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

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Abstract

Can technology help citizens overcome barriers to participation in emerging democracies? We argue that, by lowering costs, technology brings new participants into the political process. However, by shaping the selection of participants, it also generates a "crowd" that is both more responsive to incentives (malleable) and more sensitive to costs (fragile). We illustrate these dynamics using VIP:Voice, a novel, multi-channel information and communication technology/digital media (ICT/DM) platform that we built to encourage South African political engagement during the 2014 national elections. VIP:Voice recruited South Africans through a variety of methods and allowed citizens to engage via low-tech mobile phones and high-tech social media. VIP:Voice generated engagement in over 250,000 South Africans, but saw large attrition as people were asked to switch from low-cost digital engagement to high-cost, real-world engagement. The implementation of a standard platform across multiple technology channels, combined with a set of experiments in the role incentives play in driving participation, reveal how technology shapes not just the level of participation but the very nature of the crowd that forms.

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1 Introduction

Healthy democracies require citizens to participate actively in political life, from turning out to vote to monitoring government performance. Yet citizens in emerging democracies frequently face barriers to participation that marginalize them from political processes. Governments engineer exclusion by 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 institutions may create additional challenges for individuals in transitioning societies.

The spectacular growth of information and communications technology (ICT) and digital media (DM) has fundamentally altered the technological landscape of developing countries, providing new and potentially powerful tools for citizen mobilization. Relative to traditional media, ICT/DM allows inexpensive communication, facilitating information-sharing and collective action across a large and dispersed user base. By lowering the costs of engagement, this technological revolution helps citizens in emerging democracies overcome barriers to participation. And as participation grows, so too might the responsiveness of governments to the needs of the electorate.

However, technology is not just a neutral tool for citizens to engage more easily in politics. We argue that, in the process of drawing in new members, ICT/DM also fundamentally alters the composition of "the crowd." Citizens' internal motivations to participate in politics vary: in equilibrium, those with higher levels of motivation participate more than those with lower levels. If political action is costly, only the deeply motivated will choose to partake. Changes in technology that decrease costs will encourage more participation. Nevertheless, we argue that these changes will also draw in extrinsically motivated individuals at a higher rate, thereby altering the composition of the crowd. These selection effects have important consequences for how we understand the underpinnings and robustness of participation. By attracting a more extrinsically motivated crowd, ICT/DM interventions generate a group of participants that is both more responsive to incentives (malleable) and more sensitive to rising costs (fragile). In the face of rising costs without concomitant incentives, the involvement of the extrinsically motivated should decay.[1]

Recent research has focused on how ICT/DM can increase participation and facilitate interactions within pre-existing social movements and organizations, but few studies examine the effect of technology on the composition of participants. For example, ICT/DM played a central role catalyzing spontaneous citizen-generated forms of protest and subsequent political change in the Arab Spring and Color Revolutions (Breuer, Landman and Farquhar 2015, Tufekci and Wilson 2012). Studies have also explored how local activists, organizations, and donors can use ICT/DM to promote democracy and governance in the developing world across applications like improving electoral integrity (Bailard and Livingston 2014, Callen et al. 2016); crowd-sourcing information on violence, corruption, and government performance (Callen et al. 2013; Cecchini and Scott 2003; DeRenzi et al. 2011; Findley et al. 2012; van der Windt and Humphreys 2014); and strengthening accountability between citizens and politicians (Grossman et al. 2014). While these studies investigate how ICT/DM interventions can increase political participation, few explicitly consider how the cost of technology shapes the kind of individuals who ultimately participate.

To explore how selection through technology affects the composition and nature of political participation, we designed a large nationwide ICT/DM platform to encourage citizen engagement in the 2014 South African election. This platform allowed us to experimentally manipulate some types of costs, to observe variation in others, and to explore how costs shaped the size and composition of the group participating in election-related activities. To our knowledge, our platform, called "VIP:Voice," is the largest, built-from-scratch, free-standing ICT/DM platform developed to date for use in an emerging democracy's election. Because VIP:Voice did not rely on any pre-existing structure or defined set of users, it allows for an unusually pure proof of concept as to whether and how technology can engender political participation. We

[1] Morozov (2011) argues that lowering transaction costs through social media may motivate individuals to engage more in expressive politics than the risky strategy of physical protest.

constructed VIP:Voice across five ICT/DM channels: USSD, a standard phone (not internet capable) channel; Mobi (mobile web for internet-capable devices); Mxit (South Africa's largest social network); GTalk (google chat), and Twitter.

Implementation of VIP:Voice proceeded in four phases. During Phase 1, we launched the platform four weeks before the South African elections, reaching millions of citizens. We ran experiments within the USSD channel to measure the effect of free usage, paid usage, and participation lotteries on the likelihood of registration. In Phase 2, we used VIP:Voice to foster digital political engagement. We surveyed participants regarding political attitudes (including vote intention) and demographic information, conducted rolling opinion surveys, and crowd-sourced information about local pre-election political activity. In Phase 3, we experimentally recruited and fielded volunteer citizen election observers tasked with reporting vote totals from their polling places the day after the election—shifting to real-world, rather than only digital, participation. Finally, in Phase 4, we encouraged citizens to vote through a series of randomized messages and asked voters about their perceptions of the voting process.

We structured VIP:Voice to explore the effects of three types of cost on participation: ease of use, cost of interaction, and type of activity. First, ease of use varied across channel. For example, registering and engaging with VIP:Voice via social media channels was easier than doing so via basic mobile phones. Second, we randomly assigned three levels of costs to interactions within the USSD channel.[2] Third, costs differed across types of participatory behaviors. Some actions were inexpensive and digital (e.g., registering on the platform, opinion polling, crowd-sourcing information on protests and violence, and reporting on voter experiences). Others involved costlier real-world behaviors (voting, volunteering to be a Citizen Observer, recording data from posted declaration of results forms the day after the election). We experimentally manipulated the cost of interaction within the USSD channel; ease of use and type of activity costs varied observationally.

[2]The "standard" USSD arm makes individuals pay all messaging costs, the "free" USSD arm eliminates user costs, and the "lottery" USSD arm offers a chance to win 55 South African Rand (about 85 U.S. cents).

We find substantial support for our theory that costs affect both the size and composition of the participating crowd. Our results demonstrate that, while a surprising number of South African citizens engaged with VIP:Voice without receiving any incentives, participation nonetheless responded sharply to external changes in costs: even small reductions in the cost of interaction increased participation, and it dropped sharply shifting from relatively costless digital engagement to costly participatory activities. We also show that changes in ease of use and cost of interaction affected the composition of the crowd. Different channels clearly generated user populations with widely different demographic characteristics that bear on participation. Moreover, switching from lower cost digital communication via VIP:Voice to higher cost activities like citizen election observation greatly reduced participation, but the decline was more prominent in individuals identified as extrinsically motivated. Increasing the costs of action also produces the steepest decline in individuals who had chosen the "easier" channels. These channels experienced the greatest attrition as costs rose, suggesting a less intrinsically motivated, more fragile crowd than that generated by costlier technology channels. Users drawn in through extrinsic rewards (via lottery) also proved more responsive to subsequent incentives, suggesting a more malleable group than one generated in the absence of rewards. In sum, we show that costs shape both the number of overall participants and the nature and composition of these participants.

South Africa's institutional and ICT/DM environment create an excellent setting for a comparative study of participation in emerging democracies. The 2014 election took place during rising dissatisfaction with the ruling party and incumbent president, Jacob Zuma. Despite many South Africans' intrinsic belief in the democratic system, participation in elections is far from universal. Uneven engagement reflects conditions common across emerging democracies where citizens participate at different rates given variation in institutional and individual factors. Additionally, like many developing countries, South Africa has enjoyed rapid infiltration of ICT/DM in recent years. Technological development in South Africa outpaces other parts of Africa but still varies significantly within the country, increasing the feasibility and generalizability 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 literatures. First, we provide micro-foundations to a rich set of studies on political participation in developing democracies by examining how variations in incentives, costs, 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 they generate. Second, we contribute to the growing empirical literature addressing the adoption of ICT/DM platforms across a wide variety of contexts such as health (Chi and Stringer 2010, Dupas 2014, Lester et al. 2010), agriculture (Aker 2010, Fafchamps and Minten 2012, Jensen 2007), 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. 2016; Collier and Vicente 2014; Hyde 2011; Ichino and Schundeln 2012; Kelley 2012).

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

2 Theoretical Motivation

2.1 ICT/DM and Participation in Developing Democracies

Social scientists have long studied the factors driving political participation in consolidated democracies (Powell 1980; Verba et al. 1978; Wolfinger and Rosenstone 1980). But the determinants and contours of participation in emerging democracies are likely distinct. Imperfect and incomplete regime transitions curtail citizen involvement and strengthen marginalization. Citizens may have only 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 (e.g., ballot secrecy) (Ferree and Long 2016; Gans-Morse et al. 2014; Kramon 2009; Nichter 2008 ; Stokes 2005).

Individual-level factors also affect participation in emerging democracies. Citizens vary in intrinsic and extrinsic motivations. 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: low literacy rates and remote, inaccessible, or overcrowded polling stations. Individuals facing constraints may fail to participate in meaningful ways even if they possess intrinsic desires to do so; they may be especially sensitive to positive and negative external influences. Together, voters' intrinsic and extrinsic motivations may interact in additive ways, or potentially crowd each other out, making it difficult to predict the likelihood of taking action.[3]

In light of these realities, the widespread adoption of ICT/DM by citizens of developing democracies presents a promising new set of opportunities to engender participation (Alozie, Akpan-Obong, and Foster 2011; Bailard 2012; Bratton 2013; Shirazi 2008). 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. Low entry prices encourage broad use to exchange information across demographic groups and 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.

Numerous evaluations document the consequences of ICT/DM in developing countries across a wide range of uses, from agricultural markets to election monitoring.[4] Previous studies on ICT/DM and political participation have focused almost exclusively on the size of the crowd i.e., the number of people participating in political action. Much of this work examines how technology enables participation within existing organizations. ICT/DM facilitated political movements associated with the Arab Spring and the Color Revolutions (Breuer 2015; Tufekci and Wilson 2012; Shirazi 2008). But other studies employ ICT/DM to engineer participation in the absence of pre-existing groups or platforms (Aker et al. 2011; Findley et al. 2012; Grossman et al. 2014). These projects expressly attempt to increase the political engagement of citizens marginalized by standard political processes, the poor, those in peripheral regions, and women. While this research shows success in generating participation, weak involvement in ICT/DM platforms and high rates of attrition from original in-

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

[4]Economists document effects of ICT/DM on agricultural markets (Aker 2010; Aker and Fafchamps 2010), health (Chang et al. 2011; Dammert et al. 2014; Garfein et al. 2012; Pop-Eleches et al. 2011), uptake of social benefits (Blanco and Vargas 2014), education (Aker et al. 2012), and mobile money (Blumenstock et al. 2013; Jack and Suri 2014). Research in political science has examined links between ICT/DM and corruption (Bailard 2009), civil conflict (Pierskalla and Hollenbach 2013; Shapiro and Weidmann 2015), and election monitoring (Bailard and Livingston 2014; Callen et al. 2016).

take samples present challenges. These patterns hold particularly 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 technology may ironically limit the participation of precisely those citizens who already face exclusion from political activity.

In its focus on how technology might be used to spur participation, previous work largely ignores how technology affects the composition of participants. One exception is Grossman et al. (2014), who show that an ICT platform in Uganda drew in participants from traditionally under-represented groups (women, the poor) and not only affected the size of the crowd but also its demographic composition.

We similarly focus on how technology induces selection effects that shape the composition of the crowd. We argue that cost-reducing technological advances affect the mixture of people engaging in the activity, drawing in more extrinsically motivated individuals. When participation is costly, the set of participants is likely to include primarily those with deep intrinsic motivations for engaging. 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 and is therefore malleable. But this crowd is also more fragile in the face of rising costs and likely to fade as activities become more demanding. We develop these intuitions as formal hypotheses in the next section.

2.2 Hypotheses on Motivating Participation

We present the primary theoretical parameters that we claim drive political participation when technology changes its costs. First, individuals vary in terms of their intrinsic motivation to engage in politics; some possess a strong internal desire to participate while 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 proves cumbersome and costly. Second, the key role of ICT is lowering the cost of participation, but the magnitude of available cost reductions depends upon the ease of use of a specific channel. Our project featured a common platform launched across multiple channels to create systematic variation in VIP:Voice's usability. 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).

Consider the decisions of citizens i assigned to a technology channel j, and then asked to participate in two different types of political activity. In period 1, they are asked to engage with a digital interface, which is low-cost and has differential costs across channels. In the second period, citizens are asked to engage in 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 citizens have intrinsic motivation to participate in a political activity equal to η_i, distributed as $Unif[0, \bar{\eta}]$. In period 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 $P_{ij1} = 1\big(\eta_i + \beta_{i1} - c_j\big)$, requiring the sum of intrinsic and extrinsic incentives to exceed the cost of digital participation on a channel.

The participation *rate* for each channel $E(P_{j1}) \equiv \rho_{j1}$ will be $\frac{\bar{\eta}+\beta_{i1}-c_j}{\bar{\eta}}$, and the average intrinsic motivation on a channel as a function of the costs and extrinsic incentives is $E(\eta|P_{ij1} = 1) = \bar{\eta} - \frac{\bar{\eta}+\beta_{i1}-c_j}{2}$. 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 period, citizens 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. We assume $R > c_j$ for all channels. Citizens are only present to be incentivized in period 2 if they participated in period 1, so it is natural to define real-world participation as:

$P_{ij2} = 1$ if $\big((\eta_i + \beta_{i1} > c_j)\big)$ & $\big((\eta_i + \beta_{i2} \geq R)\big)$,

$P_{ij2} = 0$ if $\big((\eta_i + \beta_{i1} > c_j)\big)$ & $\big((\eta_i + \beta_{i2} < R)\big)$

Given this, a shift in period 2 incentives, β_{2j} 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,

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

Consequently, the higher the incentives in the first stage (β_{j1}), the higher 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-period participants that also participate in the second period 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.

Hypotheses based on *action* and *channel* costs:

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 at the start.

Hypothesis based on *incentives*:

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

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. (The likelihood that $\frac{d\rho_{j2}}{d\beta_{i2}} > 0$ is increasing in β_{j1}).

H3b: The differential response to later incentives for the initially extrinsically motivated group disappears as individuals are asked to undertake actions with high costs (as soon as $R > c_j + (\beta_{i2} - \beta_{i1})$, $\frac{d\rho_{j2}}{d\beta_{j2}} = \frac{1}{\eta}$ 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 with 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. 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.[5] We also do not know the full size of the crowd on each channel, and hence cannot speak to participation rates among

[5]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.

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 challenges and dynamics that 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 actions, the benefits from technology fade and ICT/DM's differential effect on participation rates decreases. Similarly, incentives generate dynamic effects. Because the initial use of incentives retains a less motivated group, more people 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. South Africans reflect characteristics of voters in other settings where variation in a host of institutional and individual factors results in differential rates of political participation. The country also falls at the forefront of ICT/DM growth in the developing world, making it an important case to test our hypotheses.

1994's transformative elections brought an end to apartheid and racial segregation, 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 have not gained much traction (Ferree 2011). The ANC's dominance limits political competition, potentially discouraging participation since elections are seen as foregone conclusions. Turnout for national elections has dropped nearly 30 percentage points from 1994 to 2014, with lowest rates in the youngest groups of eligible voters (Schulz-Herzenberg 2014).

Beyond the party system, the economic and social remnants of apartheid still affect South African society and political participation. Although 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, and over half of black youths are jobless. While whites retain many economic privileges, they lack representation in the ANC. Regardless of race, many voters increasingly perceive the ANC, and incumbent president Jacob Zuma, as corrupt (Southall 2014).

But while election turnout may be in 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 have 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.

In terms of technological development, South Africa has enjoyed a "tech boom" in recent years. It boasts the highest cellular phone connections per capita in Africa,[6] 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 (Appendix Table A-3).

[6] As of 2014, 149 connections per 100 citizens; Nigeria has 77.84 per 100 (United Nations 2016).

3.2 Research Design

Our 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 phases, followed by more detail in the next section.

We worked with Praekelt, a South African technology firm, to design our multi-channel ICT/DM platform and recruit as broad a spectrum of the electorate as possible. Unlike studies that build ICT/DM platforms from extant databases of prior users or conduct household surveys to enroll people, we obtained participants directly from the overall population via the platform. While this presented significant operational challenges, it also meant that every South African voter could potentially enter the study sample and provides a robust proof of concept on purely digital recruitment.

In **"Phase 1,"** beginning on April 7, 2014 (one month before the election), we started enrollment of citizens into the platform. Users could interact with VIP:Voice through five channels: 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 network and works on feature and smartphones; Mobi is a provider of mobile web smartphone platforms; GTalk (Google Talk) and Twitter could be accessed by feature or smartphones. We built the platform to be as homogeneous as possible, providing variation in interface ease of use by channel.

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 widespread penetration of mobile phones in rural areas, but where other digital media may not have had the same reach. We attracted people to this channel primarily through advertising with 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. We purchased ad space for VIP:Voice for 49.8 million PCMs and randomized the PCM message with a "standard" arm encouraging registration, but users pay full messaging costs; a "free" arm with no interaction fees; and a "lottery" arm offering a chance to win R55.[7] On entering the system, users were asked a teaser "engagement" question about their voting intentions in the election[8] and then asked to sign the Terms and Conditions to register in the system.

The total recruitment effort, including the close to 50 million PCM messages, logged 263,000 individuals contacting the platform, 134,047 responding to the initial engagement question, and 90,646 completing the Terms and Conditions.[9] Just under half of registrants entered through the PCM-linked USSD channels; a similar number entered via Mxit. The remainder came in through Mobi or print advertising, and a very small number entered via GTalk or Twitter.[10] 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 others observational (across channels). The three experimental USSD strata and the Mxit stratum contain almost 94% of registered users.

Table 1 provides the total number of individuals at various stages on the participation waterfall, broken down by 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 registered users by the number of PCMs sent under each treatment to calculate

[7] 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"*.

[8] "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."

[9] Appendix Table A-1 shows the anticipated recruitment numbers provided by Praekelt; these were roughly four times the actual enrolled numbers.

[10] 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.

a yield rate, implying an average yield rate of .08% per PCM for the USSD channels, or 1 in 1,900 PCMs.[11] Only one third of those who initiated contact with VIP:Voice 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 (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 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 which we monetarily incentivized with a lottery for all users. Participants also were asked to complete two election-related surveys. The "What's Up?" survey asked questions on local campaign activities, while "VIP" posed relatively standard polling questions on participation in local events, evaluation of ANC performance, and probability of voting.

In addition to these surveys, presented via drop-down menus, VIP:Voice tracked real-time shifts in political opinion and incidents of political activities in the month prior to the election. One set of questions, the "Activity" 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, "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 others. Phase 2 thus consisted of digital forms of engagement as all activities involved interacting with the platform.

Attrition continued in Phase 2. Of the 90,646 people registered, 34,727 (38%)

[11]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.*

completed the four demographic questions and 15,461 (17%) answered the demographic questions and one of the other four Phase 2 surveys.

In **"Phase 3"** we sought to evaluate whether ICT/DM could enlist citizens into more meaningful and costly real-world forms of participation: observing and reporting on electoral outcomes at polling places. From the group of "high compliers" in Phases 1 and 2 (who completed all or most questions), we garnered a set of volunteers 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, submiting information about the tally via SMS and taking a photo of the tally if equipped with a camera-enabled phone.[12]

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 TCs, 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-observe 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.[13] However, given that

[12]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. 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.

[13]See Appendix Table A-2.

this variation arose as a result of a data 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 50,995 participants to volunteer as COs. Of these, 2,507 agreed, signed the new TCs, and provided all relevant location information required to identify their polling place. Using the platform, we were able to recruit citizens willing to observe 12% of the polling stations in 38% of the wards in the country. Due to a data transfer error, we then asked a different group of 1,899 individuals (who had not previously volunteered) to actually observe the voting tallies the day after election day; of these 350 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 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, 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 2016).[14] 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 election experience survey. Of these, 5,038 (6%) responded to the GOTV questions on participation. Of 85,843 individuals asked to report on their voter experi-

[14]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."

ence on election day (a checklist modeled after those of official election monitors), and 6,978 (9%) did so.

Participation levels across stages (summarized in Table 1) are impressive and daunting in equal measure. On the one hand, over 250,000 South African citizens initiated contact with the platform, more than 100,000 of these citizens provided information, over 90,000 registered into the system, and 2,500 people completed all the required information and registered 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 CO—is on the order of 50% per step.

4 Hypothesis Testing

4.1 How Technology Shapes the Crowd

We first examine how technology drives differences in participation by comparing demographic characteristics across channels. Unfortunately, even in this simple endeavor, attrition across responses remains a challenge: we can only compare attributes of those who agreed to give us their demographic information, which differed across channels. Nonetheless, we use the 35,000 people who provided these data to compare to the overall South African population.

Table 2 shows that platforms generate user groups with radically different gender and racial compositions, and compares these to national averages. While the population is just less than half female, almost two thirds of the USSD users were women. In contrast, almost two thirds of the Mxit sample is male. The USSD group is also more black (94%) than the national population (79%), while the Twitter/GTalk group is less so (60%). Mobi, building off of social networks focusing on sexual health, is equally black and female but with average age almost three years younger than the

USSD channels. The Mxit group is more Coloured (14%) and male (62%) than the population. Reported voting in the 2009 elections is 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. Within the USSD group, the demographic profiles of the standard, free, and lottery groups are mostly similar; the lottery group is slightly older and slightly less black.

Given the sharp demographic differences across channels, we investigate whether age, gender, and/or race drives participation in the platform, rather than something inherent to the technology. Table 3 first provides summary statistics on participation across the study phases for each platform, and second a regression specification controlling for the (de-meaned) demographic variables. This method allows us to determine, if we removed the observable effects of age, race, and gender, whether participation across channels would vary for this regression-adjusted "average" citizen. The first column shows the average participation rate among users by platform, the second column shows the same statistic within the sample for whom we have demographic data, and the third column controls for the de-meaned demographics. Despite very strong differences in participation across platforms, the coefficients in the second and third columns are remarkably stable, enhancing our confidence that differences in participation across channels arise from some attribute of the technology itself, not from characteristics of the users.

Table 4 illustrates that, in line with our theoretical model, the lower-cost Mxit platform does indeed have a lower level of average user engagement in the political process than the higher-cost USSD platform. We also examine the extent to which the channels deliver a crowd with an unrepresentative political orientation. 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 "Activity" questions across platforms and days, and compares them to the actual outcome of the election. Interestingly, all three platforms for which we have a sufficient number of responses to plot averages reliably 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 channel with a pro-opposition slant in this context. The overall platform support on election day is 69.8% and 12.9% for the ANC and DA while the actual election outcome was 62.1% and 22.2%, respectively.

4.2 Observational Tests of H1

We next evaluate how participation responds to a shift from low-cost, digital-only participation into higher-cost forms of real-world participation. H1a predicts users of the high-cost channel (USSD) should display greater intrinsic motivation than users of the lower-cost social media channels, and the USSD group who entered without receiving a PCM should be the most intrinsically motivated of all. We exploit the engagement question, "Do you think your vote matters?" as a simple way of testing whether a channel's ease of use creates systematic variation in the intrinsic motivation of participants. We consider participants who answered "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. 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.[15]

Early stages of this project involved simple, relatively costless tasks like answering an engagement question and signing a brief Terms and Conditions. Phase 2 continued

[15]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, a web based project of the Praekelt Foundation directed towards educating young South Africans about sex, HIV/AIDS, rape, and gender issues.

with more intensive but still completely digital engagement, answering anonymous survey questions. Phase 3 represented a departure into costlier forms of real-world participation: CO volunteers provided information about their geographic location and signaled their willingness to serve as observers. Those who deployed participated 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 tally sheet. We anticipate 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 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 predispositions for engagement, we exploit selection effects generated by the different technology channels. Because digital engagement through Mxit and Mobi proved easier than through USSD (Table 1), 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 channels, participation decreased 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).

In Table 3, we 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 than any other platform. This remains true even controlling for demographic factors. 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 cost of channel.

We examine answers to the engagement question across rounds (H1c) to explore the relationship between attitudes toward participation and attrition over the course of time more directly. 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 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, "will I vote", strongly predicts the willingness to volunteer to observe 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 observe at rates two to three times as high 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 differently, the crowd recruited through extrinsic rewards was more vulnerable to subsequent increases in costs than the crowd not recruited this way. This relationship—arising from observational, not experimental data—offers a number of interpretations. For example, perhaps individuals already intending to vote face lower costs to observe their polling place, or perhaps common factors like proximity to polling places drive both. Nonetheless, observation activity was to take place the day after the election, requiring a return visit to the polling place whether or not a participant had voted. Hence voting intentions do not directly reverse-cause willingness to observe, and our results accord with the idea that those with high initial engagement are the most likely to remain involved as costs to participate rise with real-world demands.

4.3 Experimental Tests of H2 & H3

The PCM recruitment experiment randomly assigned people to standard rates, free, 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 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 U.S. cents per USSD session) with certainty 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 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 effect on behavior.

Comparing the USSD Standard, Free, and Lottery columns of Table 6, we see 1 in every 1,900 PCMS without an incentive attached resulted in a registered user. Thus, it appears 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 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 50,814 people. In the absence of incentives, 2.7% of the Standard USSD users invited to serve as COs volunteered (196 people). Incentives increased participation by close to 2 percentage points (significant at the .01 level). We emphasize that R5 is a small sum of money and the literature generally suggests that net crowd-out of intrinsic incentives will gain strength when extrinsic incentives are small (Gneezy and Rustichini 2000).

Actual election observation also responded to incentives (see Table 8). When offered the payment of R5, only 12% of those deployed to observe entered any data on their polling places (96 people). In contrast, among those offered the more substantial payment of R55, this rate almost doubled to 21.9%. Within the sample that observed, the rate of successful entry of ANC voting data via SMS almost tripled, from 4.2 to 14.6% for those offered the larger incentive.[16]

While our data unambiguously show the effectiveness of incentives, we are struck by the evidence suggesting substantial numbers of intrinsic participators. Many of our participants were poor, using the most basic cellular technology. Yet, a substantial number participated in all phases, without incentives of any kind, in many cases paying the full cost of submitting information. We built VIP: Voice 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 discussed in H3, 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. The crowd generated by lowering costs (or increasing benefits) will be more malleable than the one

[16] 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.

created in the absence of these external motivators: it will respond more strongly to further incentives.

Because the lottery treatment was 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 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 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. 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. 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 anyway). As predicted, Table 9, Column 4 shows the incentive is strongly effective in all three groups but not differentially so across initial recruitment arms once the cost of action becomes sufficiently high.

Finally, Columns (5) and (6) in Table 9 test H3c, returning to the domain of digital engagement, 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," which urged citizens to make their voices heard; and "Visibility," which also reminded voters 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[17], 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 initially intrinsically motivated (Control). The outcome variable is a dummy indicating they responded when asked "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 individuals would 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

[17] Following Jung and Long (2015) we think of social sanctions as a type of extrinsic reward or punishment.

(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 support that by initially incentivizing a voluntary activity, we create a participant group that responds more favorably to subsequent incentives. In short, incentivization creates a positive feedback loop by selecting a set of participants that is subsequently more sensitive to these inducements.

5 Conclusion

This paper presents the results from a nationally scaled ICT/DM election platform that we built de novo using marketing methods to advertise and recruit participants across a variety of cellular and digital channels. Our study sheds light on the ways digital participation interacts with engagement in real-world political activity. Knowing how ICT/DM attracts certain kinds of participants and not others is crucial to developing more effective ICT/DM designs. While recent research finds ICT/DM interventions can increase political participation, few studies explore or test how the cost of technology can determine the kind of individuals who ultimately participate.

Despite impressive overall numbers of participants in VIP:Voice, we find that attrition across time and activities forms a critical component to the 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 costlier political actions. Overall, digital participation is highly correlated with real-world participation.

Our experimental results provide insights and important policy implications for those 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. 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, no more recalcitrant when asked to do things for free, and more responsive to incentives on the margin. The incentive to observe 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 technology channel choice. 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?"

Finally, our results provide information on the practical possibility of using citizens as election observers reporting on 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 with real-world political activities, including observing polling places.

Ultimately, the transformative potential of ICT/DM depends on how citizens use technology. We show that with appropriate channel choice, 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.

However, ICT/DM does more than simply raise participation levels. By affecting the costs of engagement, it determines who joins and acts and who does not, ultimately shaping the very nature of the participant crowd. Social movements that form in technological environments in which communication costs are high are likely to differ in fundamental ways from social movements that form in technological environments in which communication costs are low. In the former case, we would anticipate high costs to deter all but the most committed true believers; in the latter case, lower costs bring in a wider, and less uniformly committed, group of activists who are more sensitive to external inducements and less resilient to rising costs.

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	Advert/ Other	Total Total
Total # Solicited via PCM	49.8m		.	.	.	.	.
Total # Registered	40,166	4,277	40,416	4847	101	839	90,646
Registered as % of PCMs	0.08%						
Phase 2 Participation Waterfall							
Any Initiation	126,649	12,998	114,358	4,923	317	3,718	262,963
Any answer to Engagement Question	65,382	6,816	55,352	4,882	131	1,484	134,047
Registration (T&C) Initiated	52,049	5,426	50,862	4,867	119	1,135	114,458
Registration Completed	40,166	4,277	40,416	4,847	101	839	90,646
Registration & Demographics Completed	11,338	1,143	20,078	2,028	66	74	34,727
Reg, Demo, and Any Other Phase 2	3,859	367	10,215	995	23	2	15,461
Reg + Demo as % of Initiated:	8.952%	8.794%	17.56%	41.19%	20.820%	1.99%	13.21%
Reg + Demo as % of PCMs:	0.02%						
Phase 3 Monitoring Invitations.							
Invited to Volunteer as Monitor	35,242	3,885	10,823	877	33	135	50,995
Agreed & Provided All Information	1,775	212	462	51	5	2	2,507
Potential Monitors as % of Invited:	5.04%	5.46%	4.27%	5.82%	15.15%	1.48%	4.92%
Phase 3 Actual Monitoring.							
Asked to Monitor	1,817	50	0	5	0	27	1,899
Conducted Any Monitoring	331	9	1	1	0	8	350
Monitors as % of Actually Asked:	18.22%	18.00%	#DIV/0!	20.00%	NA	29.63%	18.43%
Phase 4 Participation.							
Invited to Participate in Phase 4	40,166	4,273	40,416	104	47	837	85,843
Respond to Phase 4 surveys	5,577	636	1,084	25	1	0	7,323
Invited to participate in GOTV survey	37,502	4,043	35,370	72	78	814	77,878
Respond to GOTV survey	3,314	352	1,365	7	0	0	5,038
Responses as % of Phase 4 Invitations:	13.88%	14.88%	2.68%	24.04%	2.13%	0.00%	8.53%

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	26.148	0.350	0.937	0.040	0.009	0.005	57.32%
SE	7.91	0.48	0.24	0.19	0.10	0.07	0.49
MIXT	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 come 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 gives the Standard Errors.

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***	1.621***	0.0507***	0.103***	0.0898***	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***	6.441***	0.0425***	0.0427***	0.0492***	0.250***	0.419***	0.486***
	(0.03)	(0.05)	(0.06)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Mobi	0.255***	0.766***	0.688***	0.0548***	0.0630***	0.0596***	1.548***	1.714***	1.628***
	(0.01)	(0.04)	(0.04)	(0.01)	(0.01)	(0.01)	(0.29)	(0.35)	(0.34)
Other:	0.372***	2.966***	2.897***	0.152**	0.152**	0.138**	0	0	−0.0700***
Twitter, Gtalk	(0.07)	(0.57)	(0.57)	(0.06)	(0.06)	(0.06)	0.00	0.00	(0.02)
Age			0.0182***			0.00246***			0.0178***
			(0.01)			(0.00)			(0.00)
Male			−0.672***			−0.000083			−0.0870***
			(0.08)			(0.00)			(0.03)
Coloured			0.291**			−0.0163***			−0.155***
			(0.13)			(0.01)			(0.03)
White			0.156			−0.0264**			−0.211***
			(0.29)			(0.01)			(0.07)
Asian			−0.484			0.00423			−0.198**
			(0.39)			(0.02)			(0.10)
Voted in 2009			−0.374***			0.0112***			0.171***
Election			(0.08)			(0.00)			(0.03)
Engagement:			−0.364***			−0.0115***			−0.03
too young to vote			(0.13)			(0.00)			(0.03)
Engagement:			0.0864			0.0156***			0.0956***
Enthusiasm			(0.05)			(0.00)			(0.01)
N	90,646	30,170	30,170	50,814	18,781	18,781	85,843	28,756	28,756
R^2	0.217	0.404	0.407	0.049	0.08	0.089	0.111	0.16	0.168

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

	Yes, every vote matters (1)	No but I'll vote anyway (2)	No so I'm not voting (3)	Not Registered (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	77.44%	9.76%	1.58%	11.20%

Cells give fraction of each channel (rows) that give each response to the engagement question *"It's election time! Do u think ur vote matters?"* (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***	0.0576***	0.152***	0.0721***
	(0.0016)	(0.0020)	(0.0020)	(0.0012)	(0.0015)	(0.0011)
No, but I'll vote anyway	0.609***	0.433***	0.362***	0.0478***	0.147***	0.0743***
	(0.0045)	(0.0059)	(0.0057)	(0.0033)	(0.0043)	(0.0033)
Not Voting/Not Registered	0.669***	0.460***	0.397***	0.0239***	0.0870***	0.0461***
	(0.0033)	(0.0043)	(0.0042)	(0.0019)	(0.0025)	(0.0019)
N	118,095	80,346	80,346	46,882	76,086	70,186
R^2	0.6810	0.4540	0.3840	0.0550	0.1450	0.0690
F-Test: Yes=No, Vote Anyway	308.4	13.43	12.76	7.861	1.276	0.386
p-value	0	0.000248	0.000355	0.00505	0.259	0.534
F-test: Not Voting = No, Vote Anyway	116	13.94	24.77	39.78	149.5	54.86
p-value	0	0.000189	0.000000647	2.87E-10	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

Phase 1 Recruitment.	USSD Standard	USSD Free	USSD Lottery
Total # Solicited via PCM	13.8m	16.1m	19.9m
Total # Registered	7,258	8,146	24,762
Registered as % of PCMs	0.0526%	0.0506%	0.1244%

Table 7: Impact of Incentives on Volunteering to Observe
Volunteers to Monitor in Phase 3

	All	All with Demographics	
	(1)	(2)	(3)
Incentivized to Monitor	0.0158***	0.0157***	0.0160***
	(0.00)	(0.00)	(0.00)
USSD Free	0.0273***	0.127***	0.124***
	(0.00)	(0.02)	(0.02)
USSD Lottery	0.0149***	0.0568***	0.0513***
	(0.00)	(0.01)	(0.01)
USSD non-experimental	0.0189***	0.0740***	0.0661***
	(0.00)	(0.02)	(0.02)
Mxit	0.00693*	0.000676	0.0117
	(0.00)	(0.01)	(0.01)
Mobi	0.0182**	0.0168	0.0211
	(0.01)	(0.02)	(0.02)
Twitter/Gtalk/Other	0.116*	0.110*	0.109*
	(0.06)	(0.06)	(0.06)
Age			0.00262***
			(0.00)
Male			-0.0000203
			(0.00)
Coloured			-0.0160***
			(0.01)
White			-0.0270**
			(0.01)
Asian			0.00503
			(0.02)
Voted in 2009 Election			0.0156***
			(0.00)
Constant (average in USSD Standard)	0.0274***	0.0330***	-0.0399***
	(0.00)	(0.01)	(0.01)
Observations	50,814	18,781	18,781
R-squared	0.003	0.024	0.031

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	0.098***	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	1,830	1,830	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***	0.0185***	-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				0.0227***		
				(0.006)		
Monitor Incent * "Free"				-0.013		
				(0.008)		
Monitor Incent *"Lottery"				0.000		
				(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***	0.0393***	0.0988***	0.864***
	(0.005)	(0.003)	(0.005)	(0.004)	(0.007)	(0.025)
Number of observations	40,336	40,336	40,336	35,377	37,654	3,329
R-squared	0.005	0.001	0.005	0.003	0.000	0.005
F-test: Free = Lottery	0.311	43.340	9.158	20.040	2.298	1.576
Prob >F	0.577	0.000	0.002	0.000	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.

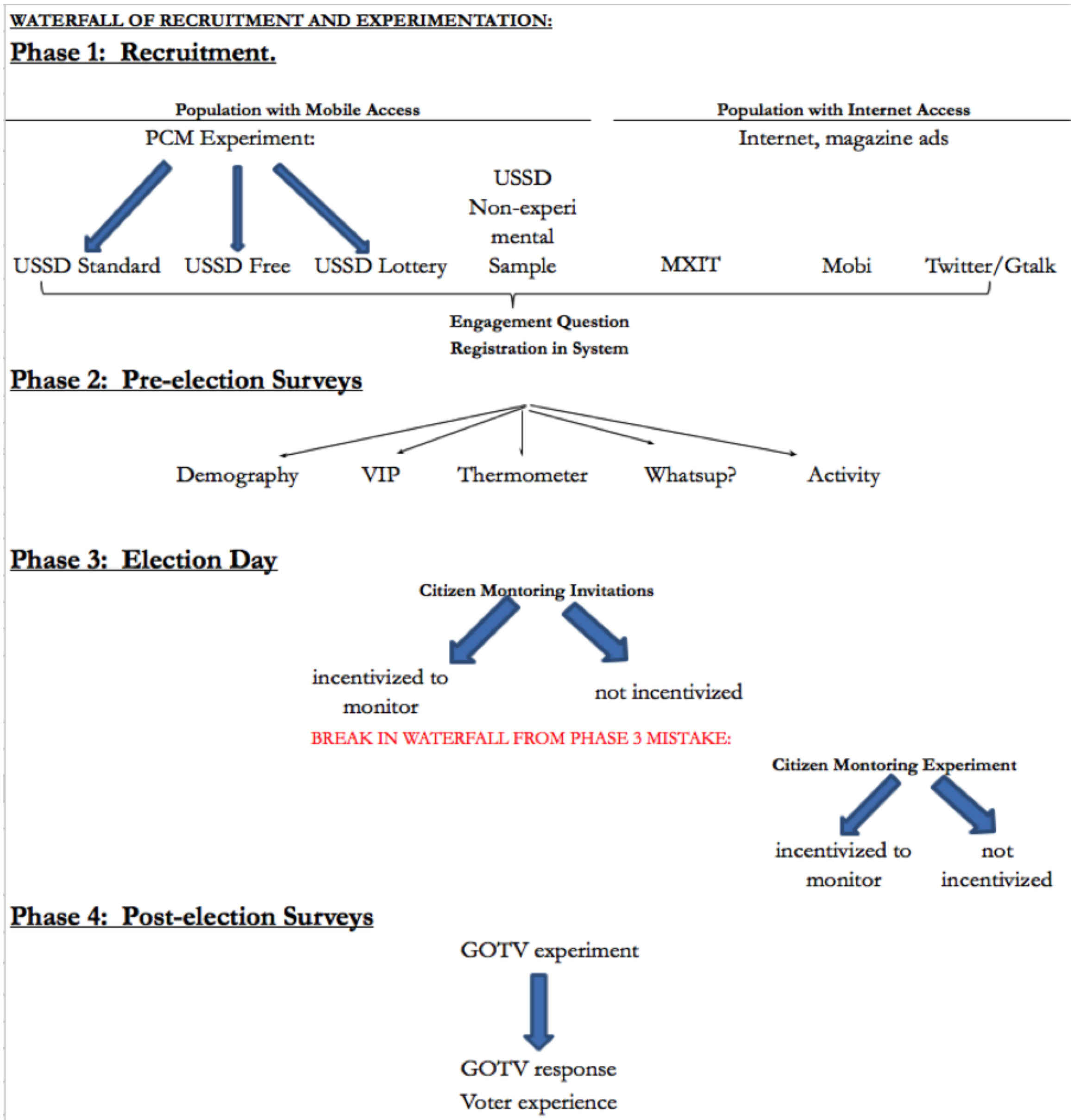

Figure 1: Waterfall of Recruitment and Experimentation

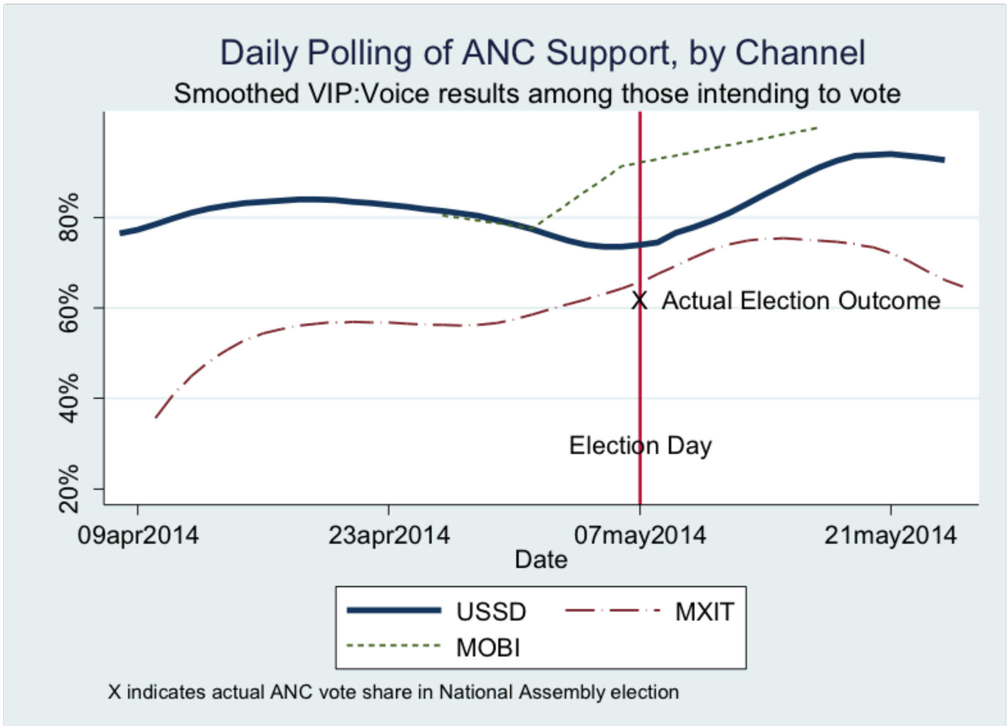

Figure 2: Daily Opinion Polling

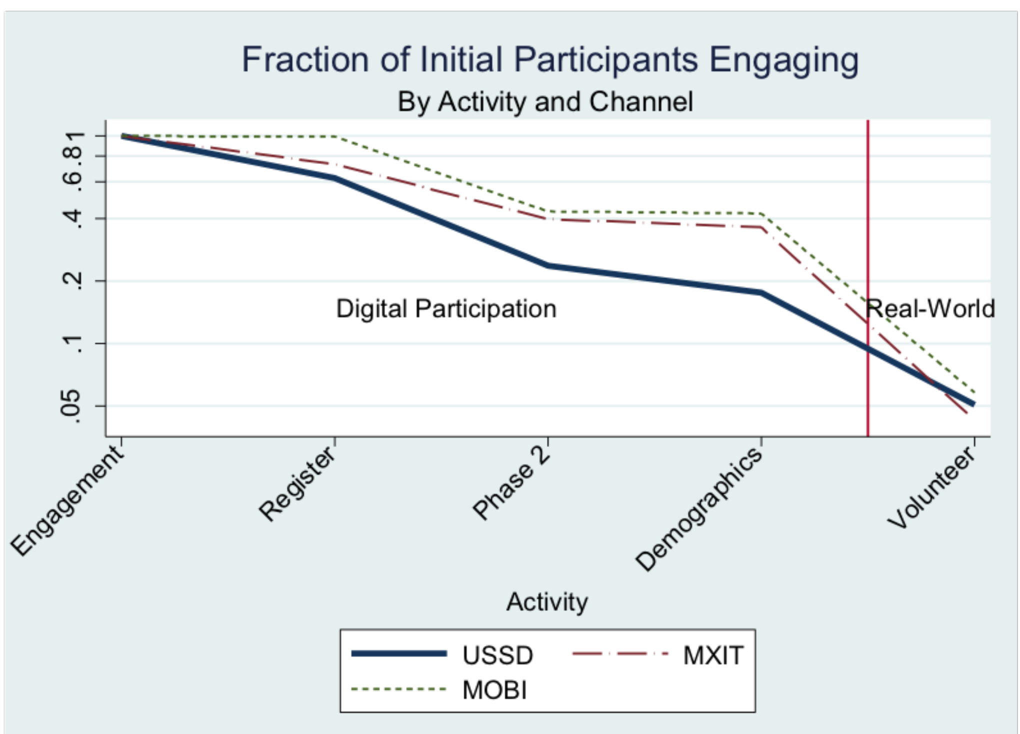

Figure 3: Participation Rates by Activity and Channel

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Appendices

Table A-1: Expected Recruitment by Channel

Advertising Channel	**Interaction Channel**	**Expected Impressions**	**Expected Recruitment**
Mxit broadcast messages & 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 A-2: Balance of the Phase 3 incentives experiment as actually performed:

Variables	Engagement: No Vote Anyway	Engagement: Yes Vote	Any Phase 2 Responses	Any 'What's up' Responses	Any Responses	Any Demographics	Age	Male	Voted in 2009	Volunteered Phase 3
Actually Incentivized	0.040	0.055	0.017	0.003	0.001	0.011	0.773	0.032	0.034	0.00138
to Monitor	(0.025)	(0.035)	(0.015)	(0.003)	(0.005)	(0.013)	(1.325)	(0.076)	(0.086)	(0.006)
Constant	0.151***	0.614***	0.102***	0.00374*	0.00998***	0.0773***	26.20***	0.290***	0.607***	0.0137***
	(0.020)	(0.027)	(0.011)	(0.002)	(0.004)	(0.009)	(0.980)	(0.058)	(0.066)	(0.004)
Observations	792	792	1862	1862	1862	1862	145	155	138	1862
R-squared	0.003	0.003	0.001	0	0	0	0.002	0.001	0.001	0

While most South Africans may not be users of social media platforms, cell phone saturation was almost 90% in the previous census and has risen to almost 100% since. Feature phones and smartphones (which can access the web) currently have a saturation rate of 70%. To set the stage of the populations that could be reached using mobile phone and internet channels, Table A-3 uses ward-level data from the census to describe how mobile penetration (average 89%) and internet access (average 25%) vary with the political and demographic features of the ward.

Table A-3: National Mobile Phone and Internet Penetration Rate

	coef (SE)	coef (SE)
ANC Vote Share	−0.020***	−0.044***
	(0.005)	(0.006)
DA Vote Share	0.030***	−0.035***
	(0.009)	(0.01)
Pop ('000)	−0.001**	−0.004**
	(0.00)	(0.00)
Pop under 25 ('000)	0.006***	0.013***
	(0.001)	(0.001)
Fraction Male	0.200***	0.030***
	(0.018)	(0.021)
Frac Black	0.119***	0.084***
	(0.009)	(0.01)
Frac Coloured	0.021***	0.053***
	(0.006)	(0.008)
Frac English Speaking	−0.003	0.091
	(0.006)	(0.008)
Frac w/ HS Diploma	0.244***	0.211***
	(0.011)	(0.015)
Frac w/ Electricity	0.083***	−0.001***
	(0.005)	(0.004)
Frac w/ Computers	0.026*	0.518*
	(0.015)	(0.016)
Frac w/ Internet Access	0.064***	
	(0.012)	
Constant	0.513***	0.012***
	(0.012)	(0.014)
Number of observations	4,276	4,276
Mean of Dep Var:	0.888	0.248

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

OLS regressions using census data at the ward level on all wards in South Africa, weighted by ward-level population to be nationally representative.