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Exchanging fertilizer for votes?

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Abstract

Several countries have made targeted input subsidy programs an integral part of their policies for improving food security. Given the programs' often centralized structure and targeting of private goods nation-wide, these may also serve as instruments for garnering electoral support. I investigate to what extent distributions from such a program was altered leading up to the 2009 Malawian presidential election, comparing the allocations of fertilizer vouchers in the last season prior to this relative to other seasons. I do not find evidence of targeting at the incumbent's core supporters, whereas swing supporters receive on average more fertilizer vouchers in the 2008/09 season relative to other seasons. This increase comes at the expense of the main opponents' core supporters, whom receive on average fewer vouchers. These findings add to the broader set of questions of whether targeted subsidies is the right approach for improving food security, and if so how.

JEL classification: D72, H53, O13, Q18

Keywords: fertilizer subsidies, elections, Malawi

1 Introduction

Redistribution policies play a central but dual role in countries' development. These are means for improving welfare, but may also serve as political tools for retaining power. Targeted programs are a special case of redistributive policies, and may be more effective in achieving both aims, given that program costs and inefficiencies are reduced and that politicians are more effectively able to target the intended recipients. A wide range of developing countries have introduced large-scale targeted redistribution programs over the past decade, and several of these have been agricultural-oriented in

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sub-Saharan Africa. The predominance of agriculture as the main income generating activity offers a natural link for redistribution through agricultural subsidies with the aim of improving recipients' ability to work their way out of poverty. The extent to which these programs are overridden by electoral goals is, however, not well understood. The ongoing Malawian agricultural subsidy program is of particular interest as it set about a wave of similar programs in other African countries (Jayne and Rashid, 2013), and provides a rich history of data to draw upon. Although the institutional settings differ between countries, the issues of politically motivated redistribution may resonate.

This paper investigates the role of a national agricultural input subsidy program in garnering electoral support in Malawi. The Agricultural Input Subsidy Program (AISP), later renamed the Farm Input Subsidy Program (FISP), was introduced in 2005 with the aim of improving national and household food security (Dorward and Chirwa, 2011). It targets rural households who are unable to purchase farm inputs by distributing vouchers that allow for accessing fertilizer and seeds at highly subsidized prices. Given the magnitude of the program, both in terms of the vast number of beneficiaries¹ and the inputs' market value, the high dependence on agriculture throughout the country,² and the vague targeting and allocation rules, the input subsidy program may also serve as an instrument for amassing electoral support.

Within the political economy literature, politically motivated redistribution is categorized as being driven by either patronage or tactical redistribution with the aim of winning elections. Patronagedriven redistribution is motivated by clientelistic practices, where access to power serves as the ruling party's chance to favor their own, without necessarily having underlying re-election motives (Cole, 2009). Within the domain of tactical redistribution, there are two main "pork-barrel"³ theories for which voters the candidate may chose to favorably target in an election run-up, and which have been extended to the realm of vote buying. Cox and McCubbins' (1986) core supporter model suggests that (promises of) resources will be targeted at areas where the candidate traditionally has strong ties. The probabilistic swing voter model, on the other hand, predicts that resources are used to garner support among voters without a strong party preference (Dixit and Londregan, 1996, 1998; Lindbeck and Weibull, 1987, 1993).⁴ Related is the issue of what happens to the opposition's

¹The number of beneficiaries of fertilizer vouchers ranges from 1.4 million to over 1.9 million households, and corresponds to 61-79 percent of rural households and 52-68 percent of all households in Malawi (LU, 2008, 2009, 2010, 2011, 2012; NSO, 2008).

²According to the 2008 census, 76 percent of the employed, rural population report subsistence-farming (*mlimi*) as their employment status, and among unemployed adults the most commonly stated reason for being inactive is "home worker", possibly implying agricultural work (NSO, 2010).

³ "Pork-barrel" refers to publicly funded projects that are allocated to constituencies/districts with the aim of building political support rather than being based on needs.

⁴Variants of both models assume a two-party system with a single-constituency, where the candidates' objective is to maximize their expected vote share given a resource constraint, and there is a fixed turn-out. Lindbeck and Weibull (1987) also allow for a different objective function, maximizing the probability of winning. The parties make a promise of redistribution, which enters into the voters' utility function, upon which promises are delivered if elected.

core supporters. Diaz-Cayeros et al. (2012) argue that politicians may punish the opponent's core supporters by distributing less resources to them. This is particularly relevant given a tight budget constraint, whereby increased spending on one group may require decreased spending on another.

Empirically, the core and swing voter models are applied to both pre-election distributions (Schady, 2000; Dahlberg and Johansson, 2002; Banful, 2011),⁵ and post-election redistributions, where voters are assumed to vote based on promises and the elected politicians deliver as promised (Cole, 2009; Vaishnav and Sircar, 2012). The empirical evidence regarding the relevance of these models is mixed so far,⁶ and this is also the case in the context of agricultural development. Using victory margins from previous and upcoming elections, Cole (2009) assesses whether public banks' distribution of agricultural credit is driven by patronage or electoral goals. Districts with a smaller victory margin experience larger transfers of agricultural credit in the election year relative to other years, suggesting targeting at swing voters. Banful (2011) studies the effect of a similar program to the FISP in Ghana, using cross-sectional data. He finds that districts in which the ruling party lost with a larger vote margin in the previous election received on average more vouchers. Mason et al. (2013) analyze several Zambian agricultural input subsidy programs using household level panel data. They find targeting at the core supporters, defined as areas where the incumbent party received a large vote share, and not at the swing voters, the latter identified as areas with a close vote margin.

With these models and empirical findings in mind I analyze the following: To what extent were subsidies targeted at swing voters or the incumbent's core supporters, at the expense of the opponent's core supporters, leading up to the 2009 presidential election? The institutional setting calls for two novel strategies to identify core and swing voters. First, if the incumbent, Bingu wa Mutharika, had remained attached to just one party, then a typical strategy would be to treat the past election outcome as a measure of the incumbent's core supporters, and likewise for the relevant opponent. The establishment of new parties, in this case by the incumbent, requires instead a more nuanced approach. I identify the incumbent's share of his previous party's past election outcome based on ethnic affiliation, and similarly for the opponent's share of voters that is derived from the same party. Second, I apply the core and swing voter concepts to a setting where there are more than two dominant parties, rendering the more common measure of swing voters, the difference in vote margin between the two main parties, less applicable. I argue instead that the swing voters in the

⁵A criticism to the pre-election approach is that voters face reduced incentives for voting for the candidate as they have already received benefits. Yet, voters may respond with a favorable vote due to a feeling of obligation and/or the expectation of more future resources (Dahlberg and Johansson, 2002). This is particularly relevant in a setting where politicians frequently make undelivered promises, as the voters may perceive "revealed preferences" as a better reflection of future actions and good provision (Schady, 2000; Kramon, 2011).

⁶Ansolabehere and Snyder (2006) find for instance support for the core supporter model, whereas Dahlberg and Johansson (2002) and Stokes (2005), among others, reveal targeting at swing voters.

Malawian setting, are those who previously voted for parties that by the 2009 election had more or less disintegrated, as supported by the 2005 and 2008 Afrobarometers (Khaila and Mthinda, 2005; Tsoka and Chinsinga, 2008).⁷ These voters are more likely to be responsive to economic benefits as compared to those with a strong party affiliation. Importantly, the presidential election results are based on a direct national vote, whereby each vote is worth the same and a relative majority is needed to win. In other words, I focus on swing and core *voters* rather than for example constituencies, but where the former is proxied by geographical areas. The notion of swing and core in a setting with a direct national vote is perhaps less intuitive, but I argue that given that the incumbent's objective is to maximize votes rather than seats and that his own core supporters are in minority, then distributing economic benefits to those that may be perceived as more responsive (i.e. swing voters) as opposed to the opposition's core supporters is potentially an important strategy.

The empirical strategy otherwise is straightforward. I look at the impact of the defined voting measures on district level allocations in the last season prior to the election relative to pre- and post-seasons, using a two-way fixed effects estimator. I do not find that the core supporters are favored, in terms of receiving fertilizer vouchers, in the last season preceding the election relative to the six other seasons. Instead, a one percentage point increase in the 2004 vote share to other parties than the two opposition parties (MCP and UDF^8), corresponds to an increase in the average allocated number of vouchers per 100 households by 0.42 percent in the 2008/09 season compared to the six-season average. This suggests that the swing supporters are favored. Further, the main opponents' core supporters receive on average fewer vouchers per household. A one percentage point increase in the opposition's core supporter measures correspond to a reduction of 0.41-0.52 percent in vouchers per 100 households compared to the six-season average, implying that they are punished. Although these findings suggest a favoring of swing supporters at the expense of the opponents' core supporters, their economic magnitudes are small. Importantly, the results rely on the official distribution of vouchers, which masks potential differences in additional voucher allocations that are unaccounted for. Whether the inclusion of these additional vouchers would strengthen these results, or present a different picture is in other words not clear.

To my knowledge, this is the first paper to look at whether the distribution of subsidized vouchers is used to garner electoral support at the national level in Malawi. Previous studies have largely focused on a sub-set of seasons and/or voting behavior. In their household-level analysis of seed markets in Malawi, Mason and Ricker-Gilbert (2012) instrument for whether a household received

⁷The Afrobarometer is a research project that regularly conducts nationally representative surveys in African countries (Tsoka and Chinsinga, 2008).

⁸Malawi Congress Party (MCP) and United Democratic Front (UDF) are the two main opposition parties, discussed in more detail in Sections 2.3 and 3.

fertilizer or seed vouchers using whether the "ruling party" won the household's district in the last presidential election, i.e. 2004, and the administratively determined district level allocations. They find that households residing in these districts receive on average more kilograms of fertilizer (and seeds) in the 2006/07 and 2008/09 seasons. The ruling party is, however, not named. The ruling party at the time of their surveys was Democratic Progressive Party (DPP) (the incumbent's new party). whereas the party that won the election in 2004 was UDF (the incumbent's previous party). It is not clear how they have addressed this division. Dionne and Horowitz (2013) use individual-level panel data from three districts in Malawi with the aim of revealing whether individuals that claim stronger feelings towards the incumbent's party were more likely to receive a subsidized voucher in 2009. They find no evidence of this, and claim that the incumbent was unable to efficiently target supporters due to institutional limitations and the lack of a grassroots organization. More recently, Brazys et al. (2015) investigate whether areas that receive on average more vouchers prior to the 2009 election, were more likely to give a favorable vote. They argue that the vouchers were most likely targeted at areas with higher levels of poverty in order for the incumbent to build electoral support, and place less emphasis on likely core supporters. Their analysis is two-fold. First, they analyze district level allocations in the 2007/08 season, and how these correspond to poverty indicators, ethnicities and likely program success. Second, they analyze voting behavior in the 2009 parliamentary election using different instruments for district allocations, including an averaged district annual measure based on FAO's allocation of aid projects, ethnic distributions and poverty indicators. Based on their findings, they claim that a one percentage point increase in households receiving vouchers increases the incumbent's electoral margin by two percent. The validity of their instruments is however questionable, as ethnicity, for instance, is likely to correlate with the geographical dispersion of other government interventions that again may affect voting behavior.

Further, this paper adds to the literature on politically motivated redistribution. Unlike previous studies on similar subsidy programs using either cross-sectional data at an aggregated level (Banful, 2011) or household-level (panel) data (Pan and Christiaensen, 2012; Mason et al., 2013; Brazys et al., 2015), I analyze the official, nation-wide allocations from the central level. Panel data is more likely to address possible confounding factors and is less prone to attrition bias and measurement error in terms of the incumbent's intended allocation. Moreover, I address some of the issues that the establishment of new parties creates in analyzing politically motivated redistribution. Contrary to more mature democracies, politicians in sub-Saharan African countries have a larger tendency to change their party flag (van de Walle, 2003), suggesting a relevance of my approach to other settings. This resembles the empirical approach taken by Gutiérrez-Romero (2014), where Kenyan core and

swing supporters are identified based on ethnicity due to the creation of new parties.

The remaining paper is organized as follows. I first describe the program in question, the electoral background and why the input subsides may be termed political. Next, I give an overview of the data and the empirical strategy. This is followed by the results, and a discussion of these and potential caveats. The final section concludes.

2 The politics of the subsidy program

2.1 Farm Input Subsidy Program

Food security has stood at the forefront of Malawian politics for decades, and was a central topic in the 2004 election run-up. The possibility of improving food security with a large-scale subsidy program was incorporated into several party campaigns (Booth et al., 2006), and the election winners, the United Democratic Front (UDF), where among the proponents. Yet, they did not implement such a program in the following agricultural season, continuing instead the smaller Targeted Inputs Program (TIP) (Chinsinga, 2010; Mpesi and Muriaas, 2012). The mixed signals regarding a possible large-scale program likely contributed to lower fertilizer application rates in the 2004/05 season, resulting in lower harvests and reduced food security (Dorward et al., 2008). This, combined with the recent food crisis in 2001/02, lead the Mutharika-led government to introduce the Agricultural Input Subsidy Program (AISP) in 2005, which I will henceforth refer to as the Farm Input Subsidy Program (FISP), the current name of the program (Booth et al., 2006; Holden and Lunduka, 2013; Mpesi and Muriaas, 2012). The program involves annual distributions of vouchers for fertilizer and seeds, with the fertilizer primarily intended for maize production, and in some seasons also tobacco. tea and coffee.⁹ Although initially described as a targeted program, it was not until the 2007/08season that the Ministry of Agriculture and Food Security (MoAFS) put forth a set of targeting guidelines, focusing on vulnerable households (see Appendix A for a description).

The vagueness of these guidelines have, however, allowed for local, idiosyncratic interpretations. In addition, several levels of authority are involved in identifying beneficiaries and distributing vouchers, which again affects the final allocations. First, the MoAFS decides upon the initial allocation of vouchers to districts, and which are then further broken down to the level of Extension Planning Areas (EPA). In some seasons, the ministry has also disaggregated the intended allocations further down,

⁹The most common fertilizers made available are NPK (basal dressing) and urea (top dressing) (LU, 2007, 2008, 2009, 2010, 2011, 2012). These contain respectively 23 and 46 percent nitrogen, and Pauw et al. (2014) assume in their back-of-the-envelope calculations that under a high marginal return to fertilizer then one additional kg of nitrogen translates into 15 kg more maize. In comparison, the average annual per capita consumption of maize among rural residents was 154 kg in 2003/04 (Verduzco-Gallo et al., 2014).

to the village level (LU, 2008, 2009). The allocations are supposed to reflect the share of cropped land allocated to maize and tobacco by EPA, and from 2007/08 and onwards also population density as informed by the annual farm family register, which is supposed to provide a detailed register of all possible beneficiary households (Dorward and Chirwa, 2011; Chirwa et al., 2011; Chirwa and Dorward, 2013). Data on distributions, however, suggest that this is not over-held and the Logistics Unit, an underlying institution of the MoAFS that monitors the program, has repeatedly claimed lack of transparency on behalf of the government with regards to how the allocations are made (LU, 2009, 2010, 2011, 2012). Second, the annual farm family register is compiled through the involvement of multiple stakeholders that may seek to inflate their household numbers in order to induce the government to allocate more vouchers (Holden and Lunduka, 2013). There is a large discrepancy between the number of households identified by the 2008 census administered by the National Statistical Office (NSO) and the number of households that exist according to the farm family registers. Dorward and Chirwa (2010) and Chinsinga (2012) argue, among other, that this is due to the listing of households and villages that do not exist, so called "ghost households and villages". Third, the final lists of beneficiaries are determined locally, with the assistance of district level employees, based on the aggregated figures from MoAFS. The use of local information may improve targeting, but also gives room for rent-seeking by local authorities.¹⁰ Fourth, the actual distribution of vouchers involves several parties, including the MoAFS, local government officials and Traditional Authorities (Dorward and Chirwa, 2011), and whose involvement I discuss further in Section 5.5.

2.2 Political subsidies

Several program characteristics make the subsidy program an attractive tool for targeting voters. First, the subsidy program is politically relevant due to its shear size. Dorward and Chirwa (2011) estimates that the combined program costs in 2008/09 amounted to \$265.4 million, of which \$37.8 was financed by donors, and net of farmer payments totaling \$242.3 million. This was equivalent to 16 percent of the national budget and 74 percent of MoAFS's budget. The costs were particularly high this season due to increased import costs, in comparison the program costs in 2007/08 amounted to \$116.8 (Dorward and Chirwa, 2011). Second, it is relevant to the majority of voters as it targets agricultural subsidies, a type of income support, in a setting where 85 percent of the population are rural residents (NSO, 2008). As noted, most of the subsidized fertilizer is intended for maize

¹⁰For instance, in the 2008/09 season lists over eligible households were set up by the traditional leaders (chiefs) or Village Development Committees. These were then to be verified by the local extension officer and the District Agricultural Development Officers (Holden and Lunduka, 2013). Actual procedures varied however, and the final lists of beneficiaries were often subject to multiple changes. For a more detailed discussion of the institutional setting, see Appendix A.

production. Maize is a key staple of the Malawian diet; according to a national survey around 97 percent of farming households cultivated maize in the 2002/03-2003/04 (NSO, 2005). That the majority of households are net buyers of maize (Dorward et al., 2008) further adds to the value of these fertilizer subsidies. Third, the centralized organization of the program by the MoAFS, with the president as its Minister, combined with the opaque targeting rules leaves the distribution of program vouchers and inputs in part at their discretion. This is exemplified by the second-round allocations made in the beginning of 2009 (LU, 2009). Lastly, the program was an important election promise in 2009 for both the governing and the main opposition parties (Mpesi and Muriaas, 2012), indicating that the program was still at the forefront of Malawian politics. Added to this, the incumbent's party, DPP, lacked a strong grassroots organization that they could mobilize given their recent establishment, which may have prompted the incumbent to exploit the subsidy program in reaching out to rural voters.

A number of authors describe the FISP as politicized, in particular leading up to the 2009 election. Dorward and Chirwa (2011) argues that the "pressures to expand the programme and use it for patronage arose prior to the election" (p. 243), referring to the 2009 election, and Kelly et al. (2010) further claim that the 2008/09 season was characterized by politicians more often being involved in the distribution of vouchers than in previous seasons. According to informants cited by Chinsinga (2012), the incumbents' stronghold, Thyolo, and neighboring districts of Mulanje and Phalombe. received more vouchers per eligible households, and that this was "particularly pronounced in the election year" (p. 9), referring to the 2009 general election. Dorward et al.'s (2010) respondents in Karonga district distinguish between the two allocation rounds in 2008/09, stating that the secondround vouchers were more likely to be distributed by "political figures like MPs, party chairpersons" (p.12), than the first-round vouchers. This is supported by Mpesi and Svåsand (2012), who claim that the fertilizer subsidies played a key role in the incumbent's party's (DPP) election campaign. Nevertheless, they argue that the individual constituency candidates were unable to affect the program, thereby indicating a centralized distribution structure. Mpesi and Muriaas (2012), on the other hand, argue that the program was politicized at the local level, and "not on a national scale" (p. 381), further claiming that "fertilisers were distributed rather evenly thorough [sic] the country" (p. 381), but that "in some areas the local administrators said that only those who support the government deserve the spoils of the government policies" (p. 387), referring to the fertilizer subsidies. Although the above descriptions are primarily anecdotal, and highlight different levels of authority, they indicate that allocations are to a certain extent politicized. The centralized structure of the program imply that the presidential, rather than parliamentary, elections should be the main focus in understanding how the voucher allocations may have been used to mobilize electoral support.

2.3 The 2009 general election

Presidential and parliamentary elections take place every fifth year, and prior to 2009 party voting had largely fallen in line with regional borders. Voters in the most populous region, the Southern region, gave most of their support to the United Democratic Front (UDF) in the first three multiparty elections. This resulted in a presidential seat for Bakili Muluzi in the first two terms, i.e. 1994 and 1999, and for Muluzi's hand-picked candidate, Bingu wa Mutharika, in the third term. The Central region was, and still is, dominated by Malawi Congress Party (MCP), whereas voters in the most sparsely populated region, the Northern region, have historically given most of their support to AFORD. I return to these political parties in Section 3.3.

The fourth multi-party election took place on May 19th, 2009, in accordance with the week set by the constitution (Commonwealth Secretariat, 2009).¹¹ Seven candidates ran for presidential office, among them the incumbent Mutharika whose intention to represent DPP was finalized in October 2008. The most notable opposition candidate in the 2009 election run-up was John Tembo, representing MCP (EU-EOM, 2009). Mutharika won a majority of the votes in all three regions, and was only surpassed by Tembo in five out of 28 districts. This election was therefore historical in the sense that it broke down regional voting patterns.

3 Who are the core and swing voters?

The aim of this paper is to investigate whether the incumbent, Mutharika, used the subsidy program to garner political support for the presidential election in Malawi in May 2009. Since the fertilizer vouchers are distributed at the end of the calendar year, at times into January, the 2008/09 season is the key period of interest. I assume that the incumbent's objective is to maximize the expected voting return from distributing economic benefits, in this case fertilizer vouchers, according to a budget constraint. Previous theoretical and empirical work suggest that the incumbent may target either or both core and swing supporters. These are typically identified based on past election outcomes, and most relevant for my purpose are the results from the 2004 presidential election in Malawi. If the incumbent had fronted the same party in both elections a strategy would be to use the share of votes received in 2004 to identify areas with likely core and swing voters. However, the fact that Mutharika instead left UDF and formed a new party, DPP, in between the 2004 and 2009 elections' complicates this task. Some of UDF's core supporters in 2004 are expected to be the opposition's

¹¹See Appendix A for a more detailed description of the institutional setting, and Table B1 for a timeline of events.

core supporters by 2009. Moreover, a share of the votes received in 2004 are likely attributable to AFORD, since Mutharika was the joint candidate of AFORD and UDF. It is therefore necessary to identify characteristics that were observable prior to the 2009 election and that Mutharika may have exploited in order to target likely core and swing voters.

3.1 Voting preferences

I assume that voters derive utility from their affinity to a party and from an economic benefit, in this case the fertilizer vouchers. The incumbent is assumed to know the utility that voters derive from the economic benefit, which is increasing in the economic benefit, whereas the utility derived from partisan affinity is not known. Based on the assessment of the distribution of likely core and swing supporters, the incumbent determines how to optimally allocate the economic benefits in order to win votes given a budget constraint. A larger distance between the voter's individual partisanship and the incumbent's characteristics requires a larger benefit to the voter in order to induce him/her to vote for the incumbent. In other words, reaching out to the opponent's core supporters will be more costly, whereas those voters that lack a clear alternative are expected to be cheaper to sway. Given this logic, the incumbent's own core supporters will be even cheaper to buy off than swing voters.

There are several reasons for why partisan affinity is more likely attached to the incumbent and the other candidates' personal attributes than to policies or ideologies. According to Kadima (2006) there are no clear ideological differences between the political parties in Malawi, and following the introduction of multi-party elections, the increase in number of political parties seems largely motivated by personal conflicts rather than ideological differences (Booth et al., 2006). Rather, most parties are "identified with specific tribal and elite groups and party colours" (p. 115) and "the most important divisive factors in Malawi are regionalism and tribalism" (p. 117) (Kadima, 2006). Responses to the 1999 Afrobarometer for Malawi confirm this relationship between ethnic identity and party colors (Ishiyama and Fox, 2006). Combined this would suggest that ethnicity is a key factor that the candidates may mobilize based on. There is less qualitative evidence that other characteristics, such as religion, may have been exploited for political gain. As of 2008, around 83 percent of the population were Christian whereas 13 percent were Muslim (NSO, 2008). Although there may be divisions between Muslims and Christians that are relevant, this does not provide sufficient variation for the incumbent to draw upon, and there is less evidence of political divisions between the Christian denominations.

The 2008 census distinguishes between 12 ethnicities, in addition to "other", where the Chewa,

Lomwe, Yao, Ngoni and Tumbuka are the largest groups, covering respectively 33, 18, 14, 11, and 9 percent of the population (NSO, 2008). Figure B1 shows the spatial dispersion of the ethnic populations, based on the census and as depicted in Robinson (2013). There is a clear geographical concentration of the different ethnic groups. The ethnic divisions fall more or less in line with the ethnicities of the main candidates, Tembo (MCP), Muluzi (UDF) and Mutharika (DPP) in the 2009 run-up. Tembo is a Ngoni but historically has a strong attachment with Chewas through his prominent role during Hastings Kamuzu Banda's Chewa-dominated rule (Libby, 1987).¹² Muluzi is part of the Yao tribe, whereas the now deceased Mutharika (he died in 2012) was a Lomwe. Mutharika underlined his ethnicity among others through the establishment of the organization "Mulhakho wa Alhomwe", meant to promote Lomwe culture (EU-EOM, 2014). Given the above, I therefore restrict my focus to ethnicity as an observable characteristic that the incumbent relies on to infer the distribution of likely core and swing supporters.

3.2 Incumbent's core supporters

Core supporters are defined as those who feel a strong attachment to the incumbent, irrespective of economic benefits, and the above discussions highlight the incumbent's ethnic group, the Lomwe, as likely group of core supporters. I employ two measures for the incumbent's core supporters. First, I separate the UDF's district vote share from 2004 into Lomwe and non-Lomwe, arguing that the former are the incumbent's core supporters. This approach implicitly assumes that all ethnicities within a district were equally likely to have voted in 2004, an assumption to which I return to later.

Specifically, I hypothesize that:

Hypothesis 1a: Areas in which a larger population share are Lomwe and voted for Mutharika in the 2004 election receive more fertilizer vouchers per household in the season leading up to the 2009 election than in other seasons.

Second, I investigate a variant of this hypothesis using the ethnicity share only, regardless of past voting outcomes. I expect that areas in which a larger share are Lomwe received more vouchers in the pre-election season relative to other seasons:

Hypothesis 1b: Areas in which a larger population share are Lomwe receive more fertilizer vouchers per household in the season leading up to the 2009 election than in other seasons.

Evidence of the above would suggest that Mutharika favored his core supporters leading up to the 2009 presidential election.

¹²The MCP leader prior to John Tembo, Gwanda Chakuamba, also received most of his votes from the Chewa-dominated Central region despite himself being from a Southern district (Hughes, 2001).

3.3 Opponents' core supporters

The task of identifying the incumbent's swing supporters is also complicated by the changing party affiliations, in addition to the existence of more than two dominant parties. A first step is to identify the main opposition candidates and their core supporters. Further, the opponents' core supporters are of interest in their own right. In a setting with limited resources, the incumbent may reduce the allocation of economic benefits to those that are likely to be the least responsive, in order to free up resources for those believed to be more responsive.

According to the responses to the 2005 and 2008 Afrobarometers, UDF and MCP, in addition to the incumbent's party, DPP, were the most popular parties prior to the 2009 election (Khaila and Mthinda, 2005; Tsoka and Chinsinga, 2008). UDF's candidate, Muluzi, was not allowed to run for a third term, and the UDF-supporters were instead urged to vote for the Tembo-led MCP. However, this was not finalized until April 2009, in other words after the distribution of vouchers for the 2008/09 season, and so I treat Muluzi as a separate opposition candidate. Although MCP and UDF were expected to be the incumbent's main party challengers in 2009, around one third of the votes in the 2004 presidential election went to other parties. This demands the question of who the past contenders were, and what happened to them. Table 1 lists the presidential candidates from 2004, their party affiliation, election result and ethnic affiliation. Added to this is their party affiliation in 2009, and whether they ran as a presidential candidate in 2009. The third main competitor in 2004, Chakuamba, received about a quarter of the votes representing the Republican Party (RP) as part of the Mgwirizano Coalition. He did not run on the RP ticket in 2009, but was instead replaced by Stanley Masauli (Lansford, 2014). The fourth and fifth candidates, Brown Mpinganjira and Justin Malewezi, representing the National Democratic Alliance (NDA) and running as an independent, respectively, each received less than 10 precent of the votes in 2004. Both candidates were the result of internal fighting in UDF.¹³ Similar internal squabbling characterized the party leadership of AFORD that pre-2004 had a strong foothold in the Northern region (EISA, 2004; Mpesi and Muriaas, 2012). Several AFORD members broke off to establish new parties in 2004, in part in response to the AFORD leader Chakufwa Chihana's initial bid that they support Muluzi for a third term (Mpesi and Muriaas, 2012), and some united into the Mgwirizano coalition headed by Chakuamba. The remaining branch of AFORD entered into the coalition with UDF in 2004, a collaboration that was further threatened by Muluzi's appointment of Mutharika as the presidential candidate (EISA, 2004; Gloppen et al., 2006). These ongoing fights and shifting partnerships may have contributed

¹³Mpinganjira established NDA in 2003 in opposition towards Muluzi's bid for a third term. The party lasted only past the 2004 election. Malewezi, who was the vice-president during Muluzi's second-term, ran as an independent candidate following Muluzi's appointment of Mutharika as his successor (EISA, 2004; Gloppen et al., 2006).

to reduced support from voters. Already in the 2005 Afrobarometer, when asked whether they felt close to any political party only two percent responded yes and referred to AFORD, and one percent would vote for AFORD had there been an election tomorrow. Even fewer gave their support to other parties, such as NDA and RP, and responses were largely similar in the 2008 Afrobarometer (Khaila and Mthinda, 2005; Tsoka and Chinsinga, 2008). The run-up to the 2009 election was therefore largely dominated by DPP, MCP and UDF.

			2004			2009	
Name	Ethnicity	Presidential candidate	Political party	Results (%)	Presidential candidate	Political party	Results (%)
Bingu wa Mutharika	Lomwe	Yes	UDF^*	35.8	Yes	DPP	65.98
John Tembo	Ngoni	Yes	MCP	27.0	Yes	MCP	30.69
Gwanda Chakuamba	Sena	Yes	RP^{**}	26.0	No	NRP	
Brown Mpinganjira	Lomwe	Yes	NDA	8.7	No***	UDF	
Justin Malewezi	Chewa	Yes	Indep.	2.5	No		
Kamuzu Chibambo		No			Yes	PETRA	0.79
Stanley Masauli		No			Yes	RP	0.76
Loveness Gondwe		No			Yes	NRC	0.72
James Mbowe Nyondo		No			Yes	Indep.	0.61
Dindi Gowa Nyasulu		No			Yes	AFORD	0.45

Table 1: Presidential candidates 2004 and 2009: ethnicities and political parties

Sources: Libby (1987); EISA (2004); Gloppen et al. (2006); Lansford (2014). I have not been able to identify the ethnicities of the remaining candidates. *Joint coalition with AFORD. **Candidate of Mgwirizano Coalition, representing RP and PETRA, in addition to five other parties. ***Joint coalition with MCP, i.e. Tembo's running-mate.

I thus return to Tembo (MCP) and Muluzi (UDF) and identify their likely core supporters. MCP has historically drawn the bulk of its support from the Central region. It was the only party allowed during Hastings Kamuzu Banda's one-party regime prior to 1994, a period during which the Central region and the ethnic group of Chewas were favored.¹⁴ Mutharika is therefore likely to perceive areas that previously voted for MCP and Chewa-dominated areas as the opposition's core supporter areas. This is supported by MCP's acquired vote shares in these areas in the previous multi-party elections (Ferree and Horowitz, 2010). MCP's candidate, Tembo, is himself from the Central district of Dedza. Similarly, areas that have historically voted for UDF and that are ethnically closer linked to Muluzi, i.e. Yaos, are unlikely to be perceived as swing voters by Mutharika, despite him running on the Muluzi-backed UDF ticket in 2004. These areas will instead categorize as the opposition's

¹⁴Examples of preferential treatment include the relocation of the capital from the Southern region (Zomba) to the Central region (Lilongwe), the imposition of Chewa as the only African national language (Kaspin, 1995), more agricultural investments channeled to the Chewa-dominated areas, higher exam entry requirements to secondary school for students from the Northern and Southern regions and firing of non-Chewas in the public sector (Vail, 1989).

core supporters. Based on the above I hypothesize the following:

Hypothesis 2a: Areas in which a larger population share voted UDF in 2004, and are ethnically affiliated with Muluzi (Yao), receive fewer fertilizer vouchers in the season leading up to the 2009 election than in other seasons.

I further expect that:

Hypothesis 3a: Areas in which a larger population share voted MCP in 2004 receive fewer fertilizer vouchers in the season leading up to the 2009 election than in other seasons.

Again, I investigate these hypotheses in terms of ethnicities only. In other words, I expect that areas with a larger share of Yaos or Chewas receive on average fewer vouchers in the 2008/09 season relative to other seasons, regardless of past voting outcomes. Thus I expect, that:

Hypothesis 2b: Areas in which a larger population share are Yao receive fewer fertilizer vouchers in the season leading up to the 2009 election than in other seasons.

Likewise, I hypothesize that:

Hypothesis 3b: Areas in which a larger population are Chewa receive fewer fertilizer vouchers in the season leading up to the 2009 election than in other seasons.

3.4 Swing supporters

The final step is to identify the swing supporters. A number of remaining areas are without any clear ties to neither the incumbent nor the main opponents as identified based on ethnicities and past election outcomes. For instance, the Southern districts of Chikhwawa, Nsanje and Mwanza all gave the majority of votes to Chakuamba or Malewezi in 2004. These latter three districts all have populations that are primarily Ngoni, Sena, or Nyanja. Likewise, districts in the Northern region lacked a clear regional alternative in 2009, having voted for Chakuamba's coalition in 2004. The extent to which these areas were likely to hold swing voters for the different candidates differs. For instance, the Chewas and the Tumbukas, the latter the largest group in the Northern region, have historically followed different political blocks (Posner, 2004). Voting for MCP as opposed to DPP may incur a higher utility loss for the Tumbukas.¹⁵ Mutharika may therefore expect areas where MCP has previously received a small vote share, like in the Tumbuka-dominated areas, as more receptive to vouchers from his DPP-led government. Similarly, areas where UDF has historically received fewer votes may be perceived as more responsive to the economic benefits from the incumbent and his new party.

To sum up, I apply the concept of swing voters to a setting with historically more than two $\overline{}^{15}$ There is less written about political affiliations for other ethnic groups, such as the Ngoni.

dominant parties. Further, I define two of these parties as more stable in their support, and identify the remaining parties' previous areas of support as potential areas of swing voters. Targeting these areas will increase the probability of reaching a persuadable voter.

I employ three measure of swing voters, where I first expect that:

Hypothesis 4a: Areas in which a larger population share voted other parties than MCP and UDF in 2004 receive on average more vouchers in the season leading up to the 2009 election than in other seasons.

The wording "other parties" refers to the RP (Mgwirizano Coalition), NDA, and the independent candidate Malewezi.

Second, I extract the share of UDF-votes from 2004 that can be ethnically aligned to neither Muluzi (Yao) nor Mutharika (Lomwe), and add this to the bulk of other parties. These are likely the past core supporters of AFORD. I thus expect:

Hypothesis 4b: Areas in which a larger population share voted other parties than MCP and UDF in 2004, and the latter group are neither Yao or Lomwe, receive on average more vouchers in the season leading up to the 2009 election than in other seasons.

Third, I rephrase the hypothesis in terms of ethnicities only, comparing all other ethnicities against the Yao, Chewa and Lomwe, regardless of past voting outcomes. I expect that:

Hypothesis 4c: Areas in which a larger population share belong to other ethnicities than Yao, Chewa and Lomwe receive on average more vouchers in the season leading up to the 2009 election than in other seasons.

Finding empirical support for the above suggests that the incumbent, Mutharika, and his party DPP targeted swing voters in the run-up to the 2009 election.

4 Data and empirical strategy

4.1 Data

I combine data from a number of sources to investigate the above hypotheses. Data on the Farm Input Subsidy Program (FISP) is obtained from the Logistics Unit (LU). The LU annually produces a final report that includes both the first-round allocations referred to in the annual beneficiary lists, and any subsequent second-round allocations, such as those that took place in 2007/08 and 2008/09. These "final figures" are only available at the district level. I have accessed reports for the seasons 2006/07-2013/14, but omit the last two seasons due to the death of Mutharika in 2012, and the new elections in May 2014. This subsidy data is coupled with the population figures from the 2008 census (NSO, 2008)

in order to construct the main outcome variable of interest, i.e. fertilizer vouchers per 100 households. According to the census there were 2.44 million rural households as of 2008, after excluding reserves and parks. The census data is in other words used instead of the annual farm family registries, which I have only been able to access for later years. I discuss the possible implications of this in Section 5.5. The census also provides information on the distribution of the ethnic groups. Results from the presidential election in 2004 are obtained from the Sustainable Development Network Programme's (SDNP) website (SDNP, 2004), whereas results for 2009 are accessed through the Malawi Electoral Commission's (MEC) website (MEC, 2009). Both are available at the district level, of which there are in total 28.

Lastly, I include data that allows for controlling for possible confounding factors. First, there is the issue of changing program goals. The program included fertilizer for tobacco in some seasons, and tea and coffee in the 2008/09 season. Since there exists no district level figures on the distribution of coffee and tea I do not include these in the analysis, and therefore do not control for this program change. I do include the proportion of households farming tobacco in a district, as reported in the Integrated Household Survey 2004/05 (NSO, 2005). Second, one may worry that changes in the distribution of poor and vulernable groups, or other factors that correspond to the selection criteria, could affect the government's targeting. It seems unlikely that there are any systematic changes in the number of child-, female- or orphan-headed households, or households with individuals with disabilities, that again affect distributions at a more aggregate level, especially given the mixed adherence to these guidelines. The high reliance on rain-fed agriculture may, however, result in a drought or flood in one season affecting allocations in the following season, as a compensation for past loss and the reduced income available to households for purchasing fertilizer commercially.¹⁶ I therefore include lagged seasonal rainfall deviations by the unit of analysis. More specifically, I use gridded precipitation data from the Climatic Research Unit (CRU) to create district level figures for lagged seasonal deviations of rainfall from the historical mean. The dataset CRU TS3.22 covers the period 1901-2013, from which I use the years 1961-2013 to create a historical mean, and where the agricultural seasons are defined from August to July, as the last harvest typically takes place by July. See Harris et al. (2014) for a detailed description of the data.

¹⁶Experiencing a drought/flood in the same season is unlikely to affect distributions, as the rainy season usually lasts from November to February, with extensions to March-April in the northern parts of the country (McSweeney et al., 2010a,b), whereas fertilizer distributions typically take place by December or January at the latest.

4.2 Summary statistics

Summary statistics at the district level are reported in Table 2. According to the annual reports from the Logistics Unit each district received annually on average 134 vouchers per 100 rural households over the period 2006/07-2011/12. The official number received per 100 households varies between zero and 342. Likoma is the only district that in a season received zero fertilizer vouchers, it covers two islands in Lake Malawi. The share of the district population that are Lomwe, Yao or Chewa varies greatly, ranging from almost no inhabitants of the specific ethnicity to 73-98 percent. The presidential vote shares from 2004 also differ largely by district, ranging from almost zero to over 80 percent for a given party.

Table 2: Summary statistics							
Variable Mean Std. Dev. Min. M							
Subsidy program							
Fertilizer vouchers per 100 rural HH^a	134.464	53.571	0	342.283	168		
Covariates							
Share to bacco farmers $(\%)$ x to bacco season	8.379	16.012	0	64.000	168		
Seasonal deviation in rainfall (mm)	-16.518	132.735	-501.215	166.649	168		
Ethnicity shares, 2008							
Lomwe share $(\%)$	16.346	26.156	0.018	87.111	28		
Yao share (%)	10.762	18.391	0.173	72.774	28		
Chewa share $(\%)$	27.411	36.045	0.447	97.880	28		
Share that are not Yao/Chewa/Lomwe (%)	45.482	36.670	1.661	99.362	28		
Presidential election results, 2004							
MCP's vote share $(\%)$	19.866	28.289	0.566	79.970	28		
UDF's vote share $(\%)$	34.511	22.364	1.309	88.207	28		
Other parties' vote share $(\%)$	45.623	29.991	4.566	98.124	28		
Presidential election results, 2004, by ethnicity							
UDF's vote share $(\%)$ x Lomwe share	8.625	14.303	0.004	44.265	28		
UDF's vote share $(\%)$ x Yao share	6.815	15.122	0.009	60.779	28		
Other parties' vote share $(\%)$,	64.693	28.844	19.880	99.412	28		
inc. non-Lomwe and Yao share of UDF							

^aSource: Logistics Unit's reports for six seasons (2006/07-2011/12), and population figures from 2008 Population and Housing Census.

4.3 Empirical specifications and identification strategy

4.3.1 Core supporters

I investigate possible targeting at core supporters using the following empirical specification:

$$Vouchers_{ds} = \alpha_0 + \mathbb{1}(s = 08/09) \left(\alpha_1 \text{UDF}_d \times \text{Lomwe-share}_d + \alpha_2 \text{UDF}_d \times \text{Yao-share}_d + \alpha_3 \text{MCP}_d\right) \\ + \mathbf{X}'_{ds} \delta + \lambda_d + \gamma_s + \mu_{ds}.$$
(1)

Vouchers_{ds} denotes the official distribution of fertilizer vouchers per 100 rural household to district d in season s. $UDF_d \times Lomwe-share_d$ captures the UDF's district level vote share from the 2004 presidential election that are aligned with Mutharika's, as defined by ethnicity (Lomwe), and enters through an indicator function $\mathbb{1}(\cdot)$ set to one for the 2008/09 season, zero otherwise. UDF_d × Yao-share_d is the same vote share, now interacted with Muluzi's ethnicity (Yao), and MCP_d is the district vote share received by MCP in 2004. The vector \mathbf{X}_{ds} includes seasonal deviation in rainfall from the historical district level mean and a control for whether the subsidy program in season sincluded distributions of fertilizer for tobacco interacted with the proportion of households farming tobacco in district d. The share of tobacco farmers remains the same, but whether the subsidy program included vouchers for tobacco varies across the seasons. λ_d and γ_s denote district and season fixed effects. μ_{ds} is a mean zero error term, and standard errors are clustered at the district level. Inference based on cluster-robust standard errors relies on an asymptotic justification, and which may not hold for very few clusters. Cameron et al. (2008) show that cluster-robust standard errors are downward biased when there are few clusters. Whether 28 clusters (districts in Malawi) qualifies as "few" is not clear, as the cluster-robust standard errors perform relatively well for 30 clusters (Cameron et al., 2008). Nevertheless, I report the wild cluster bootstrapped standard errors¹⁷ that provide asymptotic refinement in addition to the cluster-robust standard errors, as recommended by Cameron et al. (2008).

I use a two-way fixed effects estimator. The district level fixed effects captures time-invariant differences in among other land size, agro-ecological conditions, ethnicity, and poverty characteristics that may lead to omitted variable bias, whereas the season fixed effects control for any annual program wide and macroeconomic changes that may affect distributions nation-wide. For instance, the formalization of beneficiary criteria that took place after the 2006/07 season is captured in the

¹⁷Wild cluster bootstrapping resamples the residuals at the cluster level, based on which new values for the dependent variable are constructed. The resample is then used to calculate the coefficient estimates and standard errors that are used for inference. Cameron et al. (2008) recommends to impose the null hypothesis for the residuals and using Rademacher weights (+1 with probability 0.5 and -1 with probability 0.5) when resampling residuals. I perform wild cluster bootstrapping in Stata using cgmwildboot.ado, written by Judson Caskey.

fixed effect for this season relative to later seasons. My identification strategy is to compare voucher allocations within districts across the six-season period, focusing on the 2008/09 season relative to other seasons, i.e. 2006/07, 2007/08 and 2009/10-2011/12. I am therefore relying on district-specific changes over time, where I allow for season-specific effects of time-invariant variables that are typically not identified in fixed effects models. Past election outcomes, and their interaction with the ethnic composition, may be correlated with other factors, such as poverty, that affect the annual distribution of fertilizer vouchers. However, finding that the defined core voter measures have a particular impact on the 2008/09 distributions relative to other seasons within a district falls in line with politically motivated tactical redistribution. The identification strategy relies on the assumption that there are no time-varying unobservables that are correlated with the core voter measures and the allocated vouchers. Core voter areas should not be on a different trend relative to other areas, it assumes a common trend. Assuming that this holds, then this will produce unbiased coefficient estimates. Further, since I am looking at the impact of past election outcomes and the ethnic composition on distributions in the 2008/09 season, rather than for instance a policy change that may be affected by past fertilizer voucher allocations, I am less concerned about possible lagged effects. I expect an immediate response, if there is one, on the importance of these variables to fertilizer vouchers allocations.

In line with Hypothesis 1a, I expect α_1 to be positive. This coefficient captures whether areas with the incumbent's core voters, defined based on the ethnic affiliation to the incumbent interacted with the 2004 election outcome, experience an altered voucher allocation in 2008/09 relative to other seasons. A positive coefficient would support the hypothesis that resources are targeted at core supporters. The coefficients α_2 and α_3 are instead expected to be negative, and would in line with Hypothesis 2a and Hypothesis 3a indicate that the opponent(s)'s core supporters are punished. A similar specification to the above is also used to investigate the alternative definition of core supporters using ethnicity shares only i.e. hypotheses 1b, 2b and 3b.

4.3.2 Swing supporters

I use a similar specification to investigate whether swing supporters are targeted in the season leading up to the 2009 election:

$$Vouchers_{ds} = \beta_0 + \mathbb{1}(s = 08/09)(\beta_1 others_d) + \mathbf{X}'_{ds}\delta + \lambda_d + \gamma_s + v_{ds},$$
(2)

where the first measure of others_d reflects *Hypothesis 3a*, i.e. it is the 2004 vote share to *other* parties than MCP and UDF, again interacted with an indicator function set equal to 1 for the 2008/09

season, and 0 otherwise. This is compared to two alternative swing measures: In order to investigate *Hypothesis 3b*, I include the share of UDF that can be attached to neither Muluzi nor Mutharika based on ethnicity in the share of other votes. The third measure of others $_{d}^{04}$ reflects *Hypothesis 3c*, and now captures the population share that are neither Lomwe, Yao or Chewa, i.e. not ethnically affiliated with the three main parties. Again, district and season fixed effects ensure that I am comparing within-district voucher allocations in 2008/09 relative to other seasons. In line with hypotheses *3a*, *3b* and *3c*, I expect a positive β_1 . This would indicate that Mutharika targeted areas with fewer of the oppositions' and the incumbent's core supporters, and where voters, in lack of a clear local alternative are potentially likely to be induced to vote for the incumbent and his new party, DPP.

The empirical strategy on swing voters differs from previous work. A common measure of swing voters is the difference in vote margin between the two dominating parties, whereas in my case there are several parties as well as establishment of new parties in between elections, precluding this alternative. I argue that the swing areas are those in which neither the incumbent nor the main opponents received many votes in the 2004 election.

5 Results

5.1 Core supporters

Results on the core supporters are reported in Panel A in Table 3, with the full specification from eq. (1) reported in column (4). I do not find support for the hypothesis of more vouchers being allocated to the incumbent's core supporters, captured through the population share of Lomwe and its interaction with UDF's vote share from the 2004 presidential election, i.e. (1a). The coefficient is instead negatively signed and not statistically significantly different from zero at a conventional level of significance (columns 1 and 4). The opponents' strongholds are on the other hand found to be disadvantaged in the season leading up to the election, supporting hypotheses (2a) and (3a). I find that areas in which a larger share voted for the main previous and existing opposition party (MCP) in the last election (column 2), or the Yao-share of the UDF-votes from 2004 (column 3) received on average less vouchers per household in the 2008/09 season relative to other seasons. This negative effect is particularly pronounced for the Yao-share of UDF (column 4). A one percentage point increase in the vote share to UDF interacted with the Yao-share corresponds to a decrease in the average number of fertilizer vouchers per 100 rural household by around 0.69 vouchers, whereas a similar increase in the vote share to MCP corresponds to a reduction of 0.55 vouchers. Comparing this to the average, a one percentage point increase in MCP's vote share results in a 0.41 percent decrease in fertilizer vouchers per 100 households, whereas a similar increase in the Yao-share of the UDF-votes gives a 0.52 percent decrease. Keeping in mind that the district level MCP vote share varies between 0.6 and 80 percent, then an increase of 20 percentage points in favor of MCP would result in on average 11 fewer vouchers per 100 households. These results are robust to asymptotic refinement following wild cluster bootstrapping, with the exception of the estimated coefficient for MCP's vote share.

In Panel B, Table 3, I focus on ethnicity shares regardless of past voting outcomes. I find that districts with a higher Yao-share received on average fewer vouchers, supporting hypothesis (2b), whereas a similar finding is not made for the Chewas. Again, I find no evidence of targeting at the incumbent's core supporters, now defined in terms of Lomwe only. There is in other words no evidence in support of hypothesis (1b).

5.2 Swing supporters

Results on swing voters are reported in Table 4. Areas with a larger vote share to *other* parties than MCP and UDF received on average more fertilizer vouchers per household in the 2008/09 season relative to other seasons (column 1), indicating targeting at potential swing voters. This also holds when including the UDF-share of votes that can be attached to neither Mutharika or Muluzi based on ethnicity, as seen from column 2. The magnitudes of these findings show that a one percentage point increase in the vote share to other parties, increases the allocation of fertilizer vouchers per 100 households by 0.53. A one percentage point increase in other parties' vote share thus corresponds to a 0.39 percent increase in fertilizer vouchers per 100 households relative to the average. Using the third measure of swing voters, I expected that areas where a larger share are *not* Yao, Chewa or Lomwe, in other words those without a clear ethnic affiliation to the incumbent and the main opponents' parties in 2009, to receive more vouchers. I do not find that these were favored, the coefficient is not statistically significant at the 10 percent level (column 3). These results are robust to asymptotic refinement following wild cluster bootstrapping.

	(1)	(2)	(3)	(4)
Panel A: Election outcomes and ethnicities				
UDF's vote share (%) x Lomwe share x Season $08/09$	0.063			-0.157
	(0.354)			(0.405)
	[0.248]			[0.566]
UDF's vote share (%) x Yao share x Season $08/09$		-0.511**		-0.693***
		(0.198)		(0.212)
		$[0.286]^*$		$[0.303]^{**}$
MCP's vote share $(\%)$ x Season $08/09$			-0 432*	-0 546*
			(0.247)	(0.314)
			[0.282]	[0.339]
Number of obs.	168	168	168	168
adjusted R^2	0.326	0.335	0.347	0.357
F-stat	99.863	130.665	99.390	120.975
Mean Dep. Var.	134.464	134.464	134.464	134.464
Panel B: Ethnicities				
Lomwe share $(\%)$ x Season $08/09$	0.038			-0.066
	(0.195)			(0.232)
	[0.164]			[0.475]
		0.40.0**		0 00 0**
Yao share (%) x Season $08/09$		-0.496**		-0.606**
		(0.203)		(0.231)
		$[0.244]^{**}$		$[0.261]^{**}$
Chewa share $(\%)$ x Season $08/09$			-0.195	-0.286
			(0.176)	(0.237)
			[0.199]	[0.261]
Number of obs.	168	168	168	168
adjusted R^2	0.326	0.339	0.333	0.343
F-stat	99.793	118.349	96.944	101.000
Mean Dep. Var.	134.464	134,464	134.464	134.464

Table 3: District level: Pre-election distribution of fertilizer vouchers to core supporters

Dep. var.: fertilizer vouchers per 100 rural households, based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions. Columns (1)-(4): Comparing distribution of fertilizer vouchers in 2008/09 relative to 2006/07 - 2011/12. All vote shares are from the 2004 presidential election. Mutharika's and Muluzi's core supporters are identified based on ethnicity, Lomwe and Yao respectively. All specifications include district and season fixed effects, an interaction between tobacco subsidy season and share tobacco farming households in 2004/05 and seasonal deviation in rainfall relative to the historical mean. Robust standard errors clustered at district level in parentheses. Wild cluster bootstrapped standard errors in brackets, with null hypothesis imposed, Rademacher weights -1 and 1, as recommend by Cameron et al. (2008), and 1,000 replications. * p < 0.10, ** p < 0.05, *** p < 0.01

	(1)	(2)	(3)
Other parties' (than MCP and UDF) vote share (%) x Season $08/09$	0.575^{**}		
	(0.264)		
	$[0.283]^{**}$		
Other parties' vote share (%), inc. non-Lomwe and Yao share of UDF x Season $08/09$		0.529^{*} (0.278) $[0.292]^{*}$	
Share that are not Yao/Chewa/Lomwe (%) x Season $08/09$			0.287
			(0.215)
			[0.238]
Number of obs.	168	168	168
adjusted R^2	0.370	0.360	0.343
F-stat	107.869	102.614	98.645
Mean Dep. Var.	134.464	134.464	134.464

Table 4: District level: Pre-election distribution of fertilizer vouchers to swing support
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Dep. var.: fertilizer vouchers per 100 rural households, based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions. Distribution of fertilizer vouchers in 2008/09 relative to 2006/07 - 2011/12. All vote shares are from the 2004 presidential election. All specifications include district and season fixed effects, an interaction between tobacco subsidy season and share tobacco farming households in 2004/05 and seasonal deviation in rainfall relative to historical mean. Robust standard errors clustered at district level in parentheses. Wild cluster bootstrapped standard errors in brackets, with null hypothesis imposed, Rademacher weights -1 and 1, as recommend by Cameron et al. (2008), and 1,000 replications. * p < 0.10, ** p < 0.05, *** p < 0.01

5.3 Robustness checks

5.3.1 Disaggregated analyses using beneficiary lists

In addition to the annual reports on voucher allocations, the Logistics Unit (LU) also compiles annual beneficiary lists. Unlike, the annual reports, these lists have the advantage of providing disaggregated figures down to the village level. The beneficiary lists are on the other hand not available for the seasons 2006/07 and 2007/08, and I lack lists for one district in three of the seasons: Mulanje in 2008/09, Mwanza in 2009/10 and Ntcheu in 2011/12. These have unfortunately been lost by the LU.¹⁸ There is no reason to suspect that the loss of files is not random, however if it was not random, it would have resulted in attrition bias. Nevertheless, this reduces the number of seasons available for analysis using the lists, resulting in a comparison of the 2008/09 season to post-election seasons using an unbalanced panel. I create a panel at the level of the Traditional Authority (TA) using the beneficiary lists.¹⁹ After dropping TAs where households do not receive vouchers, such as urban areas, parks and reserves, I am left with 207 rural TAs.

Results on core and swing supporters are reported in Tables B2 and B3, respectively, where I include the district level results for the same four-season period (2008/09 - 2011/12) for the sake of comparison. I do not find evidence in support of the hypotheses on core supporters when using the beneficiary lists (columns 5-8), whereas the district level results, which rely on the annual reports, are robust to focusing on the four-season period (columns 1-4). On the other hand, both data sources reveal that areas with more swing supporters, captured through a higher vote share to other parties than MCP and UDF in the 2004 election, corresponds to on average more vouchers in the 2008/09 season relative to the three later seasons (see Table B3).

5.3.2 Vouchers by voting age population

Given that the distribution of vouchers is manipulated to garner electoral support, then the incumbent is arguably more interested in voters than households per se. As a robustness check I therefore analyze fertilizer vouchers per 100 potential voting adults. The voting age in Malawi is 18, and I thus focus on those aged 18 and above. Results from the district level analyses are reported in Appendix B.

¹⁸Own communication with Logistics Unit, 03.09.2014.

¹⁹This latter choice of aggregation is determined by the ability to match the census data with the subsidy program data, as the latter data contains allocations by both TA and Extension Planning Areas (EPA) whereas the census only operates with the former delineation. In some instances, the program data is sub-divided into more Traditional Authorities (TA) than those which the National Statistical Office (NSO) operate with in the census so far. In order to be able to match different data sources, I have identified which old TAs these new TAs previously were registered as part of in the 2008 census data. I have been unable to match information from the FISP and the census data for two TAs (one in Rumphi and one in Nkhata Bay) for the five year period, these vouchers are therefore not included in the analysis. See Appendix A for a more detailed description of the Traditional Authorities.

The pattern of results is largely similar to those using fertilizer vouchers per 100 rural households. Areas that gave a higher vote share to MCP in 2004, or to UDF and are largely inhabited by Yaos, receive fewer vouchers per possible voting adult in 2008/09 relative to other seasons (see Table B4), whereas areas that gave more votes to *other* parties than UDF and MCP in 2004, receive on average more vouchers in 2008/09 (see Table B5).

5.3.3 Non-Yao and Lomwe-share of UDF

There are several decisions with regards to how variables and comparison groups are constructed that deserve further scrutiny. For instance, I have combined those that did not vote for UDF and MCP, and those that are neither Yao or Lomwe but voted for UDF in 2004, into the same category. One may expect the incumbent to treat these two groups the same in terms of altered allocations, which I investigate by separating the latter group from the rest, including them through a separate variable. Results are reported in Table B6. As seen from column 2, I cannot reject the hypothesis that these two groups differ.

5.3.4 Multiple allocations within season

I also assess the role of the multiple allocations made in 2008/09, more specifically in December 2008 and January 2009, to which there exists no detailed beneficiary lists. Dorward and Chirwa (2011) argue that "criteria and systems for subsequent supplementary rounds of voucher allocation and distribution later in the season are less clear but are intended to address problems of unmet demand in first round distribution" (p. 234). What these unmet demands are is not obvious, and the additional allocations are open to executive discretion. In order to investigate the role of these two different allocations I separate the 2008/09 allocation by rounds, and include round-specific fixed effects. The variables of interest are interactions between the 2004 election outcome, ethnicity shares and the two rounds. None of the core supporter variables are statistically significantly different from zero below the 10 percent level, nor do I find any different allocative behavior for the first and second rounds for the swing supporters (results available upon request). All in all, it is difficult to assess whether the rounds differ in terms of reflecting politically motivated redistribution.

5.3.5 Parliamentary elections

Setting aside the Ministers of Parliaments' more limited influence on the program, and focusing instead on the incumbent's desire of securing a majority in parliament, then the parliamentary election results from 2004 may be of interest. The parliamentary elections fall in line with an objective of maximizing seats rather than votes, as often done in the empirical literature. Due to lack of disaggregated data on certain variables in addition to challenges in matching constituencies with census data I do not conduct analysis at the constituency level. An alternative is to aggregate the constituency results up to the district level, or use the constituency-weighted average as in Cole (2009). Taking the former approach, I find that one of opponent's (Muluzi) core supporters are punished, whereas I am not able to replicate the results for swing supporters (results available upon request). The lack of findings is likely attributable to the success of many independent candidates in the 2004 parliamentary elections.

5.4 Discussion of results

The above results show that swing supporters were favored at the expense of the oppositions' core supporters in the 2008/09 season relative to other seasons. I do not find that the incumbent's core supporters were favored. These results rely on data that excludes the extra allocations made to tea and coffee production in 2008/09. An additional 11,000 fertilizer vouchers for tea were distributed in January 2009 to the districts of Mulanje and Thyolo (LU, 2009), and the populations of these two districts are respectively 75.3 and 75.7 percent Lomwe (NSO, 2008). Including these may have altered the findings on the incumbent's core supporters, whereby the above results represent a lower bound. Moreover, the northern districts, where the defined swing supporter measure is high, received 4,000 fertilizer vouchers for coffee in 2008/09, adding to the findings that the swing supporters were targeted.

Given these results, a central question to ask is what Mutharika would have achieved in favoring his core supporters, assuming a goal of re-election. Mutharika and his party, DPP, were still relatively new on the political stage, this being their first presidential election, rendering the notion of core supporters as less settled. Distributing additional fertilizer vouchers may have been perceived as an effective mechanism for reaching out to those who waver, and where the vouchers function as a signaling device reflecting the promising nature of the incumbent as a patron, as argued for by Kramon (2011) in another setting. On the other hand, those ethnically affiliated with Mutharika may not have had much of an alternative but to vote for him, regardless of any change in the voucher allocations in 2008/09. van de Walle (2003) argues that in countries where access to government resources falls along ethnic lines, then voters may favor their own ethnic representative more so because of the belief that the other ethnic candidate will favor his ethnicity, than in the expectation that they will in fact benefit by voting for their own ethnically affiliated candidate. The Lomwe were probably less likely to benefit from a power shift to Tembo and his Chewa-dominated MCP, keeping past ethnic favoritism in mind, and a similar reasoning may hold for the MCP voters and the Muluzi-led share of UDF. Further, securing support from Mutharika's co-ethnics would not be sufficient in order to win a re-election. The incumbent's ethnicity is a minority in Malawi, at 18 percent (NSO, 2008), requiring that the incumbent and his party reach out to other groups in society. Allocating additional fertilizer vouchers to swing areas may have increased his probability of winning a re-election.

Kramon and Posner (2013) argue that finding whether redistribution is politically motivated or not may differ depending on the outcome that is studied. In other words, the above findings on fertilizer vouchers being aligned with a goal of re-election through vote buying, does not imply that this holds for all political motivated redistributions in Malawi, nor for this type of program in other settings. Political candidates, and in particular the incumbent given more easy access to the government treasury, may engage in several electoral strategies, including among other the allocation of infrastructure projects, jobs, and access to public work programs. Nevertheless, the subsidy program constitutes a considerable share of Malawi's national budget, between 7 and 16 percent in the period 2006/07-2011/12 (Chirwa and Dorward, 2013), suggesting that it is a relevant indicator for whether and how the distribution of resources may be viewed as politically motivated in the Malawian context.

Lastly, the results indicate only small adjustments in the allocation of vouchers. The small magnitudes may either reflect, (i) that the incumbent and his government did not adjust voucher allocations at the margin, or (ii) the data does not adequately reflect the actual allocations of vouchers. I return to the latter explanation and related measurement error in Section 5.5 below. Assuming instead that the former explanation holds, one may further argue that the considerable increase in program expenditures in 2008/09 suggests that a binding budget constraint was not a central issue. This would preclude the need for reducing allocations to some groups in order to favorably target others. However, assuming that the incumbent instead increased allocations overall, not differing between areas based on past voting outcomes and ethnic affiliations, then all areas should have experienced an increase in voucher allocations per household in 2008/09 relative to other seasons, and which is not found to be the case with the data at hand. Moreover, although the program costs were considerably higher in 2008/09, this was largely due to higher import costs, whereas the actual amount of fertilizer made available was higher in the preceding season (Dorward and Chirwa, 2011; LU, 2008, 2009).

5.5 Measurement error

There are several possible sources of measurement error in a setting where decisions are politicized and data sources are imperfect. First, there is that of the dependent variable. There is likely to be measurement error in terms of whether voters actually received vouchers, as compared to the intended allocations.²⁰ This may be due to displacements of vouchers to varying degrees across the studied period, whereby certain areas received less or more vouchers than the initial intended allocation. For instance, rent-seeking by local government officials and village chiefs, as reported by Holden and Lunduka (2013), may have diluted or intensified the incumbent's electoral goals. However, this measurement issue would be more problematic if my intention was to analyze the impact of receiving subsidy vouchers on voting behavior. My main interest has instead been in the incumbent's allocative preferences and actions. In this regard, the official intended figures are less likely to be prone to measurement error compared to the final figures on recipients. On the other hand, reports of additional vouchers being in circulation, particularly in the first seasons, suggests that the government made more vouchers available than officially reported. Sales figures indicate that an additional 0.92 million fertilizer vouchers were distributed in 2008/09, an increase of roughly 27 percent compared to the initial 3.4 million (LU, 2008). Unfortunately, there are no reliable sales figures at the district level to investigate the distribution from this angle. Some seasons, such as 2008/09, also involved "unallocated vouchers" that were without district registration numbers (LU, 2009), and which may have been targeted at specific parts of the population. I am unable to assess the underlying motivations for these latter allocations, although their existence underline the notion that the program may in part have been used for political gain.

Measurement error in the dependent variable may also arise from misconceptions around the number of households in a district. As described above, the annual farm family registries were supposed to serve as the basis for allocating vouchers. I have unfortunately only been able to access these for the seasons 2011/12, 2012/13 and 2013/14, and therefore had to resort to using the census instead. The information that enters into the construction of the dependent variable may in other words not reflect the information used by the decision maker of interest, i.e. the incumbent and his government. The census took place in June 2008 and the preliminary report was finalized in

²⁰A comparison between the dependent variable in the above analyses and the share of households that received vouchers for fertilizer and seeds in the 2008/09 season, as reported in the Welfare Monitoring Survey (WMS) from 2009 (NSO, 2009), confirms this. The relationship between the number of fertilizer vouchers per 100 rural households, and the share of households reported to have received vouchers in 2008/09 is depicted in Figure B2. As expected, there is a positive relationship between the two measures, more fertilizer vouchers per 100 rural households predicts a higher share of households reported to having received vouchers. Yet, it is by far a perfect linear relationship. This may be attributed to measurement error issues, in the addition to the fact that the Welfare Monitoring Survey only includes the share of households receiving vouchers and which may mask differences in the number of vouchers received.

September 2008, suggesting that the figures could have entered into the government's decision-making process for the 2008/09 season and onwards. These figures have, however, also been used to construct the dependent variable for the 2006/07 and 2007/08 seasons in the six-season district level analysis, which is possibly misleading, and for the following seasons, thus ignoring any population growth. The pattern of results is, however, robust to using the four-season period (see Tables B2 and B3), which excludes the first two seasons. Another concern may be migration to areas that are perceived to receive more vouchers, thus affecting the number of vouchers available per household. However, the requirement that recipients own land and the limited existence of markets for selling and buying land pose as likely barriers to such a tactique. More importantly is how the census figures compare to the farm family registries. The census figures may be underestimating the number of households in 2008, as suggested by Dorward et al. (2010)²¹ The use of the same population figures across the seasons for a given area suggests that any variation in the dependent variable within an area is attributable to the fertilizer program and not the population figures. On the other hand, if certain areas are likely to report a higher number of farm families as compared to the census and this is related to my covariates, then this would be problematic. For instance, if swing areas systematically reported more farm families in 2008/09, then this would introduce upward bias in the estimated swing supporter measures. Chirwa and Dorward (2013) compare the discrepancy between the number of farm families and the census figures over time. They note a sharp increase in number of farm families in the Central region in the period 2005/06-2009/10, whereas the growth rates in number of farm families in the Northern and Southern regions were highest from 2005/06 to 2007/08 and from 2008/09 to 2009/10, respectively. Interestingly, the relatively stable number of farm families from 2008/09 and onwards in the Northern region suggests that the number of vouchers allocated in 2008/09 should not be comparably higher than in later seasons, assuming that vouchers were allocated in order to reach a more or less constant share of farm families. The defined swing supporters are to a large extent located in the Northern region, and thus my findings of more vouchers being allocated to areas with more swing supporters in 2008/09 compared to later seasons may still hold had the farm family registries been used instead in the construction of the dependent variable. Nevertheless, it is difficult to assess the extent to which measurement error in the number of households compared to number farm families is affecting my results without more detailed data.

A more severe issue is measurement error in the covariates of interest, leading to biased and inconsistent estimates if this is correlated with any unobservables that enter into the error term.

²¹The underestimation of the number of farm households in the census is based on estimates incorporating the reported voucher receipts from a 2009 household survey covering 14 districts, with the number of redeemed vouchers and perceived availability of vouchers (Dorward et al., 2010).

Assuming that any measurement error is uncorrelated with unobservables affecting the fertilizer allocations, then this will result in attenuation bias only. In other words, the estimated coefficients are biased towards zero, and this may be particularly pronounced when using the fixed effects estimator (Angrist and Pischke, 2008). The independent variables of interest are interactions between season, ethnicity and past election outcomes. Ethnicity, like population, is drawn from the 2008 census data²² and is based on the share of people and not the share of households. Ethnicity is expected to be correctly captured in the 2008 census. Although there is some migration between $districts^{23}$ the requirement that the recipients should own land (in reality have access to, as land is primarily communally owned), which is predominantly accessed through inheritance, likely limits measurement error in the share of rural farming households that align with an ethnicity. Another source of measurement error pertains to the method of identifying the core supporters using the interaction between ethnicity and vote share. This assumes equal voting participation from all ethnic groups within a given district, which may not be a viable assumption. A last source of measurement error lies in the 2004 election results. The candidate-specific votes do not add up to the total votes for each district. In the above I have defined the share of votes as the share of the reported total district vote. Aggregating instead the candidate-specific votes and calculating the share based on these district level total results in largely similar results (available upon request).

6 Extensions

6.1 How did the voters respond?

A natural follow-up question to the above analyses is whether the incumbent and his political party were successful in convincing core and swing voters to vote using the allocation of fertilizer vouchers. Mutharika and DPP won a landslide victory in large parts of the country, receiving between 26 and 97 percent of the votes at the district level, which may in part be explained by vote buying through the use of fertilizer vouchers. Then again, other campaign spending may also have been instrumental in gathering electoral support, voters may have approved of the incumbent's general economic policies and/or voted for Mutharika more as a statement against the opposition. Mpesi and Muriaas (2012), for instance, downplay the importance of the subsidy program in securing the incumbent's political victory in 2009, highlighting instead the opposition's inability to present a clear alternative as a key reason for the incumbent's success.

 $^{^{22}\}mathrm{The}$ previous census from 1998 does not include data on ethnicity.

²³In the year prior to the census in 2008, 41.4 percent of inter-district migration involved migration from rural districts to cities, the remaining being between districts (NSO, 2008).

Assessing the relationship between the 2009 voting outcome and the fertilizer distributions is complicated by a number of issues. I have no exogenous variation in the subsidy program to exploit and there are likely to be omitted variables that are correlated with both the voting outcome and fertilizer distributions, thus biasing the estimated coefficients. For instance, access to fertilizer vouchers is likely correlated with other government benefits which again may influence the voting outcome. What I can provide are the correlations between the allocations of fertilizer vouchers in 2008/09 and the incumbent's district level vote share in 2009. These are reported in Table 5. The raw correlation between the two variables without controlling for any confounding factors is presented in column (1). A marginal increase in fertilizer vouchers per 100 rural households corresponds to 0.15 percentage points more votes to the incumbent. The coefficient sign is in other words as expected, and the magnitude remains more or less unchanged when introducing controls for the rural share of the district population, the number of potential voters, and district shares of households with access to improved sanitation and safe water as reported in the 2008 census (columns 2-3). These latter two measures serve as proxies for poverty. Introducing separate controls for the shares of farmers that grow maize and tobacco do not alter the results either (column 4). However, controlling for average literacy rates and/or past election outcomes (columns 5-7) renders the coefficient on fertilizer vouchers no longer statistically significant at the 10 percent level. Interestingly, the district level literacy rate exhibits a strong positive correlation between the fertilizer vouchers per 100 rural households, whereas the MCP and UDF vote shares are strongly negatively correlated with the same variable.

6.2 Where voters rewarded?

A related question to the above, is to what extent political support was rewarded by the provision of more vouchers to the locations where the support was stronger. I investigate this by analyzing the differential impact of the 2009 election outcome and the ethnic composition on the allocations in the 2009/10 season relative to the other seasons. Results from the district level analyses are reported in Table 6. I do not find that districts with a higher vote share to DPP in 2009 received comparably more vouchers in the 2009/10 season relative to other seasons, rather their received on average fewer vouchers (column 1), and districts in which the winning margin (between DPP and MCP) was larger received on average fewer vouchers (column 2). This also falls in line with the result that districts in which the incumbent experienced a larger increase in the vote share in 2009 relative to 2004 are also disfavored in 2009/10 relative to other seasons (column 3). However, the pattern changes when focusing on the incumbent's ethnicity. The coefficient on the interaction between the DPP vote share and the incumbent's ethnicity, Lomwe, is positive (column 4), and so is the estimated coefficient on

the district level share of Lomwe (column 5). However, these results are not statistically significantly different from zero, making it difficult to establish whether the incumbent chose to reward his own ethnic group or not.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Fertilizer vouchers per 100 rural household [2008/09]	0.145^{**}	0.115^{*}	0.128^{*}	0.158^{*}	-0.002	0.061	0.003
	(0.065)	(0.063)	(0.065)	(0.079)	(0.098)	(0.045)	(0.057)
		0.010	0 705	0.054	0 =00	0.000	0.010*
Share rural inhabitants (%) [2008]		(0.018)	0.735	0.054	0.706	(0.923)	0.910^{*}
		(0.831)	(0.905)	(0.981)	(0.935)	(0.620)	(0.521)
Total number of individuals aged $+18$ '1000 [2008]		-0.087***	-0.078**	-0.068**	-0.052**	-0.032	-0.029
		(0.027)	(0.033)	(0.031)	(0.023)	(0.019)	(0.017)
		()	()	()	()	()	
Share with improved sanitation $(\%)$ [2008]			1.400	0.672	-1.274	0.763	-0.106
			(3.312)	(3.993)	(2.734)	(1.634)	(1.726)
			0.000	0.000	0.097	0.104	0.120
Share with safe water $(\%)$ [2008]			(0.208)	-0.000	-0.037	-0.104	-0.138
			(0.343)	(0.441)	(0.431)	(0.302)	(0.379)
Share maize growers (%) [2002/03-2003/04]				0.069	0.256	0.362^{**}	0.405^{**}
				(0.326)	(0.301)	(0.155)	(0.141)
						()	· · · ·
Share to bacco growers (%) $[2002/03-2003/04]$				-0.281	-0.292	0.039	-0.009
				(0.238)	(0.227)	(0.227)	(0.223)
$I:t_{m} \to m + (07)$ [2002]					1 C 17***		0.796*
Literacy rate $(\%)$ [2008]					1.04((0.120)
					(0.040)		(0.414)
UDF's vote share $(\%)$ [2004]						-0.613***	-0.532***
						(0.139)	(0.120)
						· · · ·	· · · ·
MCP's vote share $(\%)$ [2004]						-0.602***	-0.522^{***}
						(0.113)	(0.121)
Number of obs.	28	28	28	28	28	28	28
adjusted R^2	0.143	0.280	0.230	0.193	0.415	0.699	0.728
Mean Dep. Var.	71.712	71.712	71.712	71.712	71.712	71.712	71.712

Table 5: District level: Relationship between incumbent's vote share in 2009 and pre-election (2008/09) distribution of fertilizer vouchers

Dep. var.: Mutharika's (DPP) district level vote share from 2009 presidential election. Fertilizer vouchers per 100 rural households to district, based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions. All shares are district level shares from the year(s) referred to in the squared brackets. Robust standard errors in parentheses. * p < 0.10, ** p < 0.05, *** p < 0.01

	(1)	(2)	(3)	(4)	(5)
DPP's vote share (%) [2009] x Season $09/10$	-0.334*				
	(0.179)				
	$[0.163]^{**}$				
Vote share margin (%) [2009], between DPP and MCP x Season $09/10$		-0.166^{*}			
		(0.090)			
		$[0.082]^{**}$			
D'(1) = DDD' [2000] = LUDE' [2004] = 1 (07) C = 00/10			0.000**		
Diff. between DPP's [2009] and UDF's [2004] vote snares ($\%$) x Season 09/10			-0.200°		
			(0.099)		
			[0.089]		
DPP's vote share $(\%)$ [2009] x Lomwe share x Season 09/10				0.146	
				(0.099)	
				[0.101]	
				[01101]	
Lomwe share $(\%)$ x Season $09/10$					0.147
					(0.089)
					[0.092]
Number of obs.	168	168	168	168	168
adjusted R^2	0.333	0.333	0.328	0.328	0.335
F-stat	108.848	109.634	100.878	101.801	113.364
Mean Dep. Var.	134.464	134.464	134.464	134.464	134.464

Table 6: District level: Post-election distribution of fertilizer vouchers to incumbent's voters

Dep. var.: fertilizer vouchers per 100 rural households, based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions. Distribution of fertilizer vouchers in 2008/09 relative to 2006/07 - 2011/12. Vote shares refer to presidential elections in 2004 and 2009, with the election year indicated in squared brackets. All specifications include district and season fixed effects, an interaction between tobacco subsidy season and share tobacco farming households in 2004/05 and seasonal deviation in rainfall relative to the historical mean. Robust standard errors clustered at district level in parentheses. Wild cluster bootstrapped standard errors in brackets, with null hypothesis imposed, Rademacher weights -1 and 1, as recommend by Cameron et al. (2008), and 1,000 replications. * p < 0.10, ** p < 0.05, *** p < 0.01

7 Conclusion

This paper provides evidence on how an incumbent targets resources that are of interest to the majority of the population, in order to sway voters to give a new round of trust. I find that the incumbent's government alters the distribution of subsidized fertilizer vouchers in the last season prior to the presidential election compared to other seasons. This falls in line with possible electoral motives. More specifically, areas with potentially more swing voters receive on average more vouchers, at the expense of the opponents' core supporters. I do not find evidence of the incumbent's core supporters being favored. The categorization of core and swing supporters differs from previous work, an approach made necessary due the institutional setting of shifting party affiliations and which resonates in many other developing countries. Importantly, there is no a priori reason for why these groups should be assigned a different need for vouchers in the pre-election season relative to other seasons, indicating that electoral motives rather than program goals are a driving force behind the allocations.

The Malawian subsidy program is hailed as an African success story, replicated in several other countries, and is still at the spearhead of the Malawian government's agricultural and food security policies. My findings of politically motivated distribution demands the question of whether distributing targeted vouchers for subsidized fertilizer is the right strategy for achieving the goal of improved food security. Increased transparency at the central level in the distribution process may in part address the issues set forth in this paper, as still called for by an underlying government entity (LU, 2014), although the government's reliance on local power structures in identifying beneficiaries will nevertheless uphold the possibility of local elite capture. Further, more detailed targeting guidelines may reduce the program inefficiencies and potentially improve the food security of resource poor households, as intended. In general, informing the population about the drawbacks and costs related to the program and how these may be dealt with, is crucial in order to allow voters assess politicians' behavior and policy platforms. This should be a requirement set forth by donors where their support is relevant.

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Appendices

Appendix A: Institutional details

Agricultural/Farm Input Subsidy Program

Guidelines: Prior to the 2007/08 season, the program targeting emphasized that beneficiaries were to be "full time smallholder farmers who cannot afford to purchase one or two bags of fertiliser at prevailing commercial prices, as determined by local leaders in their areas" (p. 23) (Dorward et al., 2008). More detailed guidelines for targeting were given after this, with greater emphasis on vulnerable households: (1) A Malawian that owns a piece of land and should be cultivated, (2) Guardians looking after physically challenged persons, (3) Resident of the village, (4) Only one beneficiary per household will be registered, and (5) The vulnerable group, such as child-headed, female-headed, or orphan-headed households (MoAFS, 2008).

Subsidized inputs: The type of fertilizer and seeds made available to a subsidized price differs across the years. In the program's first season each eligible household was to receive three vouchers, two for 50 kg fertilizer and one 2-4 kg seeds. This was next expanded to include hybrid maize seeds, legume and cotton seeds, as well as cotton pesticides. In more recent years the type of seeds has altered, and the focus has shifted to food crops only (LU, 2007, 2008, 2009, 2010, 2011, 2012). In addition, the size of the subsidy has varied. When the program was initiated in 2005/06, a 50 kg bag of fertilizer for maize or tobacco required the payment of MKW 950 or MKW 1450, respectively. This was reduced to MKW 950 for both types in the 2006/07 season, and later to MKW 900 and MKW 800, in the 2007/08 and 2008/09 seasons, respectively. The largest price reduction followed the 2009 presidential election, when the maize top-up price was further reduced to MKW 500 for the 2009/10 season, in line with Mutharika's election promise. This was the going price at least until the 2013/14 season (LU, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014). The degree of subsidization was highest in the 2008/09 season, following spikes in oil prices, and corresponded to less than 10 percent of the commercial price (Holden and Lunduka, 2013), as opposed to 25 percent in the first seasons (Ricker-Gilbert et al., 2011).

Access to inputs: The printing of vouchers is organized by Ministry of Agriculture and Food Security (MoAFS). Inputs have in recent years been accessed at the local depots, administered by the two government parastatals Agricultural Development and Marketing Corporation (ADMARC) and Smallholder Farmers Fertilizer Revolving Fund of Malawi (SFFRFM). These have obtained the fertilizer from contracted private companies that are responsible for importing the fertilizer (LU, 2008, 2009, 2010, 2011, 2012). Although the program stipulates that each beneficiary is to receive a certain number of vouchers reality is often different. Households are reported to have had to share their vouchers with another household in the village. This may in part be driven by equality preferences, or that these other households were in fact on the original list of beneficiaries, but failed to receive vouchers (Holden and Lunduka, 2013).

Political and traditional institutions

Malawi's institutional power structure is complex, and consists both of elected representatives, government bureaucrats and the Traditional Authorities. The government is described as a presidential system, rather than a parliamentary one, whereby the president is endowed with considerable power (Patel et al., 2007). General elections are held every fifth year, when a president, to become the Head of State and Head of Government, a vice-president and Members of Parliament (MPs) are elected through majority voting. Following a general election, the President appoints cabinet ministers. Many of these are chosen from the rank of parliamentary members, and these may therefore act as both the executive and legislative branch (Patel et al., 2007). Each parliamentary member represents one constituency, and are elected based on a first-past-the-post single-member system.

The Ministry of Agriculture and Food Security (MoAFS)²⁴ is the ministry most closely involved in the subsidy program, followed by the Ministry of Finance. As of 2009, the former ministry was headed by a principal secretary and divided into six centralized departments, under which there are eight Agricultural Development Divisions (ADDs). Each ADD is responsible for between two to five districts. The next level of authority is the District Agricultural Development Officer (DADO) (Chinsinga, 2009c; Masangano and Mthinda, 2012). These play a central role in providing information to the farm family register and compiling the beneficiary lists. Exactly how the DADO position is assigned is unclear, in certain districts there seems to be frequent changes in the position (Chinsinga, 2009a). Each district's agricultural services is further broken down into Extension Planning Areas (EPA), covering several sections which again each are headed by an Agricultural Extension Development Officer (AEDO) who is responsible for several villages (Masangano and Mthinda, 2012).

The Local Government Act was passed in 1998 in an attempt to decentralize power. This led to the establishment of district assemblies, now titled district councils (Chiweza, 2010), to which local councillors were elected, each representing a ward (Patel et al., 2007; Cammack et al., 2007). In addition, each assembly was to consist of non-voting members encompassing the local MP's, the Traditional Authorities and five persons each representing a group within the district. The Local Government Amendment of 2010 altered this, granting local MPs a vote (Chiweza, 2010). Local elections of councillors were to be held every fifth year, but have so far only been executed in 2000 and 2014. The district assemblies (councils) are further subdivided into Area Development Committees (ADC) and Village Development Committees (VDC). These have over time become active in the

²⁴Previously titled the Ministry of Agriculture.

identification of beneficiaries for the subsidy program. The VDCs were established in 1998 as part of a decentralization process. In theory they are supposed to consist of locally elected representatives, excluding the local chief. The extent to which these guidelines are followed varies greatly. In some instances the local chief decides on who should sit in the committee, or are part of it themselves (Chiweza, 2010).

Another party is the District Commissioner (DC) who is in charge of administrative responsibilities similar to that of a governor (Chiweza, 2010). The District Commissioner serves as a more formal link between the central government and the Traditional Authorities, often cooperating closely with the latter (Cammack et al., 2007). They were until 2010 appointed by the Local Government Services Commission, but are now elected by the Minister of Local Government, following the Local Government in 2010. As a result, the position has become more politicized (Cammack, 2012).

Interlinked with the described governmental structures are the Traditional Authorities. Each district is divided into Traditional Authorities, and which are further subdivided into villages, each headed by a Village Headman (Patel et al., 2007). Villages are the lowest level of administrative unit. This traditional structure is firmly embedded in the political and institutional structure. The Traditional Authorities are chosen based on kinship, are paid by the government and play a central role in local decision-making (Patel et al., 2007). According to Cammack et al. (2007) they are often affiliated to political parties. Notably, during the 2009 election "a home of a traditional leader in Zomba had recently been painted blue in DPP party colours" (p. 24) (Commonwealth Secretariat, 2009), whereas others participated in party meetings (Cammack et al., 2009) or campaigned on behalf of a party (EU-EOM, 2009). Moreover, they often exert considerable influence over the local MPs, whose constituency tend to overlap several Traditional Authorities, and may influence whom the villagers vote for in the general elections (Patel et al., 2007; Chinsinga, 2009b).

Appendix B: Tables and Figures

1994 •	Hastings Kamuzu Banda's one-party rule (Malawi Congress Party (MCP)) ends
•	Bakili Muluzi (United Democratic Front (UDF)) is elected president in first multi-party election
1999	Bakili Muluzi (UDF) is re-elected president
2004	Bingu wa Mutharika (UDF) is elected president
2005	Bingu wa Mutharika leaves UDF and formes Democractic Progressive Party (DPP)
	Agricultural Input Subsidy Program is introduced, later renamed Farm Input Subsidy Program
2009	Bingu wa Mutharika (DPP) is re-elected president
2011	Joyce Banda leaves DPP and creates People's Party (PP)
2012	Bingu wa Mutharika dies and vice-president Joyce Banda (PP) becomes president

Level of analysis	District				Traditional Authority			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Election outcomes and ethnicities								
UDF's vote share (%) x Lomwe share x Season $08/09$	-0.170			-0.334	0.301			0.214
	(0.398)			(0.389)	(0.264)			(0.264)
	[0.511]			[0.498]				
UDF's vote share (%) x Yao share x Season $08/09$		-0.624**		-0.803***		0.037		-0.048
		(0.237)		(0.216)		(0.094)		(0.116)
		$[0.325]^*$		$[0.271]^{***}$				
MCP's vote share (%) x Season $08/09$			-0.553**	-0.749**			-0.217	-0.194
			(0.244)	(0.296)			(0.192)	(0.212)
			$[0.256]^{**}$	$[0.330]^{**}$				
Number of obs.	112	112	112	112	811	811	811	811
F-stat	31.890	35.588	68.281	60.603	23.558	21.565	29.243	25.641
Mean Dep. Var.	133.094	133.094	133.094	133.094	135.110	135.110	135.110	135.110
Panel B: Ethnicities								
Lomwe share (%) x Season $08/09$	-0.092			-0.190	0.215			0.209
	(0.219)			(0.225)	(0.150)			(0.170)
	[0.309]			[0.284]				
Yao share (%) x Season $08/09$		-0.603**		-0.704***		0.068		0.058
		(0.234)		(0.239)		(0.094)		(0.120)
		$[0.286]^{**}$		$[0.274]^{**}$				
Chewa share (%) x Season $08/09$			-0.238	-0.395*			-0.057	-0.012
			(0.194)	(0.222)			(0.152)	(0.177)
			[0.209]	[0.269]				
Number of obs.	112	112	112	112	811	811	811	811
F-stat	31.991	36.816	49.485	47.273	24.828	21.243	24.015	23.152
Mean Dep. Var.	133.094	133.094	133.094	133.094	135.110	135.110	135.110	135.110

Table B2: District and Traditional Authority level: Pre-election distribution of fertilizer vouchers to core supporters

Dep. var.: fertilizer vouchers per 100 rural households, based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions (district level), and beneficiary figures from Logistics Unit's beneficiary lists that exclude second-round distributions (Traditional Authority level). Distribution of fertilizer vouchers in 2008/09 relative to 2009/10 - 2011/12. All vote shares are from the 2004 presidential election. Mutharika's and Muluzi's core supporters are identified based on ethnicity, Lomwe and Yao respectively. All specifications include district/Traditional Authority and season fixed effects, an interaction between tobacco subsidy season and share tobacco farm households in 2004/05 by district and seasonal deviation in rainfall relative to the historical mean. Robust standard errors clustered at district level in parentheses. Wild cluster bootstrapped standard errors in brackets, with null hypothesis imposed, Rademacher weights -1 and 1, as recommend by Cameron et al. (2008), and 1,000 replications. * p < 0.10, ** p < 0.05, *** p < 0.01

Level of analysis	District			Tradit	hority	
	(1)	(2)	(3)	(4)	(5)	(6)
Other parties' (than MCP and UDF) vote share $(\%)$ x Season $08/09$	0.713^{***}			0.233^{*}		
	(0.241) $[0.262]^{***}$			(0.132)		
Other parties' vote share $(\%)$,		0.671^{**}			0.079	
inc. non-Lomwe and Yao share of UDF x Season $08/09$		(0.256)			(0.147)	
		$[0.292]^{**}$				
Share that are not Yao/Chewa/Lomwe (%) x Season $08/09$			0.390^{*}			-0.062
			(0.202)			(0.140)
			$[0.232]^*$			
Number of obs.	112	112	112	811	811	811
adjusted R^2	0.675	0.652	0.616	0.221	0.207	0.208
F-stat	77.325	56.060	44.880	29.197	24.448	22.685
Mean Dep. Var.	133.094	133.094	133.094	135.110	135.110	135.110

Table B3: District and Traditional Authority level: Pre-election distribution of fertilizer vouchers to swing supporters

Dep. var.: fertilizer vouchers per 100 rural household. Columns (1)-(3): District level: based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions. Columns (4)-(6): Traditional Authority level: based on population figures from 2008 census and beneficiary figures from Logistics Unit's beneficiary lists that exclude second-round distributions. Distribution of fertilizer vouchers in 2008/09 relative to 2009/10 - 2011/12. All vote shares are from the 2004 presidential election. All specifications include district/Traditional Authority and season fixed effects, an interaction between tobacco subsidy season and share tobacco farm households in 2004/05 by district and seasonal deviation in rainfall relative to the historical mean. Robust standard errors clustered at district level in parentheses. Wild cluster bootstrapped standard errors in brackets, with null hypothesis imposed, Rademacher weights -1 and 1, as recommend by Cameron et al. (2008), and 1,000 replications. * p < 0.10, ** p < 0.05, *** p < 0.01

	(1)	(2)	(3)	(4)
Panel A: Election outcomes and ethnicities				
UDF's vote share (%) x Lomwe share x Season $08/09$	0.065			-0.037
	(0.172)			(0.192)
	[0.156]			[0.445]
UDF's vote share (%) x Yao share x Season $08/09$		-0.230**		-0.321^{***}
		(0.092)		(0.099)
		$[0.128]^*$		$[0.134]^{**}$
MCD's such a share $(07) = 0.0000000000000000000000000000000000$			0.007*	0.059*
MCP's vote share (70) x Season $08/09$			-0.207	-0.235
			(0.112)	(0.142)
	1.00	100	[0.125]	
Number of obs.	168	168	168	168
adjusted R^2	0.333	0.341	0.354	0.362
F-stat	86.256	110.608	89.223	101.920
Mean Dep. Var.	65.861	65.861	65.861	65.861
Panel B: Ethnicities				
Lomwe share $(\%)$ x Season $08/09$	0.037			-0.006
	(0.095)			(0.108)
	[0.090]			[1.304e+19]
Vao share (%) x Season $08/09$		-0 224**		-0 275**
		(0.094)		(0.105)
		$[0 \ 108]^{**}$		[0 119]**
		[0.100]		[0.115]
Chewa share (%) x Season $08/09$			-0.088	-0.122
			(0.082)	(0.106)
			[0.091]	[0.120]
Number of obs.	168	168	168	168
adjusted R^2	0.333	0.344	0.339	0.347
F-stat	85.742	98.788	84.678	83.429
Mean Dep. Var.	65.861	65.861	65.861	65.861

Table B4: District level: Pre-election distribution of fertilizer vouchers to core supporters. Adults +18

Dep. var.: fertilizer vouchers per 100 adults (ex.cities), based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions. Distribution of fertilizer vouchers in 2008/09 relative to 2006/07 - 2011/12. All vote shares are from the 2004 presidential election. Mutharika's and Muluzi's core supporters are identified based on ethnicity, Lomwe and Yao respectively. All specifications include district and season fixed effects, an interaction between tobacco subsidy season and share tobacco farming households in 2004/05 and seasonal deviation in rainfall relative to the historical mean. Robust standard errors clustered at district level in parentheses. Wild cluster bootstrapped standard errors in brackets, with null hypothesis imposed, Rademacher weights -1 and 1, as recommend by Cameron et al. (2008), and 1,000 replications. * p < 0.10, ** p < 0.05, *** p < 0.01

	(1)	(2)	(3)
Other parties' (than MCP and UDF) vote share $(\%)$ x Season $08/09$	0.265^{**}		
	(0.121)		
	$[0.134]^{**}$		
Other parties' vote share (%), inc. non-Lomwe and Yao share of UDF x Season $08/09$		0.240^{*} (0.125) [0.132]*	
Share that are not Yao/Chewa/Lomwe (%) x Season $08/09$			$0.119 \\ (0.095) \\ [0.105]$
Number of obs.	168	168	168
adjusted R^2	0.375	0.364	0.345
F-stat	91.980	85.332	82.397
Mean Dep. Var.	65.861	65.861	65.861

Table B5: District level: Pre-election	n distribution of fertilizer	vouchers to swing supporters	. Adults $+18$
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Dep. var.: fertilizer vouchers per 100 adult (ex. cities) to district, based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions. Distribution of fertilizer vouchers in 2008/09 relative to 2006/07 - 2011/12. All vote shares are from the 2004 presidential election. All specifications include district and season fixed effects, an interaction between tobacco subsidy season and share tobacco farming households in 2004/05 and seasonal deviation in rainfall relative to the historical mean. Robust standard errors clustered at district level in parentheses. Wild cluster bootstrapped standard errors in brackets, with null hypothesis imposed, Rademacher weights -1 and 1, as recommend by Cameron et al. (2008), and 1,000 replications. * p < 0.10, ** p < 0.05, *** p < 0.01

	(1)	(2)
UDF's vote share (%) x Lomwe share x Season $08/09$	-0.157	-0.359
	(0.405)	(0.447)
	[0.566]	[0.548]
UDF's vote share (%) x Yao share x Season $08/09$	-0.693***	-0.687***
	(0.212)	(0.194)
	$[0.303]^{**}$	$[0.313]^{**}$
MCP's vote share (%) x Season $08/09$	-0.546*	-0.527*
	(0.314)	(0.305)
	[0.339]	[0.342]
UDF's vote share (%) x (1-Yao-Lomwe shares) x Season $08/09$		-0.798
		(0.506)
		$[0.476]^{*}$
Number of obs.	168	168
adjusted R^2	0.357	0.361
F-stat	120.975	99.518
Mean Dep. Var.	134.464	134.464

Table B6: Pre-election distribution of fertilizer vouchers to core supporters, extension

Dep. var.: fertilizer vouchers per 100 rural household, based on population figures from 2008 census and beneficiary figures from Logistics Unit's reports that include second-round distributions District level distribution of fertilizer vouchers in 2008/09 relative to 2006/07 - 2011/12. All vote shares are from the 2004 presidential election. Mutharika's and Muluzi's core supporters are identified based on ethnicity, Lomwe and Yao respectively. All specifications include Traditional Authority and season fixed effects, an interaction between tobacco subsidy season and share tobacco farming households in 2004/05 by district and seasonal deviation in rainfall relative to the historical mean. Robust standard errors clustered at district level in parentheses. Wild cluster bootstrapped standard errors in brackets, with null hypothesis imposed, Rademacher weights -1 and 1, as recommend by Cameron et al. (2008), and 1,000 replications. * p < 0.10, ** p < 0.05, *** p < 0.01



Figure B1: Spatial distribution of ethnic groups in Malawi, Robinson (2013)



Figure B2: Relationship between official 2008/09 district level distribution (Source: Logistics Unit (LU, 2009) and 2008 Population and Housing Census (NSO) (NSO, 2008)) and share of households that received vouchers in 2008/09 (Source: 2009 Welfare Monitoring Survey (NSO, 2009)). Districts excluded: Likoma, Neno and Mwanza.