The Impact of Mass Bed Net Distribution Programs on Politics: Evidence from Tanzania

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Many African countries have implemented large donor funded public health programs in the past decade targeting major diseases such as HIV/AIDS and malaria. There is a large literature which examines the effect of these programs on health outcomes, but little is known about their effect on politics. Do politicians gain popularity as a result of these programs? If so, it could suggest the potential for a positive, mutually reinforcing equilibrium, whereby politicians would see delivery of health services as a key way to maintain public support. I exploit the fact that two national bed net distribution campaigns in Tanzania (in 2008-09 and 2010-11) took place at approximately the same time as the 2008-09 and 2010-11 National Panel Surveys. This enables a regression discontinuity design based on survey interview date to estimate the effect of these programs on the approval ratings of local politicians. I find that bed net distribution results in large and statistically significant improvements in the approval levels of a broad range of political leaders. However, this is only true for the 2010 campaign, when all household members (rather than children under 5) were the primary beneficiaries. Moreover, the effect is driven by respondents living in opposition-dominated villages, and by nets delivered in the rainy season, when malaria is a particularly salient problem. Taken together, these findings suggest that citizens are prepared to update their evaluation of their political leaders, especially when they deliver services that are salient and visible, and when this service delivery provides information about the capability of actors, such as opposition party officials, about whom there is limited prior knowledge.

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I. Introduction

Do well-delivered government programs change the way citizens evaluate their political leaders? There is a large literature in rich countries which seeks to demonstrate that voters reward politicians for delivering economic growth (Fiorina, 1981). A burgeoning literature in Africa also tries to establish similar links between economic growth and voting (Posner and Simon, 2002). Much more common, however, in Africa is the assumption that voters support politicians *not* based on their ability to foster economic growth or deliver effective social programs, but based on shared ethnic identity or in exchange for material benefits that they receive via patronage networks. Much of this literature assumes that the distribution of public spending in Africa, and in developing countries more broadly, is predominantly driven by clientelist logic, rather than according to programmatic criteria, because clientelist programs, while less effective at delivering goods and services to voters, are more likely to result in benefits to politicians. Wantchekon (2003), for example, shows that promising clientelist benefits is a more effective campaign strategy than committing to deliver public goods in Benin.

But even in developing countries with weak governance, some fraction of public goods are delivered on a programmatic basis. According to standard political economy models, politicians make strategic choices about whether to pursue programmatic or clientelist strategies based on the benefits that they expect to receive. A critical, unresolved question in the literature is whether citizens in developing countries react to effective, programmatic policies by increasing their support for politicians associated with these policies, or whether information deficits, attribution problems, or even preferences for other styles of resource distribution prevent such reactions. If good policy is not rewarded even when delivered, it could help explain perverse equilibria in which voters do not reward politicians who deliver public services, so politicians in turn see no incentive to deliver these services. Voters are thus conditioned to not expect such services and do not vote for politicians who promise them.

I study the reaction of citizens to a programmatic, highly effective delivery of a social good in Tanzania; the mass distribution of insecticide-treated bed nets (ITNs) in 2008 and 2010-2011. Distribution of mosquito nets is a particularly interesting policy to study in this context because it involves direct, highly visible and clearly attributable transfer of a good from the government to individuals for free. This is quite different from other government actions such as management of the economy or stewardship of a national health or education system, where the link from a given politician's effort to individual benefit is more diffuse. Furthermore, it is a universal program, in that (depending on the nature of the campaign) either all children under 5, or all individuals in the country were targeted. Although there is good evidence that individuals in these settings are not willing to pay for even highly subsidized ITNs (Cohen and Dupas, 2010), they clearly value them, as they have been shown to use them once they have been given for free.

Tanzania conducted two mass distributions of insecticide-treated bet nets, in 2008-2009 and 2010-2011. Fortuitously, these two bed net campaigns occurred at roughly the same time as the first two rounds of the Tanzania National Panel Survey (NPS). The timing of National Panel Survey interviews was randomized, in order to accurately measure agricultural production and consumption, without distorting seasonality effects. The result of this unusual cross-cutting of national surveys and mass national health campaigns means that it is possible to exploit a regression discontinuity design, by comparing households which were surveyed immediately before the ITN campaign to those surveyed immediately after the campaign. This provides a unique opportunity to study the reactions of citizens, in real time and in a nationally representative sample, to a large scale public health campaign that involved direct distribution of well-known and valued items to individuals.

I find that citizens increase their approval of local politicians significantly (village chairmen, ward councilors, ward executive officers, and MPs) as a result of the 2010 net distribution campaign. This effect holds regardless of whether the politician was formally involved in the campaign or not. Effects are strongest, however, in opposition villages, when nets are distributed in the rainy

season, and when the program targeted all individuals (as in 2010) rather than only children under 5 (as in 2008). These findings are among the first to empirically demonstrate that citizens in developing countries change their opinions about political leaders in response to specific health programs. While changes in public support have been demonstrated (as discussed below) for cash transfer programs in Latin America, similar dynamics have not to our knowledge been shown via experimental or quasi-experimental design in sub-Saharan Africa, or for health. Moreover, the bed nets studied here are worth just a few dollars, which is just a small fraction of beneficiaries' income, in contrast to the 25 to 50 percent of income that CCT programs often represent (Labonne, 2013).

II. Related Literature

There is a large literature in developed countries which tries to ascertain whether voters support politicians based on evaluations of their overall performance (Popkin, 1994), as a function of services or spending delivered to their community (Mayhew, 2004; Levitt and Snyder, 1997), or whether they are more likely to vote according to pre-existing loyalties, social groupings, or partisan attachments (Campbell et al., 1960). In developing countries, the literature has focused more on patterns of clientelist distribution, with a great deal of effort devoted to establishing the ways in which public resources are targeted towards co-ethnics or co-partisans.[1] As Golden and Min (2013) note, the response of voters to these strategies is a relatively small part of this literature. Yet they note that where this has been successfully analyzed, "studies overwhelmingly find that incumbent politicians are rewarded by voters for distributive allocations, and in particular for those that are clientelistic and from which recipients can be excluded."

A major challenge in identifying the response of citizens to specific policies in developing countries is likely endogeneity of program targeting. However, the advent of large scale condi-

[1] See Stokes et al. (2013) for an overview

tional cash transfers (CCTs) which either were initially randomized, or which have sharp eligibility thresholds, has led to important opportunities for causal inference and learning about the political effects of these programs. De La O (2013) shows that in Mexico, longer exposure to the *Progresa* CCT program increased voter turnout and vote share for incumbents, but did not reduce opponent vote share. Labonne (2013) provides evidence that incumbents benefited from a CCT program in the Philippines in municipalities where all villages received the program, compared to municipalities where only half of villages benefited. This effect is only present in competitive political environments, however. When a political dynasty dominates local politics, the program has no effect on vote share. Baez et al. (2012) show that in Colombia, the *Familias* en *Accion* CCT also increased political participation and support for the incumbent party. Manacorda, Miguel and Vigorito (2011) also find that recipients of Uruguay's unconditional transfer program (PANES) increased their support for the incumbent. Moving away from cash transfers to distribution or subsidy of other goods, Pop-Eleches and Pop-Eleches (2012) finds that a Romanian computer subsidy voucher program also generated incumbent support, while Yi Dionne and Horowitz (2013) show that Malawi's agricultural input subsidies benefited the ruling party. However, it is not clear ex ante that a preventive health good, such as a bed net, would necessarily have the same effect as cash or as a high value consumer subsidy such as for a computer purchase. In the health domain, Fried and Venkataramani (2014) show associations between a large reduction in mortality associated with a clean water initiative (the Programa de Agua Limpia) and incumbent vote share in Mexico. Lacking data on program implementation, they infer program intensity from reductions in diarrheal mortality, and demonstrate a significant but relatively small vote shift in favor of incumbent parties.

III. Malaria control programs in Tanzania

Malaria is a major contributor to ill health in sub-Saharan Africa, which accounts for 70 percent of total global malaria morbidity. Malaria control efforts have been progressively scaled up across Africa over the past 10 years, with particularly large increases in funding following the creation of the Global Fund for AIDS, TB, and Malaria and the US President's Malaria Initiative. One critical intervention that has been scaled up widely is the distribution of insecticide treated bed nets (ITNs) for prevention of malaria. ITNs have been well documented as a highly efficacious intervention in a number of clinical trials (Lengeler, 2004), leading Ministries of Health and donor partners to collaborate in scaling up coverage for the most at risk groups, mainly children under 5 and pregnant women. Large scale ITN distribution programs have been associated with reductions in mortality and morbidity in a number of settings (Pathania, 2014; Lengeler, 2004). ITN distribution programs in Tanzania started out with relatively small-scale pilots in the late 1990s in several districts, which were seen as highly effective in reducing malaria-related mortality and morbidity (Schellenberg et al., 2001). In 2004, a national voucher scheme was created (Njau et al., 2009), but comprehensive national coverage was not achieved until the mass free distribution campaigns of 2008-2011.

This paper focuses on two net distribution campaigns: the 2008-09 Under 5 Catch Up Campaign (U5CC), and the 2010-11 Universal Coverage Campaign (UCC). After several years of a voucher program which enabled subsidized access to nets for pregnant women and infants (the Tanzania National Voucher Scheme or TNVS), ITN coverage was still not reaching desired levels, leading policymakers to consider free distribution, for which Tanzania won funding for from the Global Fund for AIDS, TB, and Malaria. In the first free distribution campaign, nets were given to all children under 5 (the under 5 catch up campaign). Subsequently, in 2010-2011, additional nets were distributed to cover all household members, by giving one net to each household for

every sleeping space not already covered with an ITN.[2] Demographic and Health Surveys show that these campaigns were associated with increases in ITN coverage, as Tanzania reached over 80 percent ITN ownership by 2011.

In the 2008 under 5 catch up campaign, funded by a group of donors including the Global Fund, DFID, Swiss Development Cooperation, and the World Bank, the Tanzanian government hired NGOs which trained local government officials, who in turned supervised community volunteers, who registered all households and then distributed the nets (Bonner et al., 2011). The nets themselves were manufactured by A to Z Textiles Ltd., a domestic Tanzanian manufacturing firm. The country was divided into zones, which were covered progressively starting in regions with the highest malaria prevalence. The manufacturer, A to Z Textiles, distributed the nets to the village level, where they were stored temporarily. Village Executive Officers then were in charge of selecting, training, and managing four village volunteers in identification, registration, and distribution of free net vouchers for all under 5s in the community, and oversight of net storage and distribution from the storage space to the distribution site. NGOs did social mobilization and information activities before and during the registration (such as theater, videos, and public meetings). Distribution took place over weekends, and caregivers were instructed to bring their vouchers to the distribution site, where they were exchanged for nets. One month after distribution, the Red Cross (or district health staff in areas where the Red Cross was not active) followed up at households with a campaign to encourage correct bed net use. Over 8.7 million nets were issued, and the total program cost was $63 million (Bonner et al., 2011).

The modality of the Universal Coverage Campaign, which lasted from July 2010 to October 2011, was quite similar. Distribution and logistics were handled by the manufacturer and NGOs. Ward executives and village executives were again were charged with identifying and supervising in each village four community volunteers, who over a five day period visited each home and registered each sleeping space[3]. The volunteers issued coupons for each space that warranted a

[2]Technically the nets distributed in these campaigns are long lasting insecticidal nets, or LLINs, rather than ITNs

[3]According to Renggli et al. (2013), "A sleeping space was defined as any bed, sleeping mat or floor space that

net, which were redeemable at the distribution point during the three day campaign period. The Tanzanian Red Cross again conducted a hang up encouragement campaign approximately one week after distribution. In total, over 17 million nets were distributed. The total cost of the 2010 campaign was $96.4 million, financed primarily by the Global Fund for AIDS, Tuberculosis and Malaria. (Renggli et al., 2013)

IV. Politics in Tanzania

Tanzania is an excellent setting in which to study the relationship between service delivery and politician approval, as the political economy of public service delivery is dysfunctional in ways that are common to many developing countries, yet it has also been one of the largest recipients of health sector aid in the world in recent years, and it has been among the leading countries in sub-Saharan Africa in implementation of malaria control programs.

Since gaining independence in 1964, Tanzania has been ruled by a single party, Chama Cha Mapinduzi (CCM). After founding president Julius Nyerere's retirement in 1985, politics began to open up and in 1995, Tanzania had its first multi-party election. Yet despite having multiparty elections, CCM has never won less than 60% of the presidential vote or 70% of the seats in Parliament. Tanzania was in effect a single party state for much of the post-independence period, and the legacy of single party state is still present in the way that CCM manipulates formal rules and distributes state resources to entrench its dominance (Hoffman and Robinson, 2009). But as CCM's inherited historical legitimacy as the party of independence and Julius Nyerere fades, national politics is growing more competitive, and CCM is increasingly eager to demonstrate that it is delivering services to voters to justify its continued rule. This desire has intensified since CCM's legitimacy has been called into question due to a number of high-level corruption scandals involving senior party cadres.

could be potentially covered by a net."

Since approval ratings of various political figures are key outcome variables, in this section I describe their roles in the Tanzanian political system. It is a centralized, strongly executive-dominated system. The President and members of parliament are both directly elected every 5 years. A separate, smaller group of MPs are appointed. At the subnational level, regional and district commissioners are centrally appointed, while the district council is comprised of elected representatives (known as ward councillors) from each ward. Below the district, ward executive officers are civil servants, while ward councillors are elected politicians. Similarly at village level, there is an elected village chairman, and an appointed village executive officer, who is effectively a civil servant (Lierl, 2014). Below the village level, there are semi-official party structures known as ten cells, which are formally separate from, but in practice often closely intertwined with, the state apparatus.[4]

Research Design

Here I describe the data, the identification strategy, and estimation approaches that I use to identify the causal effects of national ITN distribution on citizens' views of their political leaders in Tanzania.

Data

The main data sources are the 2008-09 and 2010-2011 rounds of the National Panel Survey, a large multi-topic household survey conducted in Tanzania by the National Bureau of Statistics with support from the World Bank. 3,200 households were interviewed in 2008-09, and these

[4]Despite the formal structures described here, the state is quite weak at lower levels in Tanzania. Hoffman et al (2010) observe that while "In theory, government in Tanzania extends down to the mtaa (neighborhood) in urban areas and kitongoji (village) in rural areas. These lowest rungs of government connect to the district through division and ward levels. In practice, organized local government tends not to exist below the district level. Rather, while local government officials, such as Ward Executive Officers and Village Executive Officers exist, they are not integrated into the district government, but are left to find their own solutions to local problems with the resources they can gather on their own initiative."

households, plus any new households that split off from the original sample, were re-interviewed in 2010-2011. The main focus of the survey was household consumption, poverty, and agricultural production, but there was also a governance module, which was asked of one single randomly selected adult household member. Critically, for my identification strategy, the timing of survey visits were randomized. The survey documentation notes that "within each zone, each district and each region were visited at 3 separate (randomly assigned) points during the year, so as to account for seasonal fluctuations." This randomization, combined with the staggered roll out of the bed net campaigns, enables an "as-if" random RD design. Dates of the ITN distribution campaigns in each zone are obtained from program documents provided by one of the implementing NGOs, Mennnonite Economic Development Associates, and from Bonner et al. (2011) and Renggli et al. (2013).

I use outcome variables from this governance survey module, which asked voters for their level of approval of 8 public officials: village chairman, village executive officer, ward executive officer, ward councilor, headmaster, extension officer, police officer, and member of Parliament. I create binary outcomes variables for each political leader, excluding the sectoral functionaries (extension officer, headmaster and policeman). *Politician approval*, our principal conceptual outcome, is measured for five different leaders: village chairman, village executive officer, ward executive officer, ward councillor, and member of parliament. Between 70 and 80 percent of respondents report that they either approve or strongly approve of these leaders in the 2010-2011 round of the NPS. The key independent variable is whether respondents or anyone in their household own an ITN, or (in other specifications), or whether anyone in their household has received a free net (*"itn_receipt"*). Variable definitions for the various measures of bed net ownership and use are provided in the appendix.

Figure 1: Politician approval in full sample

Variation in Access to ITNs

I exploit the variation in possession of a free bed net driven by whether the 2010-11 ITN distribution campaign happened either before or after an individual was surveyed by the NPS. Thanks to the randomized roll out of the survey, in conjunction with the phased introduction of the two ITN campaigns, I can compare citizens who were surveyed just prior to receiving a net with those who were surveyed just after receiving a net.

One data issue is that although we know the month and year of all survey interviews, we do not know the exact *day* on which the survey was conducted. The month and year is recorded but the survey day is erased for anonymity. Therefore I impute a date of the 15th day of the month to all observations. I define respondents as treated if the survey team arrived within 4 months (120 days) after the mass bed net distribution campaign (such that the *post* variable = 1), omitting the 15 days before and 15 days after the survey date to account for uncertainty about the exact survey day of the month. Respondents who were surveyed 120 days before the ITN campaign arrived in their village are control. (*post* = 0). Later I relax this assumption to test multiple definitions of the treatment variable (including with bandwiths of 2 months, 6 months, and 1 year).

Figure 2 demonstrates that the 2010 universal coverage campaign dramatically increased ITN ownership. Individuals surveyed after the campaign occurred in their community have dramatically higher rates of net ownership and use and are much more likelier to report that a member of their household received a free net (or free ITN) than those interviewed before the campaign occurred.

I can identify the causal impact of the bed net distribution campaign under the assumption that respondents just before or just after the campaign are comparable in expectation. However, it is reasonable to think that individuals surveyed quite a long time before or long after the campaign might be different. To address such concerns, I only compare treated cohorts surveyed shortly before the campaign to control cohorts surveyed just after. Our main analysis focuses on a "bandwidth" of 120 days on either side of the campaign period. Given the plausibly exogenous timing

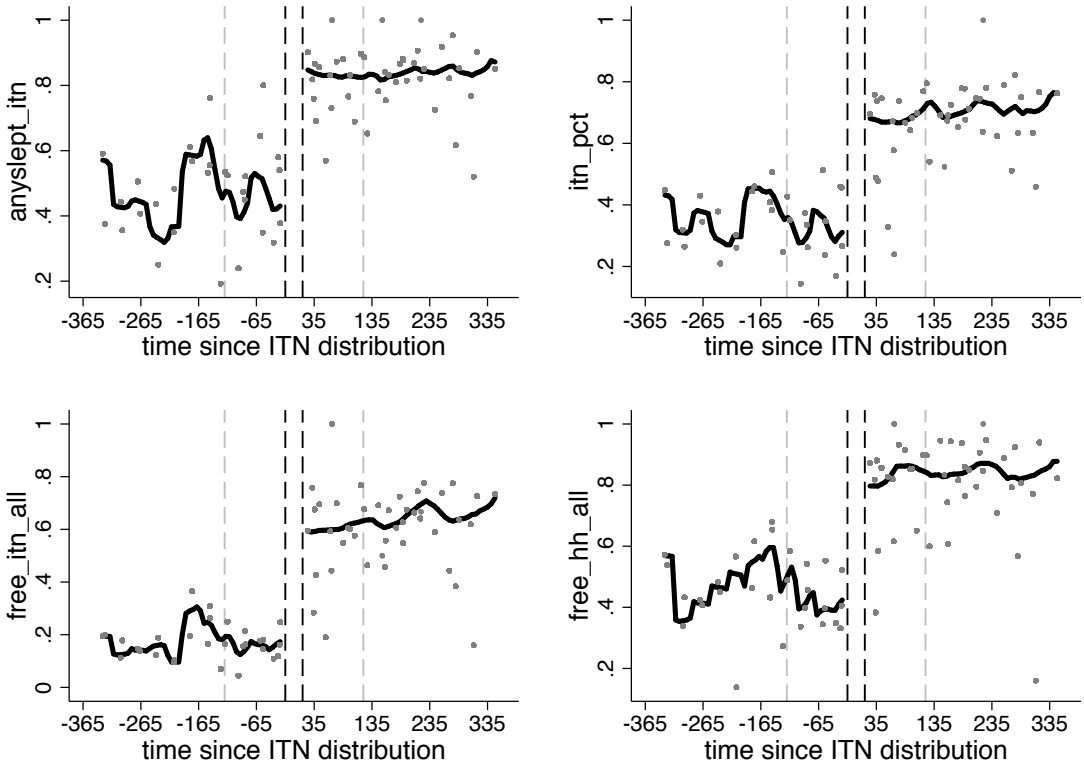

Figure 2: ITN access by survey date

Notes: Each gray dot represents average ITN ownership or use for a given survey date. Black lines are local polynomials fitted either side of the survey date (indicated by the vertical dashed line). The vertical gray dashed lines indicate the bandwidth used for our main analysis. Variable definitions are provided in the appendix. The x-axis shows the number of days elapsed between respondent's interview date and the date of ITN campaign in the respondent's region.

of the campaign's arrival in a given district combined with the survey's randomized timing, this allows us to recover causal estimates.

Estimation Strategies

In this section, I provide estimates of the effect of bed net distribution on the main outcome variable of interest: approval ratings of local government officials and political leaders. I first present results graphically, and then with reduced form and instrumental variables specifications. Figure 3 shows the graphical representation of the impact of ITN distribution on approval ratings for 5 political leaders: village executive officer, village chairman, ward executive officer, ward chairman, and MP. In regression form, I use two approaches to estimate the effect of receiving on bed net on approval of local politicians. I first estimate the reduced form effects of the bed net distribution campaign by estimating the following OLS model:

$$Politician\ approval_{ic} = \delta post\ campaign_c + \xi_{ic}, \tag{1}$$

This model is analogous to the intent-to-treat (ITT) analysis of a randomized experiment.[5]. However, simply being surveyed after the ITN campaign does not predict perfectly receipt of a net. Therefore in a separate set of estimates, we use a post-campaign survey date as an instrument for receipt of a net. In this model, we estimate the effect of post-campaign survey date on net receipt in a first stage regression:

$$ITNreceipt_{ic} = \delta post\ campaign_c + \xi_{ic}, \tag{2}$$

[5]Robust standard errors are clustered at the district level

Then we estimate a structural model using two-stage least squares (2SLS):

$$Y_{ic} = \beta ITN\ receipt_{ic} + \varsigma_{ic}. \tag{3}$$

For the IV estimation to be valid, several conditions must hold. First, there must be a strong and highly significant relationship between the instrument (post campaign survey date) and the endogenous variable (ITN receipt). As Figure 2 shows, being surveyed after the ITN campaign took place (*post*=1) increases net ownership by 30 to 40 percentage points for any definition of net ownership, receipt, or use. The resultant first stage F statistic, ranging from 19 to over 100, in all cases comfortably exceeding the threshold value of 10 (Staiger and Stock 1997). Second, the exclusion restriction requires that our instrument only affects political opinions through the mechanism of exposure to the bed net campaign, which seems quite plausible given the role of survey date randomization in generating the discontinuity.

Table 1: impact of campaign on net ownership

	(1) anyslept_itn	(2) slept_itn	(3) itn_pct	(4) anynet	(5) free_net_all	(6) free_itn_all	(7) free_hh_all
post	0.369***	0.372***	0.351***	0.199***	0.403***	0.441***	0.399***
	(0.0464)	(0.0374)	(0.0325)	(0.0446)	(0.0481)	(0.0482)	(0.0535)
Constant	0.466***	0.326***	0.329***	0.729***	0.255***	0.167***	0.437***
	(0.0260)	(0.0176)	(0.0166)	(0.0439)	(0.0180)	(0.0145)	(0.0297)
R-squared	0.151	0.138	0.193	0.071	0.163	0.203	0.174
N	7064	6995	7064	7064	7064	7064	7064

robust standard errors clustered at district level

$*p < .1, **p < .05, ***p < .01$

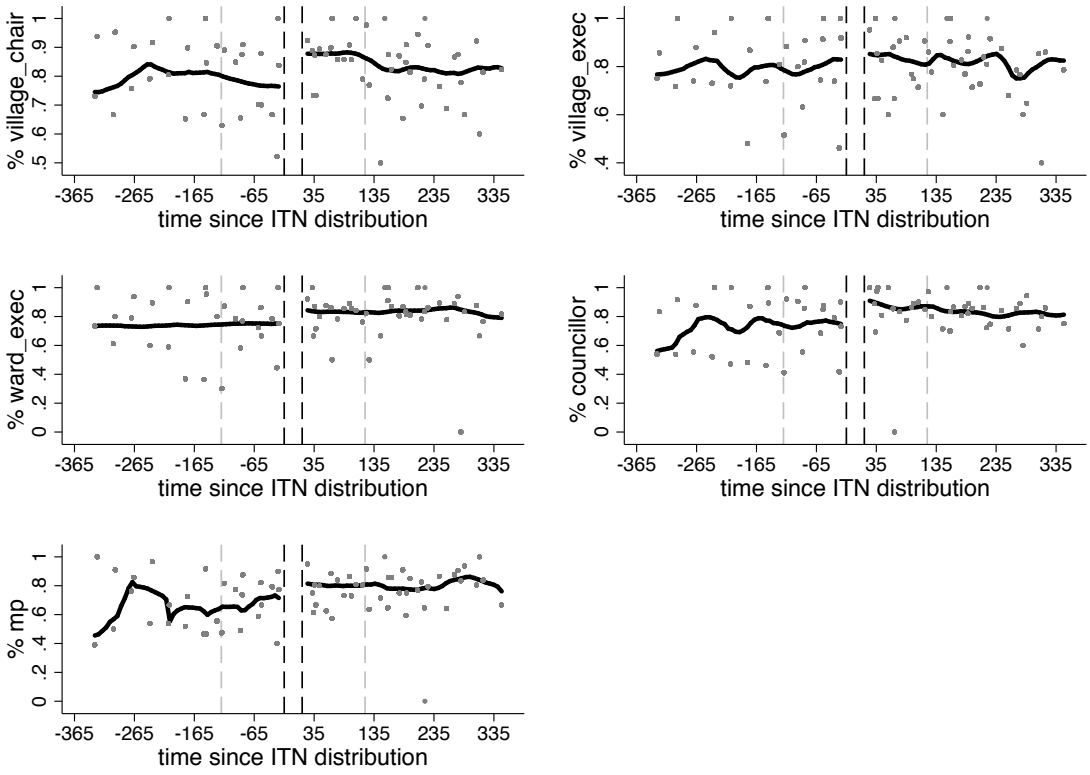

Figure 3: Politician approval by survey date

Notes: Each gray dot represents average politician approval for a given survey date. Black lines are local polynomials fitted either side of the campaign (indicated by the vertical dashed line). The x-axis shows the number of days elapsed between respondent's interview date and the date of ITN campaign in the respondent's region.

Bed Net Distribution and Politician Approval Ratings in Tanzania

In this section I present the main finding: that malaria control efforts in Tanzania have resulted in substantial public opinion gains for local politicians. Graphical evidence and regression estimates are provided for each outcome of interest. The regression tables provide our reduced form and IV estimates. I then confirm the robustness of these estimates.

Main Estimates

The main results are that, in the reduced form specifications, village chairman, the ward councilor, ward executive, and MP all see highly significant, substantive increases in their approval ratings. The approval increase they all, except for the village executive, receive is on the order of 10 to 13 percentage points, from base approval rates of 70 to 80 percent. The effects are substantively large and highly significant: for village chairman and MP, for example, I can reject that the coefficients equal zero with 99% confidence. In the IV specifications, the same patterns of significance are present (for all except the village executive officer there is a significant treatment effect), and the effect sizes are 2 to 3 times larger.

Secondary Outcomes

We also look at the impact of the campaign on two secondary outcomes which might be related to politician approval: attendance at various community meetings, and on the likelihood that the respondent reports ever speaking to various political leaders. There is no significant effect of the 2010 campaign on attendance at subvillage, village, farmer cooperative, savings group, or school committee meetings. There is, however, a positive and marginally significant impact on the likelihood of ever having spoken to the ward councillor (8 percentage point increase), and a

Table 2: impact of campaign on politician approval, 2010 round

	(1) village_chair	(2) village_exec	(3) councillor	(4) ward_exec	(5) mp
Panel A: Reduced form					
post	0.105***	0.0503	0.133**	0.100**	0.123***
	(0.0338)	(0.0386)	(0.0533)	(0.0502)	(0.0456)
Constant	0.770***	0.787***	0.739***	0.737***	0.680***
	(0.0313)	(0.0344)	(0.0530)	(0.0509)	(0.0405)
R-squared	0.018	0.003	0.028	0.013	0.019
N	1125	849	831	618	818
Panel B: IV estimates					
ITN receipt	0.259***	0.121	0.333**	0.249*	0.273***
	(0.0836)	(0.0919)	(0.141)	(0.130)	(0.101)
Constant	0.667***	0.739***	0.605***	0.629***	0.578***
	(0.0628)	(0.0692)	(0.111)	(0.107)	(0.0749)
N	1125	849	831	618	818

Standard errors in parentheses

$*p < .1$, $**p < .05$, $***p < .01$

highly significant, 11 percentage point increase in the likelihood of having ever spoken to the MP. Regression results are presented in the appendix (Table A1).

Robustness Checks

This section relaxes several model assumptions to test the robustness of the findings presented above. In Table 4 we present a series of checks testing our identifying assumptions. First we show balance on pre-treatment variables (household consumption, age, gender, and urban residence. Regressions (shown in the online appendix) show that none of these are statistically significant differences at the discontinuity.

Next I present a series of placebo reforms. I generate placebo campaigns 100 and 200 days before the real campaign and 100 and 200 days after. In 40 total placebo tests (5 outcomes x 4 placebos, 20 reduced form, 20 IV) only one coefficient is statistically significant. Results are robust to changing the bandwidth to 30, 60, 90 days (rather than 120) or to a full year. Finally, controlling

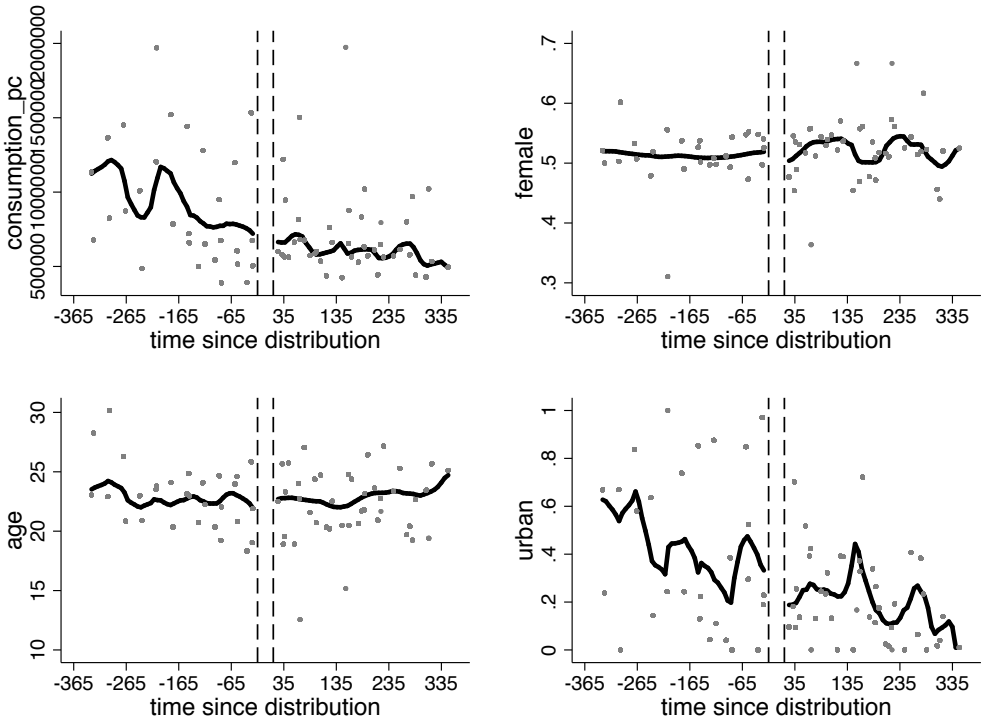

Figure 4: covariate value by survey date

Notes: Each gray dot represents mean covariate value for a given survey date. Black lines are local polynomials fitted either side of the survey date.

for pre-treatment characteristics (gender, age, consumption quintiles, and urban residence), all results come through in reduced form and IV. Select robustness checks are reported in Table 3; the rest are available upon request.

Table 3: Robustness checks

	(1) village_chair	(2) village_exec	(3) councillor	(4) ward_exec	(5) mp
Panel A: Reduced form with controls					
post	0.0898***	0.0277	0.106***	0.0905**	0.101**
	(0.0297)	(0.0295)	(0.0397)	(0.0415)	(0.0423)
N	1125	849	831	618	818
Panel B: 60 day bandwidth					
post	0.107**	0.0121	0.153***	0.0739	0.0923*
	(0.0442)	(0.0416)	(0.0548)	(0.0515)	(0.0546)
N	497	363	347	258	355
Panel C: 90 day bandwidth					
post	0.116***	0.0677*	0.132**	0.0827	0.132***
	(0.0346)	(0.0379)	(0.0507)	(0.0501)	(0.0484)
N	757	569	553	418	550
Panel D: 100 day placebo					
placebo 100 days	-0.0383	-0.0484*	-0.0143	-0.00179	-0.0308
	(0.0272)	(0.0280)	(0.0284)	(0.0274)	(0.0368)
N	1115	884	859	657	838
Panel E: 200 day placebo					
placebo 200 days	-0.0207	0.00316	-0.0468	0.00148	0.0180
	(0.0279)	(0.0390)	(0.0313)	(0.0336)	(0.0306)
N	880	729	743	549	736

robust standard errors clustered at district level

$*p < .1, **p < .05, ***p < .01$

Heterogeneous Effects

There are three further areas of heterogeneity in treatment effect which shed additional light on the relationship between distribution of bed nets and the dynamics of public opinion. The first becomes apparent if we compare the effect of the 2008 Under 5 catch up ITN campaign to the

2010 universal coverage campaign. The 2008 net distribution campaign also was contemporaneous with the 2008-2009 National Panel Survey, meaning that the same RD identification strategy can be implemented. As Figure 5 shows, there is (as in 2010) a large discontinuity in net ownership between respondents surveyed before and after the campaign.

Interestingly, however, there is *no* political benefit to politicians in the aftermath of this campaign. (A similar pattern is visible in Panel C of Table 5, which shows that in 2010, the treatment effect is driven by households which do not have children under 5.) There is no treatment effect whether we test this for the whole sample, or when we restrict the regression to households that had at least one child under 5 in 2008 (not shown). This comparison is not as well powered as that of 2010, since only 13 percent of respondents were interviewed after the campaign, compared to 49 percent after the 2010 campaign. However, the lack of significant results is not because of large standard errors but rather because point estimates are small or negative, suggesting that lack of power is not the only reason we do not see comparable results to 2010. This suggests that individuals are more likely to value benefits for adults than for children, even when children are more likely to benefit from the good in question.

The second area for analysis is heterogeneity of impact within the 2010 campaign. I test whether the effect varies as a function of the political characteristics of the respondent's village. Villages are coded as CCM if more than 50 percent of interviewed village officials are from that party; otherwise they are coded as opposition. 74 percent of respondents in 2010 live in CCM villages. I test the hypothesis that respondents are more likely to respond to the ITN campaign in villages run by the opposition. This would be the case if respondents already have fixed opinions about local CCM politicians, given that the party has ruled the country for over 50 years. Opposition parties and leaders are likely to be more of a black box to voters. Indeed, when we examine heterogeneous effects, we see that the positive effect for the village chair approval outcome is largely driven by outcomes in opposition-run villages.[6]

[6]The same pattern holds if we define CCM villages as either a) those with a CCM chairperson when visited in the

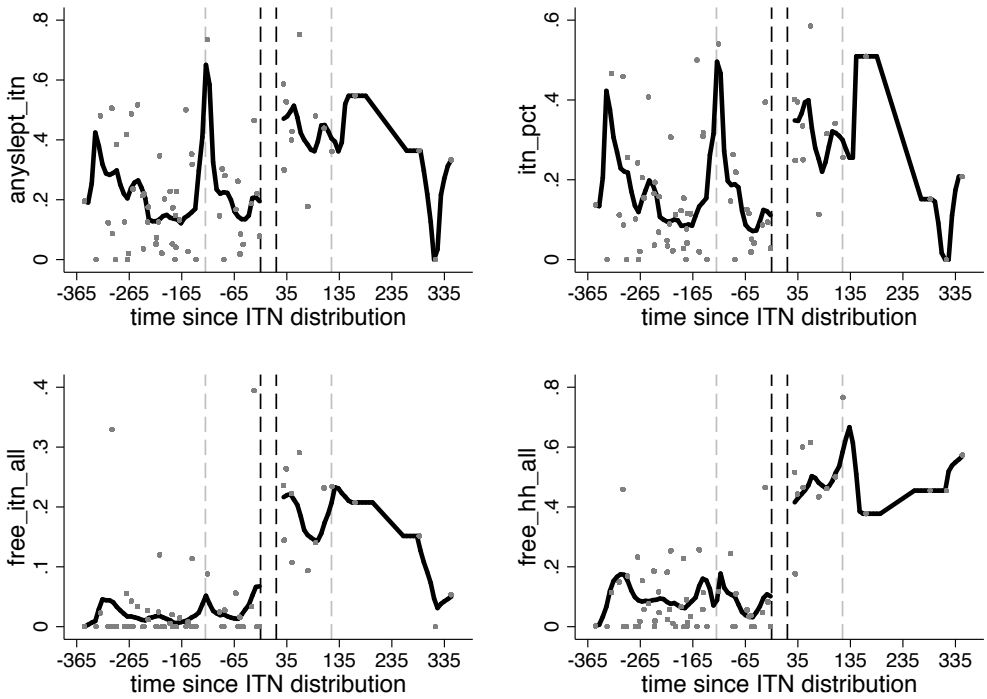

Figure 5: ITN receipt by survey date 2008

Notes: Each gray dot represents mean ITN receipt for a given survey date. Black lines are local polynomials fitted either side of the survey date. The x-axis shows the number of days elapsed between respondent's interview date and the date of ITN campaign in the respondent's region.

Table 4: impact of campaign on politician approval, 2008 round

	(1) village_chair	(2) village_exec	(3) councillor	(4) ward_exec	(5) mp
Panel A: Reduced form					
post	-0.0390	-0.00333	0.0219	0.0103	-0.0660
	(0.0399)	(0.0534)	(0.0493)	(0.0498)	(0.0565)
Constant	0.780***	0.638***	0.591***	0.519***	0.566***
	(0.0273)	(0.0419)	(0.0355)	(0.0407)	(0.0435)
N	592	592	592	592	592
Panel B: IV estimates					
ITN_receipt	-0.125	-0.0107	0.0702	0.0331	-0.211
	(0.129)	(0.169)	(0.156)	(0.157)	(0.180)
	0.787***	0.639***	0.587***	0.517***	0.579***
	(0.0328)	(0.0498)	(0.0422)	(0.0481)	(0.0508)
N	592	592	592	592	592

robust standard errors clustered at district level

$*p < 0.1, **p < .05, ***p < .01$

The third potential driver of heterogeneous effects is the severity of malaria infection at the time of net distribution. Tanzania has a long rainy season in April and May, which leads to a seasonal increase in malaria transmission in much of the country. To the extent that the benefit that politicians receive from net distribution is a function of issue salience, it would make sense for benefits to be largest for respondents interviewed after a net distribution that coincided with the rainy season. This is exactly what we see in Panel B of Table 5.

Discussion

There are three points in particular about these findings which merit further discussion. The first point of note is the substantively large political benefits for politicians as a result of the provision of a relatively low value preventive health product. Even more surprising, perhaps, this benefit is more direct than the political gains to incumbents from several CCT programs. For example, De La O

2008 survey, or b) those where more than 75 percent of interviewed village officials in 2010 were from CCM.

Table 5: Heterogeneous treatment effects

	(1) village_chair	(2) village_exec	(3) councillor	(4) ward_exec	(5) mp
Panel A: effect on households in opposition versus CCM-controlled villages					
post	0.168***	0.111	0.106*	0.158**	0.0368
	(0.0445)	(0.0585)	(0.0511)	(0.0578)	(0.0622)
post x CCM	-0.0911*	-0.0821	0.0412	-0.0820	0.133
	(0.0444)	(0.0590)	(0.0699)	(0.0758)	(0.0705)
N	1125	849	831	618	818
Panel B: effect on households receiving a net in the rainy season					
post	0.104**	0.0309	0.0872*	0.0595	0.113**
	(0.0319)	(0.0337)	(0.0422)	(0.0405)	(0.0420)
post x rainy	0.0807	0.266***	0.406***	0.500***	0.157
	(0.0550)	(0.0714)	(0.0761)	(0.118)	(0.0980)
N	1125	849	831	618	818
Panel C: effect on household without children under 5					
post	0.109*	0.0467	0.186**	0.131	0.169**
	(0.0507)	(0.0633)	(0.0706)	(0.0742)	(0.0576)
post x u5	-0.00765	0.00737	-0.0973	-0.0550	-0.0819
	(0.0546)	(0.0623)	(0.0592)	(0.0668)	(0.0615)
N	1125	849	831	618	818

Robust standard errors clustered at district level

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

(2013) finds that while incumbents benefit from *Progresa*, the gains are due to increased mobilization of incumbent supporters rather than persuasion of opposition voters. Likewise Labonne (2013) finds no average effect of CCTs, but rather treatment effects limited to politically competitive areas. Given the conditonal nature of these treatment effects, one might easily suspect that since the bed nets distributed cost less than $10 (while the CCTs in question give transfers of between 25 and 50 percent of annual income), there would be no detectable treatment effect of net distribution. Perhaps surprisingly, we find a large effect. While we cannot estimate long run effects, the short run effects seem large in comparison to the value of the good provided.

The second notable aspect of the results is the difference in political impact of the 2008 campaign and 2010 campaigns. The first potential explanation, mentioned above, is that the 2008 campaign targeted children under 5, while the 2010 campaign targeted individuals over age 5. While everyone presumably wants malaria protection for their children, the benefits that adult survey respondents received from the 2010 campaign were likely much more salient to them and thus more likely to influence their views. Another explanation for the difference in effect could be a question of magnitude: the 2010 campaign delivered approximately two times the number of nets, costing 50 percent more than the 2008 campaign. It is conceivable that there is a threshold in size or value which must be crossed for a government activity to become salient for citizens. If so, this would create a major information problem for governments who were inclined to deliver programmatic instead of clientelist goods, since they would have little way to know *ex ante* what the threshold for a beneficial public approval reaction to their program might be.

Finally, how should we interpret the heterogeneity between CCM dominated and opposition dominated villages? One possibility is that citizens in some villages prefer opposition leaders, but worry that by electing an opposition village chair, they have reduced their ability to access benefits from the CCM-dominated central government. When they observe that their village benefited from the national ITN campaign despite having opposition leadership, their remaining worry about opposition rule is reduced and they increase their support for opposition politicians. A second, not

mutually exclusive possibility is that voters already have fixed opinions about CCM, who have ruled the country since independence. But with opposition politicians, they are much more open to persuasion based on performance, e.g. effective delivery of goods or services such as bed nets.

Conclusion

Governments do not deliver services effectively in developing countries because there are powerful political forces pushing politicians and bureaucrats to use resources for their personal gain, their political survival, or both. But what if there were also large political rewards to effective service delivery, at least for some classes of goods, or types of public services? Different political equilibria could emerge. The apparent incentive compatibility, under certain conditions, that is identified here between the interests of large, life saving global health programs and local politicians offers a potentially promising new path. Uncertainty about the nature and the magnitude of citizen reaction to effective programs may be one barrier to efforts in support of such programs on the part of political leaders. This paper quantifies the benefits to one such program in Tanzania, and in doing so may point to the way to a broader research agenda on the political returns to delivering critical life saving interventions. More work is needed to estimate the political benefits of other critical interventions, such as antiretroviral treatment for HIV/AIDS, that are high on the global health agenda but are too often underprovided in developing countries.

References

Baez, Javier, Adriana Camacho, Emily Conover and Ramon Zarate. 2012. "Conditional Cash Transfers, Political Participation, and Voting Behavior." Working paper.

Bonner, Kimberly, Alex Mwita, Peter McElroy, Susan Omari, Ally Mzava, Christian Lengeler, Naomi Kaspar, Rose Nathan, Joyce Ngegba, Romanus Mtung'e and Nick Brown. 2011. "Design, implementation and evaluation of a national campaign to distribute nine million free LLINs to children under five years of age in Tanzania." *Malaria Journal* 10(1):73.

Campbell, Angus, Phillip E. Converse, Warren E. Miller and Donald E. Stokes. 1960. *The American Voter*. John Wiley and Sons.

Cohen, Jessica and Pascaline Dupas. 2010. "Free Distribution or Cost-Sharing? Evidence from a Randomized Malaria Prevention Experiment." *The Quarterly Journal of Economics* 125(1):1–45.

De La O, Ana L. 2013. "Do Conditional Cash Transfers Affect Electoral Behavior? Evidence from a Randomized Experiment in Mexico." *American Journal of Political Science* 57(1):1–14.

Fiorina, Morris. 1981. *Retrospective Voting in American National Elections*. Yale University Press.

Fried, Brian and Atheen Venkataramani. 2014. "Does Saving Lives Win Votes?" Working paper.

Golden, Miriam and Brian Min. 2013. "Distributive Politics Around the World." *Annual Review of Political Science* 16(1):73–99.

Hoffman, Barak and Lindsay Robinson. 2009. "Tanzania's Missing Opposition." *Journal of Democracy* (4):123–136.

Labonne, Julien. 2013. "The local electoral impacts of conditional cash transfers: Evidence from a field experiment." *Journal of Development Economics* 104(0):73 – 88.
URL: *http://www.sciencedirect.com/science/article/pii/S0304387813000692*

Lengeler, Christian. 2004. *Cochrane Database of Systematic Reviews* 2.

Levitt, Steven D. and Jr. Snyder, James M. 1997. "The Impact of Federal Spending on House Election Outcomes." *Journal of Political Economy* 105(1):pp. 30–53.
URL: *http://www.jstor.org/stable/2138870*

Lierl, Malte. 2014. "Preferences or Incentives? Experimental Evidence on the Accountability of Village Leader." Working paper.

Manacorda, Marco, Edward Miguel and Andrea Vigorito. 2011. "Government Transfers and Political Support." *American Economic Journal: Applied Economics* 3(3):1–28.

Mayhew, Phillip. 2004. *Congress: The Electoral Connection*. Yale University Press.

Njau, Ritha, Don de Savigny, Lucy Gilson, Eleuther Mwageni and Franklin Mosha. 2009. "Implementation of an insecticide-treated net subsidy scheme under a public-private partnership for malaria control in Tanzania - challenges in implementation." *Malaria Journal* 8(1):201.
URL: *http://www.malariajournal.com/content/8/1/201*

Pathania, Vikram. 2014. "The Impact of Malaria Control on Infant Mortality in Kenya." *Economic Development and Cultural Change* 62(3):pp. 459–487.

Pop-Eleches, Cristian and Grigore Pop-Eleches. 2012. "Targeted Government Spending and Political Preferences." *Quarterly Journal of Political Science* 7(3):285–320.

Popkin, Samuel L. 1994. *The Reasoning Voter*. University of Chicago Press.

Posner, Daniel N. and David J. Simon. 2002. "Economic Conditions and Incumbent Support in Africa's New Democracies: Evidence from Zambia." *Comparative Political Studies* 35(3):313–336.

Renggli, Sabine, Renata Mandike, Karen Kramer, Faith Patrick, Nick Brown, Peter McElroy, Wilhelmina Rimisho, Amina Msengwa, Ally Mnzava, Rose Nathan, Romanus Mtung'e, Rita Mgullo, Jane Lweikiza and Christian Lengeler. 2013. "Design, implementation and evaluation of a national campaign to deliver 18 million free long-lasting insecticidal nets to uncovered sleeping spaces in Tanzania." *Malaria Journal* 12(1):85.

Schellenberg, Joanna RM Armstrong, Salim Abdulla, Rose Nathan, Oscar Mukasa, Tanya J Marchant, Nassor Kikumbih, Adiel K Mushi, Haji Mponda, Happiness Minja, Hassan Mshinda, Marcel Tanner and Christian Lengeler. 2001. "Effect of large-scale social marketing of insecticide-treated nets on child survival in rural Tanzania." *The Lancet* 357.

Staiger, Douglas and James H. Stock. 1997. "Instrumental Variables Regression with Weak Instruments." *Econometrica* 65(3):557–586.

Stokes, Susan C., Thad Dunning, Marcelo Nazareno and Valeria Brusco. 2013. *Brokers, Voters, and Clientelism: The Puzzle of Distributive Politics*. Cambridge ; New York: Cambridge University Press.

Wantchekon, Leonard. 2003. "Clientelism and voting behavior: Evidence from a field experiment in Benin." *World Politics* 55(3):399–422.

Yi Dionne, Kim and Jeremy Horowitz. 2013. "The Political Effects of Anti Poverty Initiatives: An Analysis of Malawi's Agricultural Input Subsidy Program." Working paper.

Variable definitions

The following variables all come from the 2008-2009 and 2010-2011 National Panel Surveys

ITN_receipt. Coded as 1 if any household member was sleeping under a bed net that was received for free. (Same as free_hh_all variable below)

anyslept_itn. Coded as 1 if any household member slept under an ITN the previous night

itn_pct. Percentage of household members who slept under and insecticide treated net (ITN) the previous night.

any_net. Coded as 1 if any household member slept under a bed net the previous night.

free_hh_all. Coded as 1 if any member of the household slept under a bed net the previous night that they had received for free.

free_itn_all. Coded as 1 if any member of the household slept under an ITN the previous night that they had received for free.

post. Coded 1 if the respondent was interviewed after the bed net distribution campaign took place in the respondent's zone of residence.

Politician approval variables: *village chair, village_exec, weo, councillor, mp* Coded 1 if the respondent reports that he or she approves or strongly approves of the village chairman.

ccm_village. Coded 1 if more than 50 percent of village council members interviewed in 2010 were CCM party members.

ccm_village_75. Coded 1 if more than 75 percent of village council members interviewed in 2010 were CCM party members.

ccm_lag. Coded 1 if the one village leader interviewed in 2008 was a CCM member.

rainy. Coded 1 if interview took place in April or May.

u5. Coded 1 if the household had any child under age 5.

consumption_pc. Household consumption per capita, in 2010 Tanzanian Shillings.

urban. Indicator coded 1 if respondent household is located in an urban area.

female. Indicator coded 1 if respondent is female.

Table 6: impact of campaign on civic activities, 2010 round

Panel A: impact of campaign on speaking to politician, 2010 round					
	(1)	(2)	(3)	(4)	(5)
	talk_vc	talk_veo	talk_weo	talk_councillor	talk_mp
post	0.0485	0.0445	0.0820*	0.0573	0.109***
	(0.0475)	(0.0523)	(0.0415)	(0.0444)	(0.0364)
Constant	0.590***	0.398***	0.187***	0.345***	0.263***
	(0.0454)	(0.0496)	(0.0368)	(0.0432)	(0.0282)
R-squared	0.002	0.001	0.009	0.003	0.013
N	1341	1341	1341	1341	1341
Panel B: impact of campaign on meeting attendance, 2010 round					
	(1)	(2)	(3)	(4)	(5)
	subvillage	village	farmer_coop	sacco	school
post	0.0599	0.120	0.0350	-0.0145	-0.00218
	(0.0527)	(0.0800)	(0.0274)	(0.0131)	(0.0257)
Constant	0.563***	0.453***	0.0903***	0.105***	0.387***
	(0.0547)	(0.0798)	(0.0208)	(0.0107)	(0.0228)
R-squared	0.003	0.014	0.002	-0.000	-0.001
N	1341	1341	1341	1341	1341

robust standard errors clustered at district level

$*p < .1$, $**p < .05$, $***p < .01$

Table 7: covariate balance between pre and post campaign respondents

	(1) consumption_pc	(2) female	(3) age	(4) urban
post	-151174.4	0.0422	0.732	-0.150
	(116131.4)	(0.0345)	(1.161)	(0.102)
Constant	937692.4***	0.558***	39.31***	0.407***
	(131430.3)	(0.0252)	(0.863)	(0.0984)
N	1311	1341	1341	1341

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$