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Decentralized Beneficiary Targeting in Large-Scale Development Programs

Insights from the Malawi Farm Input Subsidy Program

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Abstract

This paper contributes to the long-standing debate on the merits of decentralized beneficiary targeting in the administration of development programs, focusing on the large-scale Malawi Farm Input Subsidy Program. Nationally-representative household survey data are used to systematically analyze the decentralized targeting performance of the program during the 2009–2010 agricultural season. The analysis begins with a standard targeting assessment based on the rates of program participation and the benefit amounts among the eligible and non-eligible populations, and provides decompositions of the national targeting performance into the inter-district, intra-district inter-community, and intra-district intra-community components. This approach identifies the relative contributions of targeting at each level. The results show that the Farm Input Subsidy Program is not poverty targeted and that the national government, districts, and communities are nearly uniform in their failure to target the poor, with any minimal targeting (or mis-targeting) overwhelmingly materializing at the community level. The findings are robust to the choice of the eligibility indicator and the decomposition method. The multivariate analysis of household program participation reinforces these results and reveals that the relatively well-off, rather than the poor or the wealthiest, and the locally well-connected have a higher likelihood of program participation and, on average, receive a greater number of input coupons. Since a key program objective is to increase food security and income among resource-poor farmers, the lack of targeting is a concern and should underlie considerations of alternative targeting approaches that, in part or completely, rely on proxy means tests at the local level.

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Decentralized Beneficiary Targeting in Large-Scale Development Programs: Insights from the Malawi Farm Input Subsidy Program[1]

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1 INTRODUCTION

In an atmosphere of constrained government budgets, development programs that are targeted toward specific populations with specific policy goals can maximize "poverty removal benefits accruing from a given burden of cost" (Sen, 1995). For this strategy to work, programs should be implemented in accordance with the operational guidelines and reach only the intended population. Although targeted programs offer great potential, there is no guarantee that they will either succeed in their intended objectives or be superior in performance with respect to untargeted programs. Even though they may be geared toward reducing inequality and risks associated with underinsurance, targeted programs designed to reduce poverty and stimulate growth may have ambiguous opposing effects (Ravallion, 2003). The success of a program lies therefore not in the fact that it is necessarily targeted, but rather in how it is targeted.

Central to the identification of eligible program participants is the issue of asymmetric information (Ravallion, 2003). While targeted programs are designed to reach only those who meet certain criteria, it is rarely, if ever, possible for central administrators to know precisely who meets the criteria at the local level. One of the key arguments in favor a decentralized targeting approach, such as community-based targeting (CBT), has been based on its potential to identify potential program beneficiaries accurately by drawing on local knowledge and preferences that might otherwise be unknown to the program administrators at the central level. (Mansuri and Rao, 2012) This assumption propels decentralization as a potential solution to the asymmetric information problem and underlies the expectations regarding the ultimate effect of decentralization in leading to a more equitable allocation of public resources and reducing corruption and rent-seeking at all levels of program administration. However, as Conning and Kevane (2002) aptly explain in the context of decentralized targeting strategies, one of the challenges is to maximize stated welfare objectives subject to the constraining effects of local elite capture. "The literature on decentralized targeting identifies a trade-off between the advantages of local information and the hazards of local capture. On balance, the evidence appears to indicate that local capture can overwhelm the benefits of local information." (Mansuri and Rao, 2012)

Our paper contributes to the long-standing debate on the merits of decentralized targeting in the administration of development programs, specifically in the context of the large-scale Malawi Farm Input Subsidy Program (FISP). FISP has been operational since the 2005/06 agricultural season and, since the 2008/09 season, has relied on CBT for identification of "resource-poor" beneficiaries at the local level. FISP, which provides its beneficiaries with coupons that allow for inorganic fertilizer and improved maize seed purchases at heavily subsidized prices, has become central to international policy debates on the effectiveness of input subsidies in improving agricultural productivity and food security in Sub-Saharan Africa (Dugger, 2007; Perkins, 2009). In their review of the program through the 2008/09 agricultural season, Dorward and Chirwa

(2011a) note increased maize production and productivity as among the program's achievements. The Ministry of Agriculture and Food Security (MoAFS) figures on crop production since the 2005/06 agricultural season have implied that the country has consistently enjoyed a maize surplus over its annual requirements estimated at 2.1 metric tons (Chinsinga, 2012).

Despite the reported progress, the national absolute poverty rate of 52.4 percent in 2004/05 declined only marginally to 50.7 percent in 2010/11. The trends in rural poverty followed a similar pattern: a rate of 55.9 percent in 2004/05 vs. 56.6 percent in 2010/11.[2] Income inequality, as measured by the GINI coefficient, increased from 0.39 in 2004/05 to 0.45 in 2010/11 (Malawi NSO, 2012)[3]. Stagnant poverty levels, increasing income equality, and the FISP accounting for 8.2 percent and 62 percent of the national budget and agriculture budget, respectively during the 2009/10 agricultural season (Lunduka et al., forthcoming) raise questions on the effectiveness of the program in targeting poor households and alleviating poverty and food insecurity in a sustainable fashion. These concerns have been raised in the past (Ricker-Gilbert and Jayne, 2011; Holden and Lunduka, 2010), and Ricker-Gilbert and Jayne (2012) document that major returns from subsidized fertilizer accrue almost exclusively to households at the top of the maize production and value of total crop output distributions.

Against this background, this paper uses data from the Third Integrated Household Survey (IHS3) 2010/11 and follows Galasso and Ravallion (2005) and Stifel and Alderman (2005) in analyzing the decentralized beneficiary targeting performance of FISP during the 2009/10 agricultural season. Since the program's inception, this is the first comprehensive targeting assessment that is based on nationally-representative household survey data and that empirically documents the relative effectiveness of CBT, compared to targeting at higher levels of program administration, in reaching the intended beneficiaries. We follow alternative empirical approaches to the evaluation of the targeting performance for the purpose of testing the robustness of our findings.

In line with Galasso and Ravallion (2005), we estimate the national targeting coefficient as the difference between the share of the eligible population participating in the program (coverage) and the share of the non-eligible population participating in the program (leakage). Alternatively, we follow the approach of Stifel and Alderman (2005), account for differential transfer values across the beneficiary population, and define the national targeting coefficient as the difference between the average value of the input subsidy among the eligible population and the average value of the input subsidy among the non-eligible population, expressed as a share of the average value of the input subsidy among the eligible population.

[2] The Second Integrated Household Survey (IHS2), and the Third Integrated Household survey (IHS3) inform the 2004/05 and 2010/11 poverty rates, respectively. The difference between the 2004/05 and 2010/11 national (and rural) absolute poverty rates is not statistically significant.

[3] The World Bank Africa Region was the source of technical assistance provided to the Malawi National Statistical Office (NSO) for the official statistics on poverty and inequality in 2004/05 and 2010/11.

Both national targeting coefficients are decomposed into (i) inter-district, (ii) intra-district inter-community, and (iii) intra-district intra-community (i.e. CBT) components in a way that identifies the relative contributions of beneficiary targeting at each level. While the three-tier decomposition expands on the two-tier decomposition pioneered by Galasso and Ravallion (2005) and represents a contribution to the literature, its use is driven by the way that the FISP coupons are allocated across the country and within localities. Further, given the lack of clarity on the definition of "resource poverty" and the concerns that have been raised regarding the spatial inconsistencies in the identification of program beneficiaries, our analysis utilizes multiple plausible indicators of eligibility drawing on the rich household survey data at our disposal. To infer the poverty targeting nature of the FISP, the paper also models the household- and community-level characteristics influencing household program participation.

Our analysis shows that the FISP is not poverty targeted in that it does not exclusively target the poor or the rich at any level of the program administration, in line with the insights from previous studies based on sub-national data. The program reaches all socioeconomic strata of rural Malawi. If there is any targeting, it is in the middle of the welfare distribution as such the share of the non-eligible population receiving FISP benefits ranges from 52 to 57 percent depending on the eligibility indicator used. The MoAFS, the districts, and the communities are nearly uniform in their failure to target the poor, with any minimal targeting (or mis-targeting) that does take place overwhelmingly occurring at the community-level. These findings, which are robust to the choice of the eligibility indicator and the decomposition method, cast doubt on accurate beneficiary identification under the current FISP approach to decentralized targeting that relies heavily on CBT. The multivariate analysis of household program participation reinforces these findings and reveals that the relatively well-off, rather than the poor or the wealthiest, have a higher likelihood of program participation and, on average, receive a greater number of input coupons.

The rest of the paper is structured as follows. Section 2 describes the conceptual foundation for the empirical analysis. Section 3 offers a brief country background and a description of the program of interest. Section 4 describes the data used in the analysis. Section 5 articulates the empirical framework used to evaluate the targeting performance of the program. Section 6 presents a discussion of the results. Section 7 summarizes and concludes with a discussion of potential revisions to the program design in the future.

2 CONCEPTUAL FRAMEWORK

There has been a marked movement toward decentralization of decisions regarding the provision of government services in developing countries (Bardhan, 2002). In comparison to central

planners that often need to rely on costly monitoring and screening mechanisms, local agents, or communities in the case of CBT, may have more current and accurate information to verify program eligibility in a cost-effective fashion, leading to fewer targeting errors of inclusion or exclusion (Cremer et al. 1996; Conning and Kevane, 2002). Supporting this view, Mansuri and Rao (2004) review several evaluations of programs featuring CBT and conclude that central administration is more capable of identifying eligibility at the community level than at the household or individual level.

In comparing the effectiveness of local versus central government in beneficiary identification and program delivery, Bardhan (2002) argues that local political accountability could be a reason for why local institutions retain the upper hand in access to and utilization of better information. Where leaders are politically accountable to their constituency, local representatives have a greater incentive to pay attention to the specific characteristics of their community than do higher-level representatives. Another channel through which decentralization may be beneficial stems from the fact that local leaders are often part of extensive social networks that would induce cooperation and coordination between them and potential program beneficiaries (Conning and Kevane, 2002). Subsequently, local social capital and structures of accountability would be useful in discouraging potential program participants from falsifying information necessary for the evaluation of their applications (Cremer et al., 1996). Furthermore, community-based programs may not only harness, but potentially strengthen social capital and community organization as the disadvantaged groups that receive program benefits may be empowered due to program participation and may be able to articulate their demands more effectively (Fox, 1996). Similarly, decentralization is likely to increase the participation of local governments in the decision making process as well as their collaboration with other layers of bureaucratic structure so that local institutional capacity may be enhanced.

The evidence suggests that community participation can improve project performance and induce better targeting. Coudouel et al. (1998) evaluate the targeting performance of Uzbekistan's social assistance program. The Uzbek program is administered locally by the semi-religious community groups, the *Mahallas*, who determine, in accordance with the definitions of the central government and their local knowledge, the most-needy families in the community and the level of social assistance awarded to the beneficiaries. The authors find that the *Mahallas* deliver benefits much more frequently to the less well-off than to the better-off.

Likewise, Alderman (2001) examines the targeting performance of the Albanian social assistance program known as *Ndihma Ekonomike*, and finds that the program is relatively well targeted to the poor (48.9 percent, 25.8 percent and 23.9 percent participation in the first, second, and third household per capita consumption deciles) in comparison to similar programs in other low-income countries. The author illustrates that in allocating program benefits among households,

local authorities use additional information that would not be available to the central government.

Galasso and Ravallion (2005) study the decentralized targeting performance of Bangladesh's Food-for-Education Program. Although the authors show that most of the program's pro-poor targeting performance is attributable to targeting within villages as opposed to the center's targeting of poor villages, they document that inequality within villages influences the relative power of the poor in local decision making and that the villages with higher inequality in terms of land distribution are worse at targeting their poor population.

Stifel and Alderman (2005) evaluate the Vaso de Leche (VL) decentralized feeding program in Peru. Following the decentralized targeting assessment methodology pioneered by Galasso and Ravallion (2005), they find the degree of overall targeting attributable to the central government's choice of districts to be greater than the contribution of targeting within districts. However, when the authors modify their methodology to take into account program transfer values, as opposed to participation rates, among eligible and non-eligible groups, they demonstrate the contribution of intra-district targeting to be greater than that of inter-district targeting.

As noted by Baker (1997), whether community involvement is an optimal policy in terms of program administration is inevitably contextual. Variation across lower levels of administration in rigor of eligibility guidelines and implementation procedures might surface. "Superior information and monitoring technologies in the hands of local agents may generate potential information rents to be captured which may divert resources away from the target group or give rise to costly rent-seeking activities that drain other community resources." (Conning and Kevane, 2002) If local preferences are not pro-poor, re-distributive efforts at the community level may be rendered ineffective (Conning and Kevane, 2002).

In addition to the threat of local elite capture, community characteristics, such as inequality, institutional capacity, perceptions of poverty and fairness, and political affiliation, can influence targeting performance at the local level (Bardhan and Mookherjee, 2000; Stifel and Alderman, 2005). Even though shadow markets lead to leakage in relatively wealthier regions under centralized programs, decentralized programs have been claimed to fare worse in impoverished areas and can exacerbate the degree of inequality (Bardhan and Mookherjee, 2005; Mansuri and Rao, 2004). Park and Wang (2010) find that China's community-based development program only increased the incomes of the better-off in each village, and Platteau (2004) provides evidence for the local elite controlling social fund expenditures in West Africa. In the context of the Tanzania agricultural input subsidy program that relies on CBT for beneficiary identification, Pan and Christiaensen (2012) demonstrate that the resulting targeting performance does not deviate much from what would have been achieved under random distribution of program

benefits, irrespective of the poverty or the marginal productivity criterion for program participation. The authors find the occurrence of elite capture to be pronounced in villages with more unequal land distributions and that are further away from the rural towns.

Given the massive scale of the FISP and its variety of documented and potential impacts at the macro, meso, and micro levels, including on agricultural production, food security/food self-sufficiency, welfare, displacement of unsubsidized fertilizer purchases, food prices and casual labor wage rates, beneficiary targeting is a central piece in the program design. With the literature on decentralization in mind, we now turn to the country context and the description of the program.

3 COUNTRY CONTEXT

Malawi is one of the poorest countries in the world, ranking 170 of 186 in terms of the 2012 United Nations Human Development Index values. Eighty-five percent of its population resides in rural areas (Malawi NSO, 2012) and agriculture is not only the backbone of Malawi's economy, but also an essential part of its social fabric. The sector accounts for 30 percent of the gross domestic product (GDP) and 84 percent of all Malawian households own and/or cultivate land[4]. The production system is overwhelmingly rainfed, characterized by limited access to irrigation and diminishing average landholding sizes due to population pressures. The rainfall is unimodal; maize is the main staple crop, grown by nearly 100 percent of the farming household population; and maize availability typically defines the food security status of the country.[5] The majority of the farming households still practice subsistence agriculture: the rates of market participation among farming households in general and maize-producing households in particular are 42 and 15 percent, respectively.[6]

Over time, the government has adopted a range of strategies to promote the agricultural sector. Policies in the 1960s and 1970s were geared toward promotion of large-scale estate farming via a state-run input and output intermediary (Chibwana et al. 2010). Following reforms undertaken via a structural adjustment program (SAP) and at the directive of the World Bank, the government turned away from estate-oriented policies and toward small-scale farming policies (Chibwana et al. 2010). Over the last two decades, however, agricultural productivity, as measured by maize yields (kilogram/hectare), has been erratic, as shown in Figure 1. The factors that are commonly cited as underlying the agricultural productivity trend include weather variability, declining soil fertility, limited use of improved agricultural technologies and sustainable land management practices, rationed agricultural extension services, market failures,

[4] The GDP contribution of agriculture is for 2011. The estimate of the percentage of Malawian households owning and/or cultivating land is based on the Third Integrated Household Survey (IHS3) 2010/11 data.
[5] The estimate is based on the IHS3 data.
[6] The estimate is based on the IHS3 data.

and underdeveloped and poorly maintained infrastructure (World Bank, 2007). The inconsistent agricultural performance has direct implications for living standards, given the predominantly rural nature of the country and its heavy reliance on agriculture.

3.1 FARM INPUT SUBSIDY PROGRAM[7]

In an effort to combat poverty and boost national and household food security, the Malawian government has embarked on an ambitious annual fertilizer and seed subsidy program known as the Farm Input Subsidy Program (FISP), starting with the 2005/06 agricultural season. The FISP is financed by the government with international donor support utilized in the form of overall budget support (Chirwa et al., 2011). The agency leading the design and implementation of the FISP is the Ministry of Agriculture and Food Security (MoAFS). The primary objectives of the program are to achieve food self-sufficiency and to increase income among resource-poor smallholder beneficiaries through increased maize and legume production driven by access to improved agricultural inputs.

The focus of our analysis is the 2009/10 agricultural season, which is driven by data availability. During this season, the government subsidized a total of 161,500 metric tons of maize fertilizer, 8,700 metric tons of improved maize seed, and 1,600 metric tons of legume seed (Dorward and Chirwa, 2011b). The cost of the program corresponded to 8.2 percent and 62 percent of the national budget and the agriculture budget, respectively (Lunduka et al., forthcoming). Ideally, each beneficiary was entitled to (i) a 50-kilogram bag of Urea fertilizer, (ii) a 50-kilogram bag of 23:21:0 fertilizer, (iii) a 5-kilogram bag of improved maize seed or a 10 kilogram bag of open-pollinated variety (OPV) maize seed, and (iv) a 1-kilogram bag of legume seed (groundnuts, beans, soya beans, or pigeon peas). Each component of the subsidized input package was associated with a unique coupon that was color coded and had specific security features and district-specific serial numbers.

The program was designed to reach 1.6 million beneficiaries during the 2009/10 season and was set up for each beneficiary to pay (i) 500 Malawi Kwacha (MK) for each bag of fertilizer (representing an approximately 95 percent subsidy), and (ii) up to 100 MK for the bag of maize seed.[8] Each beneficiary could also access a 2-kg bag of legume seed for free. The subsidized inputs could have been obtained through the Agricultural Development and Marketing Corporation (ADMARC) outlets, the Smallholder Fertilizer Revolving Fund Malawi (SFRFM) locations, and registered private input dealers.

[7] Unless otherwise stated, the details on the FISP features and implementation during the 2009/10 season presented in this section are based on MoAFS (2009) and the interview that was conducted on February 24, 2012 with Christine Mtambo, the National Coordinator of the Malawi FISP, MoAFS.
[8] The exchange rate for the IHS3 period is MK150 = US$1.

The allocation of coupons across Malawi during the 2009/10 agricultural season was conducted in three stages. At the first stage, the MoAFS was supposed to distribute coupon allocations across districts in accordance with relative farm family population estimates based on an update of an existing farm household registry that took place from May to August 2009.[9]

At the second stage, each district assembly, led by the District Commissioner (DC), with inputs from the Traditional Authorities (TAs), the District Agricultural Development Officer (DADO), non-governmental organizations, and religious leaders, decided on the allocation across villages within each Extension Planning Area (EPA) in the district. The dynamics of the coupon allocation process across villages in each district have not been documented systematically for any of the agricultural seasons in which the FISP was operational.

At the third stage, upon communication of coupon allocation to a given village, beneficiaries were identified through CBT, i.e. an open forum in which village residents in theory decided on the beneficiaries in a collective fashion. The selected beneficiaries were then pre-registered with their 2009 Presidential and Parliamentary Elections Voter Registration Cards. The organization of open forums for beneficiary identification was facilitated by the DC or his/her representative, DADO, Agriculture Extension Development Coordinator, the Agriculture Extension District Officer, TA, Group Village Chief, Village Chief, Village Development Committee (VDC) members, Malawi Police Services representatives, Community Policing members, and Temporary Enumerators hired by the MoAFS.[10] The specific dates and places for the open forums were announced in advance through the media and local leaders. Once they were completed and verified, the beneficiary registers were submitted to the MoAFS Headquarters Logistics Unit through the relevant MoAFS District Office. The distribution of coupons was carried out in a separate open forum.

The target FISP beneficiaries were supposed to be "resource-poor" households that were residents of a given village and that owned and cultivated land during the 2009/10 agricultural season. The communities were also instructed to prioritize resource-poor households whose heads of household were elderly, HIV-positive, female, child, orphan, physically-challenged or caretakers of elderly or physically-challenged individuals. Although the question of who defines program eligibility criteria can become more pertinent in CBT-based targeting programs (Mansuri and Rao, 2012), the MoAFS, whose officers are supposed to be involved in the

[9] Dorward and Chirwa (2013) report that the average annual growth in the MoAFS farm family registrations from 2005/06 to 2009/10 in the Central and Southern regions were 9.1 and 2.2 percent, respectively, which were significantly higher than the 1 percent average annual growth in rural household population estimates published by the National Statistical Office (NSO). The discrepancy at the regional- and national-levels between the MoAFS farm family estimates and the NSO rural household population estimates continue to be controversial in the country.

[10] The 2008/09 agricultural season was the first in which the practice of open forum was introduced for the purpose of identifying beneficiaries at the village-level. Prior to that season, village chiefs and VDC members were responsible for beneficiary identification. For more information on the changing FISP targeting processes since the 2005/06 agricultural season, see Dorward and Chirwa (2013).

beneficiary identification at the local level, does not provide any guidance on the definition of resource poverty in a way that would ensure the application of the eligibility criteria in a consistent and unambiguous fashion across Malawi.

The targeting impacts of this shortcoming in the program design could be amplified given local perceptions in rural Malawi regarding the number of needy households exceeding the allocated number of coupons. Previous research has hinted at pervasive inclusion and exclusion errors and has shown the likelihood of FISP coupon receipt to increase with household welfare status (Holden and Lunduka, 2012a for the 2005/06 and the 2006/07 seasons; Chibwana et al., 2012 for the 2008/09 season; Ricker-Gilbert et al., 2011 for the 2006/07 season). Leakage in terms of non-poor population receiving program benefits could have significant economy-wide effects given also the available evidence on the FISP crowding out both commercial fertilizer purchases (Dorward et al., 2008; Ricker-Gilbert et al., 2011) and organic fertilizer use (Holden and Lunduka, 2012b).

Beyond the official allocation of coupons, village chiefs and local leaders have been documented to facilitate coupon sharing arrangements, without exclusively focusing on the neediest (Holden and Lunduka, 2012a). Despite the introduction of open forums, previous studies have highlighted (i) the possibility of these meetings simply serving as a medium for announcing to the village residents a pre-determined list of beneficiaries, and (ii) claims regarding changes in coupon allocations between pre-registration of beneficiaries and coupon distribution, and the ensuing coupon diversion by key stakeholders facilitating the open forum (Dorward and Chirwa, 2013).[11]

4 DATA

This study uses data from the Third Integrated Household Survey (IHS3), collected from March 2010 to March 2011 by the Malawi National Statistical Office, with support from the World Bank Living Standards Measurement Study - Integrated Surveys on Agriculture (LSMS-ISA) project.[12] The IHS3 data were collected within a two-stage cluster sampling design and are representative at the national, urban/rural, regional, and district levels, covering 12,271 households in 768 enumeration areas (EAs), of which 10,038 were rural (628 EAs).

[11] On personal communication, based on the sub-national data informing his research program on the Malawi FISP, Andrew Dorward also indicated that while most communities hold open forums, a very few report participatory decision making during the open forum. In most cases, the village chief and the local leaders are reported to retain considerable control of coupon allocations.

[12] The lead author was the point person for the World Bank technical assistance towards the design and implementation of the IHS3 under the LSMS-ISA initiative, which is a household survey program established by a grant from the Bill and Melinda Gates Foundation to provide financial and technical support to governments in Sub-Saharan Africa in the design and implementation of nationally-representative multi-topic panel household surveys with a strong focus on agriculture (www.worldbank.org/lsms-isa). The IHS3 data and documentation are publicly available through the LSMS website (www.worldbank.org/lsms).

The IHS3 instruments included Household, Agriculture, Fishery, and Community Questionnaires. All sample households were geo-referenced and administered the multi-topic Household Questionnaire that collected individual-disaggregated information on demographics, education, health, wage employment, nonfarm enterprises, anthropometrics, and control of income from non-farm income sources, as well as data on housing, food consumption, food and non-food expenditures, food security, and durable and agricultural asset ownership, among other topics.

The sample households that were involved in agricultural activities (through ownership and/or cultivation of land, and/or ownership of livestock) were administered the Agriculture Questionnaire. Handheld global positioning system (GPS)-based locations and land areas of the plots were recorded. The Agriculture Questionnaire also solicited information on physical characteristics, labor and non-labor input use, and crop cultivation and production at the plot level, separately for the reference rainy and dry seasons. Depending on the timing of the interview, the reference rainy season could have been 2008/09 or 2009/10, while the reference dry season could have been 2009 or 2010.

Pertinent to our research, the Agriculture Questionnaire included a detailed module capturing coupon receipt and utilization dynamics, soliciting information at the household member-coupon type-level. The module allows us to observe the different types of coupons received, whether each coupon was redeemed, given away or lost, the type of input that was received upon redemption of a given type of coupon, the cost incurred by the household to redeem the coupon, whether the subsidized input was exchanged for another input or given away for free, and the input quantities associated with these arrangements, as applicable. Our focus is on the agricultural household sample reporting on the 2009/10 rainy season, accounting for approximately three-quarters of the overall agricultural household sample. Since the FISP does not operate in urban areas, urban agricultural households are excluded from the analysis. The final sample is 7,795 rural agricultural households and is representative of this population at the national level.

Table 1 presents summary statistics on FISP participation. The realized distribution of coupons across the beneficiaries was far from the ideal case scenario in which each beneficiary is entitled to four different types of coupons as outlined above. Of the 55 percent of households that receive any FISP coupon, the average number received is just over two, and less than a third (28 percent) report receiving 3 or more vouchers. The majority (86 percent) of those receiving any voucher receive the fertilizer coupon while much less (13 percent) receive the maize seed coupon. On average households that obtain a fertilizer voucher do receive more than one (1.7) while those that receive a maize seed voucher generally only receive one (1.04). The fact that the overwhelming majority of the FISP beneficiaries during the 2009/10 agricultural season were

allocated only a subset of the coupon package that they were legally entitled to constitutes the first deviation of the program targeting from the government guidelines. This finding is in line with previous analytical work on the program (Dorward et al., 2010; Ricker-Gilbert el al., 2011; Holden and Lunduka, 2012a).

Coupon resale is a legitimate concern but results show that coupon resale is insignificant at less than 1 percent, which conforms to earlier research on the 2006–2007 season (Ricker-Gilbert et al. 2011).[13] As such, the concern for coupon resale is not considered significant here, and while there are other issues in use (gifting, loss or theft), when households do receive a coupon, the vast majority (93 percent) do redeem it. Although they redeem the coupon, the subsidies input can still be shared as a result of a combination of factors, including informal arrangements—perhaps between local leaders and recipients—that make coupon receipt conditional on sharing, or previously established protocols employed via social networks and that allows for households to share risk (Fafchamps and Lund 2003). Of those that receive and redeem the fertilizer coupon, 18 percent share the fertilizer for no immediate compensation, and of those receiving and redeeming the maize coupon 16 percent share the seed. When they do share, they tend to share about half of what they receive (47 percent for fertilizer and 55 percent for maize seed) suggesting some sort of agreed-to sharing rule.

5 APPROACH TO TARGETING PERFORMANCE ANALYSIS

Given the ambiguity regarding what constitutes "resource poverty," Section 5.1 considers a range of plausible FISP-eligibility indicators for the purpose of testing the robustness of our results to the choice of the eligibility indicator. Sections 5.2 and 5.3 present two alternative methodologies that are available for decentralized targeting performance assessment. Each method identifies the relative contribution of targeting (i) across districts, (ii) within district, across communities, and (iii) within district, within communities towards overall targeting performance.[14] Following the presentation of the decomposition frameworks, Section 5.4 showcases results from a multivariate regression exploring the correlates of FISP participation and whether they are in line with the resource poverty targeting nature of the program.

[13] Since coupon resale is considered illegal, the incidence of coupon resale as captured through household surveys is likely to be the lower bound for the actual incidence.

[14] The work presented in Section 5.2 and 5.3 build on the two-layer decomposition framework presented in Galasso and Ravallion (2005), and Stifel and Alderman (2005). The proofs for the three-layer decompositions presented in our paper are available upon request. Our empirical approach attempts to follow as closely as possible the design of the FISP. The data, however, do not allow for feasible calculations of targeting at the village level. The lowest level of disaggregation available is the enumeration area (EA) as defined for the purposes of the 2008 Population and Housing Census, which on average consists of 200 to 300 households or 3 to 4 villages. The potential for heterogeneity across villages within an enumeration area is recognized but is not considered significant. The term "community" is used in subsequent discussion to refer to our lowest level of disaggregation, i.e. the EA.

5.1 IDENTIFICATION OF FISP ELIGIBLE HOUSEHOLDS

As noted above, the FISP attempts to target resource poor smallholder households. Although the IHS3 data provide a comprehensive household consumption aggregate that could be utilized with the official national poverty line to deduce household poverty status, we are concerned that the observed household consumption outcome could be directly affected by program participation; as such, it cannot directly be used as an objective identifier to gauge FISP eligibility. In an attempt to recover an objective resource poverty indicator in the absence of program participation, we rely on survey-to-survey imputation, as presented in Stifel and Christiaensen (2007).

The survey-to-survey imputation method has its origins in the small area estimation (SAE) method developed by Elbers et al. (2003). We start out by estimating a model of annual household consumption per capita as a function of non-monetary explanatory variables using the *rural* sample of the nationally-representative Second Integrated Household Survey (IHS2) 2004/05, which was conducted prior to the first year of FISP implementation during the 2005/06 agricultural season. The estimation takes into account household sampling weights and allows for intra-cluster correlation in the regression residuals to avert underestimation of standard errors. The estimated variance-covariance matrix is then used to obtain Generalized Least Squares estimates of the parameters and their variance, which are in turn combined with the same set of explanatory variables from the IHS3 data to obtain the annual rural household consumption per capita predictions.

This procedure is repeated 100 times, drawing different sets of random terms to inform predictions, and the point estimate is computed as the average of these 100 simulations. Once we have the point estimate, the official IHS2 2004/05 poverty line (16,615 Malawi Kwacha per capita per year) is used to classify whether a rural IHS3 household is poor (i.e. FISP-eligible) or not.[15] The non-monetary explanatory variables underlying the predictions are constructed based on comparable questionnaire instruments and implementation across surveys, which ensures an identical definition of the household consumption outcome over time. The critical assumption underlying the method is that the relationship between the household consumption outcome and the explanatory variables is stable over time.

The implicit assumption in using a consumption-based poverty measure to identify FISP-eligible households is that the indicator is a reasonable proxy for being resource poor. Although consumption should be a product of household resources, an argument can be made that in a

[15] The survey-to-survey imputation exercise was conducted using the PovMap2 software, which can be downloaded from http://iresearch.worldbank.org. The list of explanatory variables and the model parameter estimates underlying the predictions are provided in Table 2. The regression coefficients for the same set of covariates stemming from the model estimated with the IHS3 data were stable with respect to their counterparts in Table 2. Those results are available upon request.

given year, it does not truly reflect the underlying resource access of a household since other factors, such as shocks, can influence consumption. Given this possibility, other proxies for resource poverty featured in our analysis rely on (i) household asset index using principal components analysis, (ii) acres of total agricultural land held by the household.[16] An asset index approximates the wealth status of a household and the household capacity to generate income. The choice of the land-based measure is motivated by the recognition that land is a fundamental asset in rural Malawi where agriculture is the predominant economic activity and that targeting the relatively landless can lead to pro-poor outcomes (Ravallion, 2003). Focusing on the distribution of asset index and landholding values among the rural IHS3 households, we construct two alternative resource poverty indicators that identify whether the households are in the bottom 40 percent of the distribution of (i) the wealth index and (ii) total landholding. The choice of the 40 percent threshold is informed by previous work on the use of asset-based indicators in assessing poverty trends (Booysen et al., 2008).

Moreover, Mansuri and Rao (2012) assert that the local definition of resource poverty may not correspond to those that are featured in our analysis or that may be conceptualized at the central level. It might also exhibit variation across communities. In the context of Malawi, the qualitative findings of Dorward et al. (2010) and Chinsinga (2009) are in line with this reasoning. The difference may have implications for the accurate analysis of the targeting performance at the local level. An attempt to circumvent this concern was to (i) focus on within-community distributions of our sample points in accordance with their predicted annual household consumption expenditures per capita, wealth index values, and total landholdings, and (ii) assume the bottom 40 percent of the distribution of each variable in each community to be eligible for program benefits. An identical exercise was additionally carried out by focusing on within-district, instead of within-community, distributions. Our conclusions were robust to using these approaches to define FISP-eligibility, and the targeting decompositions informed by these alternative eligibility definitions are available upon request.

5.2 POPULATION-SHARE-BASED DECOMPOSITION

The targeting analysis based on population shares begins with the calculation of the national targeting coefficient. Being a beneficiary is equivalent to having received at least one type of

[16] The household asset index takes into account the number of rooms in the dwelling, a set of dummy variables accounting for the ownership of (i) dwelling, (ii) mortar, (ii) bed, (iii) table, (iv) chair, (v) fan, (vi) radio, (vii) tape/CD player, (viii) TV/VCR, (ix) sewing machine, (x) paraffin/ kerosene/ electric/ gas stove, (xi) refrigerator, (xii) bicycle, (xiii) car/motorcycle/minibus/lorry, (xiv) beer brewing drum, (xv) sofa, (xvi) coffee table, (xvii) cupboard, (xviii) lantern, (xix) clock, (xx) iron, (xxi) computer, (xxii) fixed phone line, (xxiii) cell phone, (xxiv) satellite dish, (xxv) air-conditioner, (xxvi) washing machine, (xxvii) generator, (xxviii) solar panel, (xxix) desk, and a vector of dummy variables capturing access to improved (i) outer walls, (ii) roof, (iii) floor, (iv) toilet, and (v) water source. The total land area holding is computed by summing at the household-level all GPS-based plot areas reported to be owned and/or cultivated for the 2009/10 agricultural season. The results that would be obtained by using the total land area owned closely mirror those obtained by using the total land area holding.

input coupon during the 2009/10 agricultural season. Following Galasso and Ravallion (2005), the national targeting coefficient is calculated as:

$$(1)\ t = \frac{n_{e,b}}{n_e} - \frac{n_{-e,b}}{n_{-e}} = \frac{(n_{e,b})(n_{-e,-b}) - (n_{-e,b})(n_{e,-b})}{(n_e)(n_{-e})}$$

where *n* stands for a given household subpopulation; the subscripts *e* and *b* represent eligible and beneficiary households, respectively; negative signs in front of the respective subscripts represent non-beneficiaries and ineligible households. The targeting coefficient *t* is the difference between coverage, which is defined as the share of FISP-eligible households receiving program benefits, and leakage, which is equal to the share of FISP-non-eligible households benefiting from the program. If the FISP is perfectly targeted such that all eligible households participated in the program and no ineligible households benefited from the program, *t* will be 1. If the opposite is the case and the program is perfectly mistargeted, the result will be -1.

The manipulation of Equation (1) allows for a decomposition of the national targeting coefficient:

$$(2)\ t = \left[\sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{(n_{b,d} - n_b)(n_{e,d} - n_e)}{(n_e)(n_{-e})}\right)\right] +$$

$$\left[\sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\ (t_d)\right]$$

where all subscripts, with the exception of *d*, are as they were defined for Equation (1); the subscript *d*, *N*, N_d and t_d stand for districts, the total national household population, the district household population, and the targeting coefficient for a given district, respectively; and the first and second bracket correspond to the *inter-district* and *intra-district* components of the national targeting coefficient, respectively. This decomposition allows the researcher to explore how much of the program's performance in reaching poor families stems from the MoAFS efforts to reach poor districts (inter-district component) versus the efforts of the districts to reach their own poor population (intra-district component).[17]

[17] Differences across districts in terms of their distributional objectives and budgetary constraints could promote the horizontal inequity among them. The central government might also be able to offset these differences via its decision regarding the FISP allocations across districts. However, since the center does not partake in the selection of FISP beneficiaries and the determination of program benefits received by participants, it is uncertain whether horizontal equity would be realized at the national level (Ravallion, 2000).

In light of the allocation process of the program, an additional level of decomposition provides a more complete understanding of allocation decisions within districts. Working with the intra-district component of Equation (2), t_d can be decomposed into two components:

$$(3)\ t_d = \left[\sum_{c=1}^{N_C}\left(\frac{N_c}{N_d}\right)\left(\frac{(n_{b,c} - n_{b,d})(n_{e,c} - n_{e,d})}{(n_{e,d})(n_{-e,d})}\right)\right] +$$

$$\left[\sum_{c=1}^{N_C}\left(\frac{N_c}{N_d}\right)\left(\frac{n_{e,c}}{n_{e,d}}\right)\left(\frac{n_{-e,c}}{n_{-e,d}}\right)(t_c)\right]$$

where all subscripts, with the exception of *c*, are as they were defined for Equation (2); the subscript *c*, N_c, N_d, and t_c represent communities, the community household population, the district household population, and the community targeting coefficient, respectively; and the first and second bracket correspond to the *inter-community* and *intra-community* components of the district targeting coefficient, respectively.

Equations (2) and (3) can be combined to provide a decomposition of the national targeting coefficient in a way that mirrors the three-layer allocation process of FISP coupons:

$$(4)\ t = \left[\sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{(n_{b,d} - n_b)(n_{e,d} - n_e)}{(n_e)(n_{-e})}\right)\right] +$$

$$\left[\sum_{d=1}^{N_D}\sum_{c=1}^{N_C}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\left(\frac{N_c}{N_d}\right)\left(\frac{(n_{b,c} - n_{b,d})(n_{e,c} - n_{e,d})}{(n_{e,d})(n_{-e,d})}\right)\right] +$$

$$\left[\sum_{d=1}^{N_D}\sum_{c=1}^{N_C}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\left(\frac{N_c}{N_d}\right)\left(\frac{n_{e,c}}{n_{e,d}}\right)\left(\frac{n_{-e,c}}{n_{-e,d}}\right)(t_c)\right]$$

where the first, second and third term correspond to the (i) inter-district, (ii) intra-district inter-community, and (iii) intra-district intra-community component, respectively. The notation is in line with the presentation of Equations 1-3. The first term represents the contribution of the across district targeting of the poor population. The second term, a summation across communities within district *d* and across districts, represents the portion of the national targeting coefficient attributable to the targeting of the poor population within districts and across

communities. The third term, also a summation across communities within district *d* and across districts, summarizes the contribution of CBT towards the national targeting coefficient.[18]

5.3 VALUE-BASED DECOMPOSITION

While the population shares method described above captures distribution across households, the value-based decomposition methodology provided by Stifel and Alderman (2005) accommodates the variation in the value of the input subsidy package across households. The methodology starts with the calculation of the national targeting differential. The notation and the interpretation of the decomposed components follow the reasoning in Section 5.3 unless otherwise stated. Assuming a 95 percent subsidy and given the commercial prices for the inputs subsidized by the FISP during the 2009/10 season, we posit the value of a fertilizer, a maize seed, and a legume seed coupon to be 9500 MK, 1500 MK, and 300MK, respectively.

The national targeting differential t is defined in Equation 5 as the average value of the coupons received among the eligible households net of the average value computed among the non-eligible:

$$(5)\ t = \left(\frac{1}{N_e}\sum_{i=1}^{N_e} V_{e,i}\right) - \left(\frac{1}{N_{-e}}\sum_{i=1}^{N_{-e}} V_{-e,i}\right) = V_e - V_{-e}$$

where V represents the average value, and the subscripts e and $-e$ capture the eligible and the non-eligible subpopulations, respectively. The first step in the methodology allows us to decompose t into its inter-district and intra-district components in Equation 6:

$$(6)\ t = \left[\sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e}-n_{-e,d}}{n_{-e}}\right)V_{e,d} - \sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\left(\frac{n_e-n_{e,d}}{n_e}\right)V_{-e,d}\right] +$$

$$\left[\sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\left(V_{e,d} - V_{-e,d}\right)\right]$$

[18] The third term is an aggregation of community-level targeting performance, t_c, across the program space as such it masks any potential variation between villages that may be present.

where the first and second bracket represent the inter-district and the intra-district component, respectively. Following the approach in Section 5.3 to unpacking the intra-district component of the national targeting coefficient, t can be decomposed further in Equation 7:

$$(7)\ t = \left[\begin{array}{l} \sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e}-n_{-e,d}}{n_{-e}}\right)V_{e,d} - \\ \sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\left(\frac{n_e-n_{e,d}}{n_e}\right)V_{-e,d} \end{array}\right] +$$

$$\left[\begin{array}{l} \sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\sum_{c=1}^{N_C}\frac{N_c}{N_d}\left(\frac{n_{e,c}}{n_{e,d}}\right)\left(\frac{n_{-e,d}-n_{-e,c}}{n_{-e,d}}\right)V_{e,c} \\ -\sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\sum_{c=1}^{N_C}\frac{N_c}{N_d}\left(\frac{n_{-e,c}}{n_{-e,d}}\right)\left(\frac{n_{e,d}-n_{e,c}}{n_{e,d}}\right)V_{-e,c} \end{array}\right] +$$

$$\left[\sum_{d=1}^{N_D}\left(\frac{N_d}{N}\right)\left(\frac{n_{e,d}}{n_e}\right)\left(\frac{n_{-e,d}}{n_{-e}}\right)\sum_{c=1}^{N_C}\frac{N_c}{N_d}\left(\frac{n_{e,c}}{n_{e,d}}\right)\left(\frac{n_{-e,c}}{n_{-e,d}}\right)\left(V_{e,c}-V_{-e,c}\right)\right]$$

where the first, second and third bracket correspond to the (i) inter-district, (ii) intra-district inter-community, and (iii) intra-district intra-community component, respectively. Following Stifel and Alderman (2005), Equations 6 and 7 can be normalized by dividing both sides by the national average transfer to eligible households. The purpose of this normalization is to allow for results across criteria and levels of decomposition to be compared. Without this step, the absolute transfer amounts may not be easily (or at all) comparable, reducing the importance of the analysis. The minimum value for the normalized targeting coefficient based on transfer values is negative infinity; this would occur in a perfectly mistargeted program where all transfers went to ineligible households. The maximum value is 1; this would be the case in a perfectly targeted program. The normalized results are presented below with the results from the population-shares method.

5.4 UNDERSTANDING THE DYNAMICS OF HOUSEHOLD PROGRAM PARTICIPATION

Complementing the decomposition analysis, we take advantage of the rich IHS3 data and explore the household- and community-level characteristics influencing household program participation. This analysis allows us to infer the poverty targeting nature of the FISP in a multivariate framework. For a program that is fairly well targeted to the poor, it is desirable to

observe positive and statistically significant relationships between various proxies for a household's poverty status and its program participation. If a program is not well-targeted, statistically significant relationships can identify the characteristics of whom, other than the poor, are program beneficiaries.

We rely on two alternative dependent variables capturing FISP participation. The first is a dichotomous variable that is equal to 1 for a household receiving at least one input coupon of any type and 0 otherwise, and the second is a count variable ranging from 0 to 3, capturing the number of input coupons received.[19] While we estimate a Probit regression for the former, an Ordered Probit regression is necessary for the latter. We report marginal effects from both estimations, and all regressions control for unobserved district and agro-ecological zone heterogeneity through the use of fixed effects defined at those levels.

The full specification includes the following covariates: (i) household size, (ii) child dependency ratio, (iii) elderly dependency ratio, (iv) the age of household head and its squared term, (v) the years of education of household head and its squared term, (vi) a dummy variable capturing whether the household head is a female, (vii) a dummy variable capturing whether village headman/headwoman, VDC member or TA is in household network[20], (viii) total household landholding in acres and its squared term, (ix) a series of dummy variables capturing household wealth quintile placement from the second to the fifth quintile[21], (x) household distance to the nearest ADMARC location and its squared term[22], (xi) index of favorable agro-ecological conditions[23], and (xii) a series of dummy variables[24] capturing whether (a) residents pay the village head while purchasing, selling or being allocated land, (b) a member of the parliament resides in the community, and (c) an agricultural extension officer resides in the community.

[19] The number of coupons received was capped at 3. 286 households that received more than 3 input coupons were assumed to have received 3 input coupons for convenient estimation.

[20] The variable was computed based on the Network Roster, which uniquely identified throughout the IHS3 Agriculture Questionnaire all non-household members that a farming household deals with as part a vector of crop and livestock production related transactions (e.g. land rental,, input acquisition, crop sales, etc…) during the reference agricultural season or the last 12 months, as applicable.

[21] The rural wealth quintile identifiers are based on the wealth index that also informs one of the resource poverty definitions used as part of the decomposition analysis.

[22] The eucledian distance measure was calculated based on the geo-referenced household location and taking into account the coordinates for all ADMARC locations in the country.

[23] The index of favorable soil conditions was computed by principal components analysis and based on a series of dummy variables indicating no or slight constraint in terms of (i) nutrient availability, (ii) nutrient retention capacity, (iii) rooting conditions, (iv) oxygen availability for roots, (v) excess salts, (vi) toxicity, and (vii) workability. These dummy variables were derived from the corresponding categorical variables that were obtained by linking the geo-spatial Harmonized World Soil Database with the geo-referenced IHS3 household locations.

[24] These covariates originate from the data collected through the IHS3 Community Questionnaire. All other explanatory variables are based on the data collected through the IHS3 Household and Agriculture Questionnaires.

6 RESULTS

The results of the targeting analysis are presented in Table 3.[25] The message is quite clear. The FISP targets exclusively neither the poor nor the rich. The program reaches all socioeconomic strata of rural Malawi, and if there is any targeting it is in the middle of the distribution. Further, none of the decision making levels appear to target the program in any manner that is either pro-poor or pro-rich. The national, district and community are nearly uniform in their failure to target the poor, with any minimal targeting (or mis-targeting) that does take place, occurring within communities.

The conclusions can first be seen in the coverage and leakage rates. Using predicted poverty as the resource poverty definition, 57.9 percent of the poor is found to have received FISP benefits during the 2009/10 agricultural season, while the comparable figure for the non-poor was 52.2 percent. Using the asset ownership (or landholding) driven resource poverty definition, the results are inverted with the coverage and leakage rates estimated at 50.7 (49.6) and 56.8 (56.7) percent, respectively. All national targeting coefficients under the population-share-based method hover around zero, indicating a lack of poverty targeting and in fact, a slight mis-targeting while using the asset ownership (or landholding) driven resource poverty definition.

A similar pattern emerges when we focus on the national targeting coefficients obtained under the value-based decomposition, as reported in the lower panel of Table 3. Assuming that predicted poverty is the resource poverty definition, the poor receive FISP benefits moderately more than the non-poor (the national targeting coefficient of 8.2 percent). The utilization of the asset ownership or landholding driven resource poverty definitions lead to negative national targeting coefficients (-16.7 and -22.2 percent, respectively) that are greater in absolute terms with respect to their counterparts estimated under the population-share-based decomposition. In other words, we find the extent of mis-targeting to be greater by taking into account the variation in the number of coupons received and using asset ownership or landholding based proxies for FISP eligibility. The program is clearly not adjusting the coupon allocations in order to systematically target the poorest households in rural Malawi.

The contributions of targeting at different levels of decision making towards the overall targeting performance can be seen by looking at the population-share- and value-based decomposition results. A result that is robust to the choice of the decomposition methodology and the resource poverty definition is the pronounced contribution of the intra-district intra-community targeting towards the national targeting coefficient. The CBT outcomes are not clearly pro-poor: the intra-district intra-community targeting either is slightly pro-poor, ranging from 0.049 to 0.072 while

[25] The replication of the analysis by focusing exclusively on fertilizer coupon receipts, as opposed to coupon receipts of any time, does not alter our conclusions, and are available upon request.

using the predicted poverty as the resource poverty definition, or favors the non-poor, ranging from -0.048 to -0.135 (or -0.075 to -0.225) while using the asset ownership (or landholding) driven resource poverty definition.

The intra-district, inter-community and inter-district components of the national targeting coefficient do not follow a consistent pattern across the decomposition methodologies and the resource poverty definitions. When we have a slightly pro-poor targeting outcome attained by using predicted poverty as the resource poverty definition, the intra-district inter-community component represents 9 to 10 percent of the national targeting coefficient and the inter-district component consistently accounts for only 4 percent of the overall targeting performance. These results hold true irrespective of the decomposition methodology.

When we detect a regressive targeting performance, the inter-district component is systematically greater than the intra-district inter-district component in absolute terms, and never carries the same sign as the intra-district inter-district component. While the sign of the inter-district component is negative under the asset ownership driven resource poverty definition, meaning that the inter-district allocation process leads to an even more regressive distribution of input coupons in comparison to the intra-district inter-community component, the opposite is true while using the landholding driven resource poverty definition.

Overall, the results indicate that 52 to 57 percent of rural agricultural households that received any FISP coupons during the 2009/10 agricultural season were not chosen based on plausible proxies for resource poverty. Factors other than poverty may play a role in beneficiary selection and this is explored in the remainder of our analysis. Table 4 presents an analysis of participation in FISP presenting the results from the Probit and the Ordered Probit regressions, as defined in Section 5.4.

The results confirm that a number of factors viewed as negatively correlated with poverty increase the likelihood of program participation. First, those in the second, third and fourth wealth quintile not only have increasing probabilities of getting a coupon but are also likely to receive more coupons. Second, those with more land are more likely to get vouchers and to receive more of them although this effect is diminishing with land size. Third, those with more education have a greater probability of getting vouchers although also at a diminishing rate. Fourth, household size and elderly dependency ratio are positively correlated with FISP participation but given that the poorest are often labor-constrained and the age of household head, though at a diminishing rate, increases the likelihood of receiving coupons, the coefficients for household size and elderly dependency ratio may have more to do with being an established as a member of a community rather than being poor. Taken together, it appears that those that are moderately well off have a higher chance of getting the voucher and in getting more vouchers rather than the poor or the wealthiest.

Beyond socioeconomic status, a key factor in receiving vouchers is having a relationship with key leaders in the community. Having a village chief, a VDC member or the TA as part of the household network considerably increases both the probability and the number of coupons received. This result stands in contrast with respect to the insignificant coefficients associated with having a member of parliament or an agricultural extension officer in the community, and indicates the importance of being locally, as opposed to regionally or nationally, well-connected in obtaining FISP coupons. Lastly, an important factor in obtaining a voucher appears to be the agricultural potential. As noted, those with larger landholdings tend to get more coupons, which could be partly due to having greater agricultural production potential. However, having higher values for the index of favorable soil conditions also significantly increases the probability of program participation.

7 CONCLUSIONS

The Malawi FISP has received remarkable attention given its perceived success in improving food security in Malawi through increasing production. The FISP is a large program covering a substantial portion of the rural population in Malawi and represents the country's primary strategy for expanding agriculture. It follows the perceived wisdom that decentralization of government services and programs offers several informational and cost advantages compared to more centrally run alternatives. Reaching specific subpopulations via targeting mechanisms can improve program performance while reducing costs. As both of these tactics have become increasingly popular, questions remain about how to effectively design a decentralized targeted program in order to maximize the informational and cost advantages while minimizing the potential for unwanted variation across locales—a particularly challenging undertaking in a very large program.

Using nationally-representative data, this paper systematically analyzes the decentralized targeting performance of the FISP during the 2009/10 agricultural season, and considers a range of approaches to defining resource poverty. The analysis includes both a standard targeting assessment focusing on the rates of participation and the transfer amounts among the eligible and non-eligible populations as well as national targeting performance decompositions that identify the relative contributions of inter-district, intra-district inter-community, and intra-district intra-community targeting. A multivariate analysis of the correlates of program participation is also considered.

Even with the range of analysis, the results present a very clear and robust picture. The FISP does not exclusively target the poor in Malawi, and concentrates primarily on the middle of the income distribution. The failure to target the poor is apparent in the decision-making at all levels

– national, district, and community. The limited pro-poor targeting (or mis-targeting – depending on the resource poverty definition) that does occur is facilitated by community-based targeting, i.e. open forums in which village residents identify beneficiaries in a collective fashion. The evidence suggests that the decentralized approach to targeting that relies heavily on CBT is leading to at least a degree of elite capture. We show that on average, households that are relatively well-off, connected to community leadership, and residing in agro-ecologically favorable locations are more likely to be FISP beneficiaries and receive more input coupons.

Our findings based on the nationally-representative data for the 2009/10 agricultural season are in line with the studies that are referenced above and informed by data collected in selected districts of the country. Since a nationally-representative sample of 3,247 IHS3 households have been selected for re-interview as part of the Integrated Household Panel Survey 2013, future research will replicate the analysis for the 2012/13 agricultural season with additional insights on (i) side payments in redeeming input coupons, (ii) open forum dynamics, specifically on the participation and role of local leaders commonly identified by the MoAFS as facilitators, and (iii) sharing/redistribution arrangements facilitated by community leaders outside open forums.

The conclusion about the lack of targeting is notable given that the program objectives are to improve productivity through access to inputs and enhance household food security through increased production. Improving food security of the poor directly through production is not possible if they are not targeted by the program. An obvious question is whether this is acceptable. While most studies reviewed by Mansuri and Rao (2012) on the relative performance of centralized vs. decentralized targeting mechanisms find support for more pro-poor targeting under decentralized beneficiary identification, the targeting gains resulting from decentralization seem to be small, which is in line with the results presented here. The authors highlight the improvements that could be realized in the local targeting of beneficiaries when central authorities provide stronger incentives for poverty targeting at the local level and control key program features, such as eligibility thresholds. Since the MoAFS exerts limited control over the operationalization of the concept of resource poverty at the local level in the context of the FISP, the gloomy poverty targeting performance of the program is perhaps not surprising.

An alternative to *or* complement to the way in which CBT is currently implemented could be the use of a proxy means test (PMT) and the identification of beneficiaries through an administrative process, using easily observed and verifiable indicators of household welfare that are intended to proxy for income. A simple PMT could be integrated into the annual process of nation-wide updating of the farming household registry and should at least be considered for piloting, as also advocated by Houssou and Zeller (2011) and Dorward and Chirwa (2013). While a PMT theoretically devalues the relevance of information in identifying beneficiaries at the community level (Mansuri and Rao, 2012), available evidence highlights its superiority over CBT when resource poverty status is based on per capita expenditures (Alatas et al., 2012). Several projects

supported by the World Bank Africa Region Social Protection Sector, including the Tanzania Productive Social Safety Net Program, could further offer useful insights in terms of the way in which CBT and PMT can be combined at the local level.[26]

More broadly and beyond the MoAFS statements regarding the main objective of the FISP, which implies overcoming food insecurity and poverty at the household level, the program has been associated with the goal of increasing production/attaining national food self-sufficiency. Given the scale of the program and its dwarfing effects on the financing of social safety nets in the country, the FISP continues to be framed as a social protection program as well. The targeting criteria for a program aimed at overcoming food insecurity at the national versus household level or providing social protection for the most vulnerable, however, need not to be identical and need to be more carefully articulated (Dorward and Chirwa, 2013).

If the FISP is designed to address poverty directly by targeting poor households that cannot otherwise afford unsubsidized agricultural inputs, it is failing to achieve this objective. The stagnant poverty trend in the country during the period that the FISP has been operational supports this insight. Alternatively, if the FISP is designed to indirectly address poverty—as well as food security—through expanding national agricultural production, it might be argued that favoring those with greater agricultural potential makes sense. To simultaneously achieve these objectives, the program should be able to identify households with high input use efficiency who also cannot otherwise buy subsidized inputs at prevailing market prices. Empirically, the identification of this segment of the population is difficult as one cannot simply work with the distribution of consumption and input marginal productivity and their overlap as observed in the data. The sound research design needs to simulate these outcomes in the absence of the program (see Pan and Christiaensen, 2012) such that the size of each alternative beneficiary universe, including the nexus between poverty and high input marginal productivity, could be estimated and the correlates of being in these universes are unpacked as possible inputs into redesigning and operationalizing the FISP eligibility criteria. Our future research on the FISP will explore these ideas based on the IHPS data.

[26] For more information on the approach to targeting as part of the Tanzania Productive Social Safety Net Program, see World Bank (2012).

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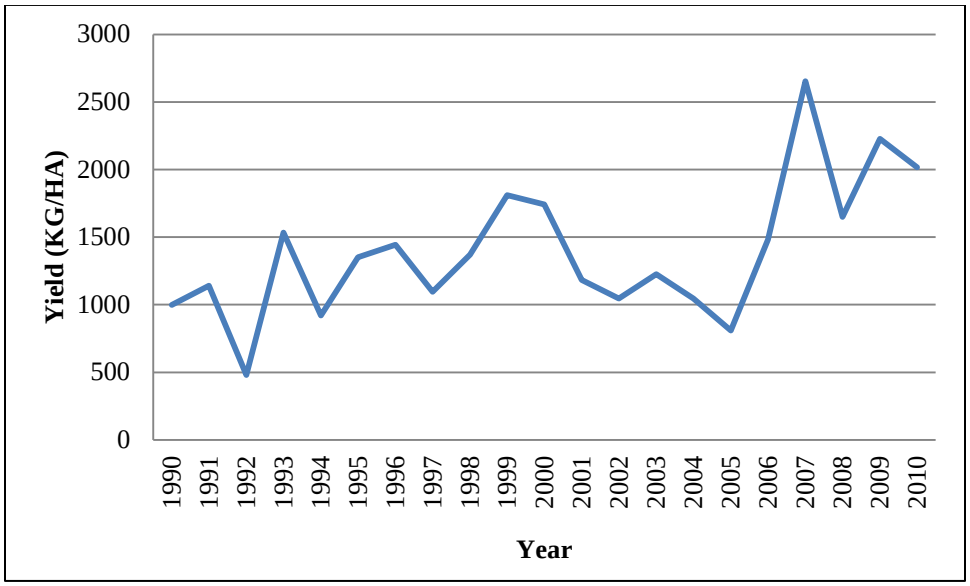
Figure 1: Malawi Annual Maize Yield Estimates (1990-2010)



Source: FAOSTAT

Table 1: FISP Participation Dynamics for the 2009/10 Agricultural Season

Total Farming Household Sample Reporting for the 2009/10 Agricultural Season	7,795
% Farming HHs Receiving Any FISP Voucher	54.45
% Farming HHs Receiving FISP Fertilizer Voucher	46.83
% Farming HHs Receiving FISP Maize Seed Voucher	6.85
Conditional on Receiving Any FISP Voucher	
# of Vouchers Received	2.16
Received 1 Voucher †	33.35
Received 2 Vouchers †	38.30
Received 3+ Voucher †	28.35
% Farming HHs Receiving FISP Fertilizer Voucher	86.00
% Farming HHs Receiving FISP Maize Seed Voucher	12.57
% Farming HHs Redeeming All FISP Vouchers Received	92.74
Average Value of All Coupons Received	7,075
Conditional on Receiving FISP Fertilizer Voucher	
# of Fertilizer Vouchers Received	1.66
Received 1 Fertilizer Voucher †	43.39
Received 2 Fertilizer Vouchers †	54.83
Received 3+ Fertilizer Voucher †	1.78
% Farming HHs Redeeming All FISP Fertilizer Vouchers Received	95.10
Average Value of Fertilizer Coupons Received	15,255
Conditional on Receiving and Redeeming FISP Fertilizer Voucher	
% Farming HHs Sharing Any of the Subsidized Fertilizer For Nothing in Return	18.36
Conditional on Sharing Subsidized Fertilizer	
% of Subsidized Fertilizer Shared	47.22
Conditional on Receiving FISP Maize Seed Voucher	
# of Maize Seed Vouchers Received	1.04
Received 1 Maize Seed Voucher †	97.03
Received 2 Maize Seed Vouchers †	2.42
Received 3+ Maize Seed Voucher †	0.55
% Farming HHs Redeeming All FISP Maize Seed Vouchers Received	94.60
Average Value of Maize Seed Coupons Received	1,554
Conditional on Receiving and Redeeming FISP Maize Seed Voucher	
% Farming HHs Sharing Any of the Subsidized Maize Seed For Nothing in Return	15.79
Conditional on Sharing Subsidized Maize Seed	
% of Subsidized Maize Seed Shared	55.02

Note: † identifies dummy variables; Estimates weighted in accordance with the complex survey design.

Table 2: IHS2 Regression Results Underlying IHS3 Consumption Predictions

Sample: IHS2 Rural Households

Dependent Variable: Log [Annual Household Per Capita Consumption]

Household Size	-0.236***
	(0.019)
Household Size Squared	0.010***
	(0.002)
Household Dependency Ratio	-0.032***
	(0.004)
Household Head: Age (Years)	-0.002***
	(0.000)
Household Head: Female ‡	-0.108***
	(0.012)
Household Head: Ever Attended School ‡	0.068***
	(0.011)
Household Highest Qualification	0.098***
	(0.007)
Dwelling Average Rooms Per Capita	0.197***
	(0.016)
Dwelling Walls: Mud Brick Burnt †	-0.006
	(0.013)
Dwelling Walls: Burnt Bricks, Concrete, Wood, Iron Sheet †	0.019
	(0.014)
Dwelling Roof: Grass, Other ‡	-0.167***
	(0.017)
Dwelling Floor: Sand, Smoothed Mud, Other ‡	-0.191***
	(0.021)
Total Land Cultivated (Acres)	0.047***
	(0.003)
Share of Total Land Cultivated w/ Clay Soil	0.119***
	(0.013)
Constant	10.442***
	(0.070)
District Fixed Effects Included	YES
Observations	9,182
R2	0.485
Adjusted R2	0.483

Note: *** p<0.01, ** p<0.05, * p<0.1; ‡ † identify dummy variables; For †, the omitted category is Grass, Mud, Compacted Earth, Other; Estimates weighted in accordance with the complex survey design.

Table 3: Evaluation of FISP Decentralized Targeting Performance for the 2009/10 Agricultural Season Based on Alternative Decomposition Methodologies & Resource Poverty Definitions

Focus: Coupon Receipts of Any Type						
Population-Share-Based Decomposition	*Resource Poverty Definition*					
	Predicted Poor Compared to National Poverty Line		*Rural Asset-Based Wealth Quintile 1 & 2*		*Rural Land Holding Quintile 1 & 2*	
Coverage (1) [% of Eligible Population Receiving Coupon]	0.579		0.507		0.496	
Leakage (2) [% of Non-Eligible Population Receiving Coupon]	0.522		0.568		0.567	
National Targeting Coefficient [NTC; **(1) – (2)**]	0.057		-0.061		-0.070	
Decomposition of NTC	*Value*	*% of NTC*	*Value*	*% of NTC*	*Value*	*% of NTC*
Inter-District Component	0.002	4%	-0.018	29%	0.016	-22%
Intra-District Inter-Community Component	0.006	10%	0.005	-7%	-0.011	16%
Intra-District Intra-Community Component	0.049	87%	-0.048	78%	-0.075	106%
Value-Based Decomposition	*Resource Poverty Definition*					
	Predicted Poor With Respect to National Poverty Line		*Asset-Based Wealth Quintile (1 & 2)*		*Rural Land Holding Quintile 1 & 2*	
Average Transfer Value Among Eligible Recipients (3)	7,632		6,574		6,291	
Average Transfer Value Among Non-Eligible Recipients (4)	7,003		7,669		7,688	
Difference in Transfer Value Averages (5)	629		-1,095		-1,397	
National Targeting Coefficient [NTC; **(5)/(3)**]	0.082		-0.167		-0.222	
Decomposition of NTC	*Value*	*% of NTC*	*Value*	*% of NTC*	*Value*	*% of NTC*
Inter-District Component	0.003	4%	-0.043	26%	0.027	-12%
Intra-District Inter-Community Component	0.007	9%	0.011	-7%	-0.025	11%
Intra-District Intra-Community Component	0.072	87%	-0.135	81%	-0.225	101%

Table 4: Correlates of Household FISP Participation

	Descriptives	**Probit**	**Ordered Probit**				
	All Households	*Dependent Variable: HH Received FISP Coupon(s)*	*Dependent Variable: No. Coupons (Any Type) Received*				
	Mean Value	**Marginal Effects**	**Coefficient Estimates**	**Marginal Effects** *Base Outcome*			
				0	1	2	3+
Household Size	4.67	0.012***	0.032***	-0.013***	0.001***	0.005***	0.007***
		(0.004)	(0.009)	(0.004)	(0.000)	(0.002)	(0.002)
Child Dependency Ratio	1.07	-0.019**	-0.043**	0.017**	-0.001**	-0.007**	-0.009**
		(0.009)	(0.020)	(0.008)	(0.001)	(0.003)	(0.004)
Elderly Dependency Ratio	0.11	0.063***	0.110**	-0.044**	0.003**	0.018**	0.023**
		(0.024)	(0.050)	(0.020)	(0.002)	(0.008)	(0.010)
HH Head: Age (Years)	43.15	0.014***	0.025***	-0.010***	0.001***	0.004***	0.005***
		(0.003)	(0.006)	(0.002)	(0.000)	(0.001)	(0.001)
HH Head: Age (Years) Squared	2137.31	-0.000***	-0.000***	0.000***	-0.000***	-0.000***	-0.000***
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
HH Head: Schooling (Years)	4.69	0.022***	0.050***	-0.020***	0.001***	0.008***	0.010***
		(0.006)	(0.013)	(0.005)	(0.000)	(0.002)	(0.003)
HH Head: Schooling (Years) Squared	37.42	-0.002***	-0.005***	0.002***	-0.000***	-0.001***	-0.001***
		(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
HH Head: Female †	0.25	0.021	0.022	-0.009	0.001	0.004	0.005
		(0.018)	(0.036)	(0.014)	(0.001)	(0.006)	(0.008)
Village Head, VDC Member or Traditional Authority in HH Network †	0.03	0.154***	0.229***	-0.091***	0.007***	0.037***	0.047***
		(0.044)	(0.078)	(0.031)	(0.003)	(0.013)	(0.016)
Total Land Holding (Acres)	1.88	0.057***	0.119***	-0.047***	0.004***	0.019***	0.025***
		(0.011)	(0.025)	(0.010)	(0.001)	(0.004)	(0.005)
Total Land Holding (Acres) Squared	6.22	-0.003***	-0.006**	0.002**	-0.000**	-0.001**	-0.001**
		(0.001)	(0.003)	(0.001)	(0.000)	(0.000)	(0.001)
HH Rural Wealth Quintile 1 †	0.20	--	--	--	--	--	--
HH Rural Wealth Quintile 2 †	0.20	0.064***	0.146***	-0.058***	0.004***	0.023***	0.030***
		(0.022)	(0.046)	(0.018)	(0.002)	(0.007)	(0.009)

Table 4 (Continued)

HH Rural Wealth Quintile 3 †	0.20	0.098***	0.212***	-0.084***	0.006***	0.034***	0.044***
		(0.023)	(0.048)	(0.019)	(0.002)	(0.008)	(0.010)
HH Rural Wealth Quintile 4 †	0.20	0.103***	0.264***	-0.105***	0.008***	0.042***	0.055***
		(0.022)	(0.048)	(0.019)	(0.002)	(0.008)	(0.010)
HH Rural Wealth Quintile 5 †	0.19	0.033	0.188***	-0.074***	0.006***	0.030***	0.039***
		(0.026)	(0.057)	(0.023)	(0.002)	(0.009)	(0.012)
HH Distance to Nearest ADMARC (KMs)	8.15	-0.003	0.000	-0.000	0.000	0.000	0.000
		(0.005)	(0.009)	(0.004)	(0.000)	(0.001)	(0.002)
HH Distance to Nearest ADMARC (KMs) Squared	94.95	0.000	0.000	-0.000	0.000	0.000	0.000
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Index of Favorable Agroecological Conditions (PCA)	0.11	0.018***	0.036**	-0.014**	0.001**	0.006**	0.007**
		(0.006)	(0.016)	(0.006)	(0.001)	(0.003)	(0.003)
Residents Pay Village Head if Purchasing/Selling/Allocated Land †	0.20	0.055**	0.042	-0.017	0.001	0.007	0.009
		(0.025)	(0.048)	(0.019)	(0.001)	(0.008)	(0.010)
Member of Parliament Resides in Community †	0.11	0.013	0.022	-0.009	0.001	0.003	0.004
		(0.028)	(0.057)	(0.023)	(0.002)	(0.009)	(0.012)
Agricultural Extension Officer Resides in Community †	0.31	0.007	0.029	-0.012	0.001	0.005	0.006
		(0.021)	(0.043)	(0.017)	(0.001)	(0.007)	(0.009)
District & Agro-Ecological Zone Fixed Effects	--	YES	YES				
Observations	7,795	7,795	7,795				

Note: † identifies dummy variables; Estimates weighted in accordance with the complex survey design.