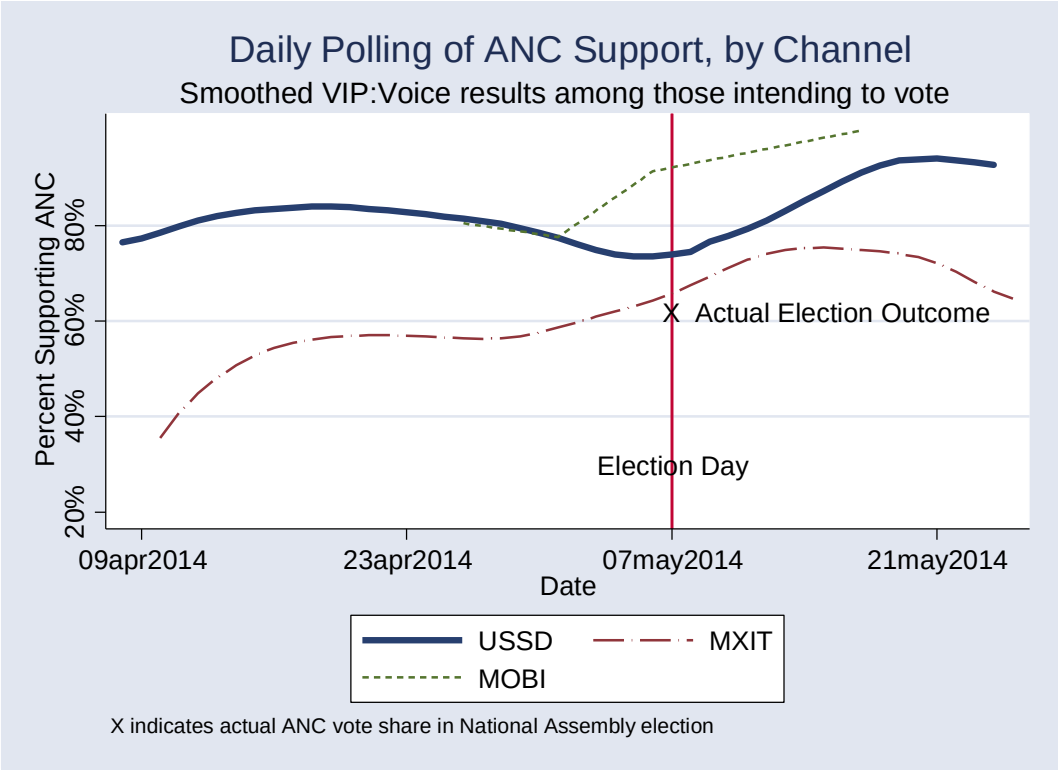
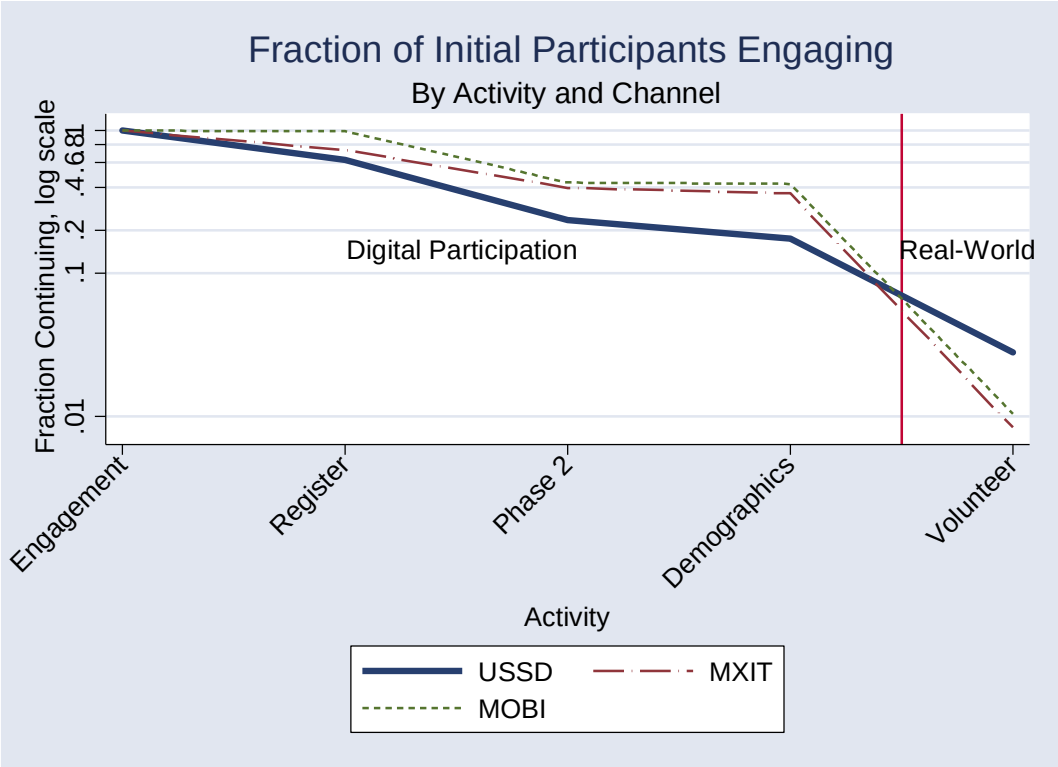


Figure 3: Participation Rates by Activity and Channel.



APPENDIX

Table A1: Expected Recruitment by Channel

Advertising Channel	Interaction Channel	Expected Impressions	Expected Recruitment
Mxit broadcast messages and splash page ads	Mxit	3,900,000	78,000
Mobi banner ads	Mobi	26,000,000	7,200
Google adwords	Mobi	550,000	15,000
Promoted tweets and accounts	Twitter	1,980,000	15,000
Facebook page posts	Facebook	5,000,000	45,000
Please Call Me (PCM) messages	USSD	20,000,000	200,000
Live Magazine SA Google+ posts	Google+	67,000	1,500
Live Magazine print ads	All channels	60,000	1,000
Total		**57,557,000**	**362,700**

Table A2: Balance of the Phase 3 incentives experiment as actually performed:

VARIABLES	phase3_volunteer_SAMPLE	entry_ussd	phase_2_ever	whatsup_ever	vip_ever	age_num	male	black	election2009_yes
Incentivized to Monitor	-0.000125	-0.00787	0.0156	0.00271	0.00113	0.684	0.0152	0.00956	-0.0432
	(0.006)	(0.010)	(0.014)	(0.003)	(0.005)	(1.376)	(0.077)	(0.024)	(0.087)
Constant	0.0147***	0.960***	0.0994***	0.00368	0.00982***	26.35***	0.300***	0.978***	0.611***
	(0.004)	(0.007)	(0.011)	(0.003)	(0.004)	(1.064)	(0.060)	(0.019)	(0.068)
Observations	1911	1,911	1,911	1,911	1,911	142	152	124	135
R-squared	0	0	0.001	0	0	0.002	0	0.001	0.002