

**THE ALLOCATION AND WELFARE EFFECTS OF EMERGENCY FOOD
AID IN RURAL ETHIOPIA**

by

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A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics

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ABSTRACT

This dissertation consists of two separate essays. The first essay examines if the allocation of emergency food aid during the 2002/3 Ethiopian drought adheres to household rankings based on their history of consumption poverty as well as their experiences with shocks and food insecurity. We found that the allocation of free food aid benefits favored consumption-poor households with older heads. In contrast, the public works program did not favor consumption-poor households because of its work requirement. We also found the allocation of benefits in both programs to be marred by inclusion and exclusion errors. Non-deserving households that received free food aid were more likely to be headed by elderly women while those who wrongly received public works benefits were more likely to be younger and had better connections. Aid deserving households with older and/or sickly heads enjoyed lower chance of being excluded from either program.

The second essay examines the effect of emergency food aid interventions during the 2002/3 Ethiopian drought on household wellbeing. We use the exogenous variation that the selection criteria provide to estimate the effect of program participation using fuzzy regression discontinuity. Results from the first stage of the RD design show that households that the criteria-based ranking deemed eligible to receive benefits had significantly higher chance of actually receiving them than those

it almost deemed eligible. Despite the allocation of benefits being progressive, results from the second stage of the RD estimation indicate that neither program was effective at preventing beneficiaries from depleting assets or growing their livestock units. However, participation in the free food aid program had a positive and significant effect on real per capita food consumption. But, this estimate loses significance when households who also received public works benefits are excluded from the analysis, suggesting that the effect on consumption may be short lived. In contrast, participation in public works employment had a significant but negative effect on the rate of growth of non-food consumption. While participation in either program had no effect on household assessments of program fairness post-intervention, recipients of either benefit were more likely to view the government or its officials favorably than their non-recipient counterparts. We explain this in terms of the relief and optimism associated with securing help during a crisis situation.

INTRODUCTION

Even though seemingly simple, food aid is tremendously complex. While the commonly held belief about food aid is that it provides emergency humanitarian relief to mitigate the effects of man-made and natural disasters, in reality food aid is quite complex, consisting of various categories with different allocation issues and intended outcomes (Awokuse, 2006). Food aid generally falls into three broad categories (Mousseau, 2005). Program food aid is a government to government transfer that allows recipient countries to purchase food grown in donor countries with borrowed money that carries below market interest rates. Project food aid is a grant supporting specific projects such as food for work or food for education programs aimed at reducing food insecurity, improving nutritional status, introducing improved agricultural technologies or promoting economic growth. Emergency relief or humanitarian food aid involves the transfer of free food to regions or communities that are impacted by natural or man-made disasters such as famine, tsunamis or civil war. Unlike program food aid, project and emergency aid programs are targeted, and typically administered by the World Food Program, non-governmental organizations as well as government institutions in recipient countries.

While program food aid traditionally accounted for majority of global food aid, its size has declined in recent years in part because its resources are not targeted

toward the poor, rendering it ineffective at reducing food insecurity in recipient countries (Awokuse, 2006). In contrast, emergency food aid, which until the 1990s accounted for a small fraction of food aid transfers, has recently been increasing, indicating the uptick in the number of emergency situations as well as the end of the cold war - an era that used food aid as a foreign policy instrument to support friendly countries (Mousseau, 2005). In fact, many developing countries with chronic poverty and insecurity have become perpetual recipients of emergency food aid. Recent reports on global flows of aid show the prominence of emergency relief aid in global food aid transfers. For example, emergency food aid accounted for 70 percent of global food aid transfers in 2012, with project and program aid accounting only for 27 and 3 percent respectively (WFP, 2012).

Owing to their widespread poverty and food insecurity, often made worse by recurrent droughts, famine and civil war, sub-Saharan African countries have traditionally been the main recipients of global food aid. In 2012 alone, 4 out of the top 8 food aid recipient countries were from this region, with Ethiopia receiving the largest share at 16 percent (WFP, 2012). This same WFP report also showed that sub-Saharan African countries received 61 percent of global emergency aid deliveries in 2012. With 0.86 million metric tons in emergency food aid receipts, accounting for nearly one fifth of total emergency aid transfers in 2012, Ethiopia ranked at the top followed by the People's Democratic Republic of Korea at 11 percent. The 2002/3

Ethiopian drought was one of the instances that saw increased flow of emergency aid aimed at preventing severe malnutrition and loss of life in the affected communities.

In its January 2002 appeal regarding the 2002/03 drought, the Ethiopian Government's Disaster Prevention and Preparedness Commission (DPPC) estimated total relief needs would peak around 3.2 million people by July 2002 (Lautze et al., 2003). This appeal was revised up in August 2002, and the number of people it affected was so large that Ethiopia's then Prime Minister Meles Zenawi drew comparisons with the 1983/4 Ethiopian famine (Frignet, 2004). A December 2002 revision of this appeal put the total number of affected population at around 15 million, with 11.2 million requiring immediate food assistance and another 3.1 million facing significant famine risk (Lautze et al., 2003). However, this drought was less deadly than the one in 1983/4, in part due to improvements in the Government's early warning and response systems as well as the generous support from the international community.

By 2003, the Ethiopian government had secured pledges for more than 90 percent of the 1.8 million metric tons for which it appealed (Frignet, 2004), allowing it to expand the free food aid and food for work (or public works)¹ components of its emergency food aid program. These two emergency food aid programs target different population groups. The food for work program required that beneficiaries provide

¹ Throughout this dissertation, we will use the terms food for work and public works interchangeably

labor in exchange for receiving benefits. Program participants were expected to work on public projects. In contrast, the free food aid program targeted those that were not able to work, perhaps due to old age, disability or other health conditions. By insuring beneficiaries against drought induced consumption shortfalls, these programs could have long-term effects on agricultural production by preventing severe malnutrition and the destruction and/or liquidation of assets in the short-term. However, the efficacy of these programs in achieving their short and long-term goals depends on how well they are timed and targeted. While the literature on the long-term effects of emergency food aid is very thin, numerous studies point to the targeting and timing of food aid distributions as critical influences to the success of food aid programs in general (Harvey and Lind, 2005; Barrett, 2006).

This dissertation aims to investigate the allocation and effectiveness of emergency food aid distributions in the context of the 2002/3 Ethiopian drought. The first essay examines factors influencing the allocation and/or misallocation of free food aid and public works employment using data from multiple rounds of the Ethiopian Rural Household Survey (ERHS). Multiple rounds of the ERHS provide detailed data on household consumption as well as their experiences with shocks and the mechanisms they use to cope with them. This essay will leverage the households' history of consumption poverty and food insecurity along with their experiences with shocks to rank potential beneficiaries and subsequently examine if the distribution of free food aid and public works employment adhere to these rankings. Given that

leakage and under-coverage of benefits are very common in food aid programs (Dutrey, 2007), this essay will also identify factors explaining the inclusion into (exclusion from) each program of ineligible (eligible) households.

The second essay examines if emergency aid interventions during the 2002/3 Ethiopian drought had any effect on the wellbeing of their beneficiaries about a year and half after the peak of the crisis using data from multiple rounds of the Ethiopian Rural Household Survey. Using fuzzy regression discontinuity design, it examines if participation in free food aid and public works programs during the 2002/3 drought had any effect on household consumption and asset holdings nearly a year after all aid disbursements have ceased. In addition, this essay tests if the receipt of program benefits had any influence on the views that households hold toward program administrators or on their ratings of the allocation process post-intervention. To implement this regression discontinuity design, this essay relies on information about the criteria village authorities reportedly used in selecting beneficiaries during the 2002/3 intervention.

Chapter 1

THE ALLOCATION OF EMERGENCY FOOD AID IN RURAL ETHIOPIA

1.1 Introduction

The average household in a low-income country is poor, food insecure and likely uneducated and malnourished. These problems are even more acute in rural areas where education and health facilities are relatively in short supply. In addition, most rural households in developing countries still use traditional farming techniques which make agricultural output heavily dependent on the vagaries of nature. Frequent famine and drought intensify the problems of poverty and chronic food insecurity. For example, Porter (2012) provides evidence that households in rural Ethiopia are vulnerable to adverse shocks such as rainfall. In most cases, the rural household's important assets, such as cattle, are a famine or a drought away from being sold as a way of coping with difficult times.

Attempting to break this cycle of poverty and food insecurity has long been the focus of development strategies by governments and donors. One component of this strategy may be providing these households with emergency aid to prevent asset depletion during times of famine or drought. An equally important component of this strategy is making investments to create opportunities for rural households to generate income and accumulate assets. However, these donor and/or government provided

resources are limited and the efficacy of such programs depends on how these resources are allocated among potential beneficiaries.

Ideally, the allocation of such resources would be based on means testing of household income. But the reality, especially in low-income countries, is that household incomes are difficult to observe given that the majority of households in poor countries are employed in sectors that are informal and/or insufficiently monetized (Lavalley et al, 2010). The issue is, therefore, that of correctly identifying the poor with proxy means tests (PMTs) based on observable household characteristics such as consumption, assets, land ownership, etc.

Proxy means testing as an allocation method can be effective if these observed household characteristics are well correlated with household poverty. However, proxy means tests based on periodic surveys fail to capture movements in and out of poverty and/or food insecurity due, for instance, to transient shocks. More importantly, metrics based on such observable characteristics as consumption and assets are prone to measurement errors and may fail to provide an accurate picture of how poor a household really is, increasing the likelihood of misallocation.

In an attempt to resolve these problems, donors and/or governments have often resorted to designing a targeting method that delegates some level of authority to community leaders. However, this arrangement can create an incentive problem on the part of the agent responsible for managing the program at the local level. Thus,

whether or not these resources ultimately reach the very poor depends in part on how the agent conducts himself or herself (Bardhan and Mookherjee, 2006; Niehaus et al., 2013). With superior knowledge about members of the target population, the agent may be able to target interventions much better than the donor or the central government, consistent with the benefits of decentralization. But, the delegation of authority to a local agent has its own caveats. In the absence of accountability as well as strict and enforceable penalties, the agent's rent seeking behavior may result in the inclusion into (exclusion from) the program of ineligible (eligible) households (Niehaus et al., 2013).

The alignment of the agent's preferences with that of the donor obviously improves the chance that these resources reach the hands of aid-deserving households (Niehaus et al., 2013). However, it does not guarantee efficiency. The resulting allocation may still be inefficient if community leaders do not have additional poverty-related "soft information" on potential beneficiaries beyond what the donor observes from periodic surveys. Lack of such information limits the agent's ability to better distinguish the poor from the non-poor. Inefficiency may also arise from the agent being transparent about the selection criteria and potential beneficiaries changing their behavior to game the system, leading to relatively well-off households trying to reap benefits from such programs by misrepresenting themselves (Dutrey, 2007).

This essay examines the allocation and/or misallocation of emergency food aid during the 2002/3 Ethiopian drought using data from multiple rounds of the Ethiopian

Rural Household Survey (ERHS). Specifically, it examines if the allocation of free food aid and public works employment benefits adhere to rankings based the households' history of consumption poverty and their experiences with shocks and food insecurity. In addition, it tries to identify factors explaining the inclusion into (exclusion from) each program of ineligible (eligible) households.

This essay is organized as follows. The next section reviews the literature. Section 1.3 lays out the methodology. Section 1.4 provides a detailed description of the data. In section 1.5, we report results from estimations of participation equations as well as inclusion and exclusion errors. Section 1.6 concludes.

1.2 Literature

Measuring the success of targeted programs in directing resources to their intended beneficiaries has always been of great interest to development researchers and economists alike. As such, numerous authors have tried to measure success of targeted interventions in directing resources to where they are needed the most. In some studies, such as Coady et al. (2004) and Coll-Black et al. (2011), targeting efficiency is measured in terms of the amount of resources the poor (or deserving) receive from a targeted program compared to the amount they would have received from an equally funded universal scheme. In some other studies, such as Neihaus et al. (2013) and Atalas et al. (2012), the success of a targeted intervention has more to do with how rare or how rampant misallocation is. If allocation errors are rampant, a

targeted intervention, deemed progressive in terms of the amount of resources it directs toward the included poor, may be less progressive than an equally funded universal scheme since it excludes a sizable portion of its intended beneficiaries.

In their comprehensive study of targeted programs spanning 48 countries, Coady et al (2004) reported that the average targeted intervention transferred 25 percent more resources to the poor than an equally funded universal scheme. They found some interventions to be more progressive than others and that targeting performance was better in countries that were relatively richer and with stronger institutions. However, such measures can be misleading because they fail to take the excluded poor into account (Dutrey, 2007). In fact, targeted programs have always benefitted some non-deserving households and excluded some deserving ones. And, as Dutrey (2007) notes, the exclusion of the deserving poor is quite prevalent even in some of the most successful programs. For example, the percentage of the excluded poor ranges from a low of 26 percent in Columbia's subsidized health insurance program to a high of 84 percent in Chile's PASIS (old age benefits program).² Thus, interventions that seem quite progressive in terms of the amount of resources they funnel to the included poor may in fact be regressive if the metric used for measuring targeting efficiency takes account of the excluded poor.

² For a review of these interventions, see Dutrey (2007).

Some studies have attempted to measure the effectiveness of targeted programs in terms of leakage and under-coverage in the distribution of benefits. For example, Neihaus et al. (2013) found the allocation of Below Poverty Line (BPL) cards in Karnataka, India to be less progressive with widespread rule violations, including more than 60 percent of ineligible households and excluding about 13 percent of eligible households.³ Likewise, Atalas et al. (2012) estimated models of misallocation at the household level to compare the performances of three different targeting methods, which on average excluded 53 percent of the poor and included 20 percent of the non-poor. Other studies that investigated the effectiveness of targeting along this line include Bardhan and Mookherjee (2006), Baird et al. (2009), Uraguchi (2011) among others. In addition, some authors such as Jayne et al. (2001) and Clay et al. (1999) examined if the allocation of benefits followed some agreed upon guidelines or criteria for targeting beneficiaries. However, to the best of my knowledge and with the exception of Atalas et al. (2012) and Clay et al. (1999), none of these studies have analyzed allocation errors to identify the root causes of inclusion and exclusion errors.

One of the most critical issues in the targeting literature relates to the difficulty of devising an effective tool for distinguishing the needy from those that are not. This is particularly difficult in developing economies where institutions are weaker,

³ BPL is short for Below Poverty Line. The Indian government introduced a poverty targeting program in 1997. According to this program, households who fall below the poverty line are entitled to purchase a specified amount of basic commodities (wheat, rice, kerosene, etc.) at subsidized prices. However, to enjoy this benefit one should have the BPL card, the issuance of which, at least in principle, is based on proxy means tests (PMTs). For more details about this program, see Niehaus et al. (2013).

budgetary constraints are stringent and the majority of households are employed in informal and insufficiently monetized sectors, thereby making household incomes difficult to observe (Lavallee et al, 2010; Ravallion, 2003). To account for this, some targeted projects relied on household surveys to generate income or consumption related metrics as a means of setting thresholds for distinguishing eligible households from those that are ineligible (Ravallion, 2003). In some other projects, ownership of observable assets such as television sets were used to measure the level of poverty experienced by households (Neihaus, et al., 2013). However, proxy means tests of this sort, often generated from periodic surveys, may fail to capture short term movements into and out of poverty. Besides, such metrics may fail to account for some other aspects of poverty that are known to and well understood by local authorities. Along this line, Atalas et al. (2012) noted differences in how poverty was perceived by communities and the central government, which often used survey data to generate consumption based poverty definitions. In such circumstances, community or hybrid targeting methods have been suggested as alternative mechanisms to allow community leaders use their local information to better target beneficiaries in their respective communities (Atalas et al., 2012; Lavallee et al, 2010).

The vast literature on targeting identifies problems related to institutional capacity (Ravallion, 2003; Lavallee et al, 2010; Dutrey, 2007), political support (Dutrey, 2007), as well as incentives (Ravallion, 2003; Neihaus et al, 2013) as main factors influencing targeting performance. Distinguishing beneficiaries from non-

beneficiaries as well as implementing and monitoring the program requires considerable institutional capacity. This requirement poses a serious problem to the effectiveness of targeting in developing countries where institutions are weak both in terms of skilled manpower and other resources (Lavalley et al., 2010). Lack of reliable data on household income, consumption and other measures of wellbeing in low-income countries, often attributed to lack of institutional capacity, can have serious implications on targeting efficiency. This problem could be even more critical in situations where poverty is so widespread – using less reliable data to select beneficiaries from a pool of almost equally poor households can be very difficult. In addition, weak institutions can translate into weak enforcement of allocation rules and less accountability on the part of local agents, exacerbating fraud and abuse (Neihaus et al., 2013). Mitigating fraud and abuse would require investing resources in building institutional capacity, ultimately decreasing the amount of resources available to the poor.

Targeted programs enjoy less political support than universal programs and political opposition to such programs may prove particularly perilous if the targeted individuals belong to a group that has little political power (Dutrey, 2007). First, they exclude some groups from receiving benefits (Lavalley et al., 2010). Second, lack of political support for taxation may weaken targeted interventions if they are financed with domestic resources. In addition, benefits from such programs may come at the cost of the beneficiary's status in society, which may deter self-targeting into the

program. For example, Schanzenbach (2009) found that perhaps due to sensitivity to the stigma associated with receiving food stamp benefits, poor working families were less likely to enroll in the program than poor non-working families. This contrasts with the universal child allowance program in Sweden, a program that enjoys widespread political support (Dutrey, 2007).

Incentive related problems can arise when potential beneficiaries change their behavior to make sure that they meet the eligibility criteria for participation in targeted programs (Ravallion, 2003; Lavalley et al., 2010). For example, reducing labor force participation marginally can be the difference between whether a household qualifies for a program or not. Neihaus et al. (2013) tested this possibility of ineligible households knowing more about targeting rules and concealing critical information to game the system in the allocation of BPL cards in Karnataka, India. Their results show that such knowledge has little to do with whether an ineligible household gets a BPL card or not. Likewise, Gilligan and Hoddinott (2006) found that the likelihood of a household receiving free food aid or public works benefits has little to do with it participating in prior episodes or not.

While not publicizing the eligibility criteria could curtail the household's ability to manipulate the assignment variable, the resulting lack of transparency could create another incentive problem on the part of agents who are responsible for managing the program at the local level (Lavelle et al., 2010). The agents in charge of making allocation decisions can use their role to demand bribes or consolidate

political support. This can manifest itself in the form of local authorities favoring households with better connections to people in positions of power. Empirical evidence on fraud and abuse is rather mixed. In some studies, such as Baird et al. (2009) and Bardhan and Mookherjee (2006), local leaders were successful in directing resources to where they were needed the most, and in some cases helping a higher level regressive allocation become moderately progressive overall. On the contrary numerous other studies have found local agents to be less progressive. For example, in their study on the effectiveness of emergency food aid in Ethiopia, Gilligan and Hoddinott (2006) found some evidence confirming the presence of favoritism in the selection of beneficiaries for participation in free food aid and public works programs in rural Ethiopia. Similarly, Neihaus et al, (2013) provided evidence on local authorities in Karnataka, India breaking rules and allowing some non-deserving households to receive BPL cards as part of India's poverty targeting program. In the presence of weak enforcement of a targeting rule that includes more household characteristics, their results showed ineligible card holders as paying slightly higher fees than their eligible counterparts. In sum, including more household characteristics in the targeting rule is not a problem if the rule can be enforced perfectly. But widespread fraud and abuse is the likely outcome of a targeting rule that is difficult to enforce, especially if the agent's preferences are not progressive. They use this finding to highlight the benefits of designing easy to enforce targeting rules.

Rule violations are not necessarily bad. If the agent is progressive, rule violations arising from, for example, the agent trying to take transient shocks into account in the allocation of benefits can in fact improve targeting performance. Community leaders can gather additional information on each household through needs assessment inspection visits or other means that they could use to better target the needy than a higher level decision maker would. In the presence of a ‘corruptible’ agent, a targeting mechanism that grants more discretion to local agents may end up being less progressive. In a manner that is consistent with fraud hypothesis, Neihaus et al. (2013) found that “inspection” visits by government officials to a household increased the odds of this household receiving a BPL card and that these visits were more likely to be deal making sessions.

The misallocation of benefits in targeted interventions can occur at different levels if allocation decisions are made at multiple levels. In a situation where recipient regions or districts are first chosen by authorities higher up, misallocation can occur at a higher level. Jayne et al. (2001), for example, found this to be the case in their study on the allocation of food aid benefits in rural Ethiopia. Specifically, they found variations in the allocation of aid among Ethiopia’s various regions had little to do with variations in regional observable characteristics, implying perhaps that federal authorities funnel more resources to politically favored regions.

Similarly, Baird et al. (2009) found higher level allocation decisions in Tanzania’s Social Action Fund (TASAF) program to be regressive because wards

needed to apply in order to be considered. Using a unique dataset on ward level poverty and literacy rates, voter registration, election results, the number of applications, and funding decisions, they showed that the number of funding applications per capita was higher for wards that were relatively more educated, more informed, more politically engaged, and more equal. But given that the program required applications for funding, they refrained from interpreting this result as politicians trying to reward areas with higher voter registration and turnout. Instead, more literate and politically engaged communities could more easily make application related collective decisions. In fact, they found village level (lower level) allocations to be progressive rendering the overall allocation to be moderately progressive, benefitting the poor in more active and engaged communities. In their study on the implications of decentralization to pro-poor targeting, Bardhan and Mookherjee (2006) also found results similar to that of Baird et al. (2009). Using longitudinal data from a sample of 89 villages in West Bengal, they found the allocation of subsidized credit, agricultural inputs, and employment at local infrastructure projects was progressive within villages but regressive across villages. The misallocation occurred at a higher level of authority such that the final allocation benefitted poor households who resided in rich areas more than it benefitted equally poor households who lived in poor areas. In both studies, local “elite capture” was not a problem. Poor households in relatively more affluent, well-educated or politically engaged districts benefitted the most because their leaders were able to attract more funding to their communities.

The study that is closest to ours is one by Atalas et al. (2012). By conducting a field experiment in 640 Indonesian villages, Atalas et al. (2012) examined differences in the performance of three targeting methods - PMT, community, and hybrid targeting. Using a daily consumption threshold of PPP\$2 to classify potential beneficiaries as poor or non-poor, they showed that the average program excluded 53 percent of the poor and included 20 percent of the non-poor. They compared the community and hybrid targeting methods with PMTs based on the government's per capita consumption based definition of poverty to examine their relative ability to identify the poor. Their results show that compared to the PMT method, the community and hybrid methods were more likely to misclassify the middle non-poor as deserving (inclusion error) and the upper poor as non-deserving (exclusion error) although they were more effective than the PMT in including the very poor with daily per capita consumption of less than PPP\$1. However, they also noticed that the community method's poor performance in selecting the poor was not due to "elite capture" but rather due to diminishing returns to community effort in the ranking of potential beneficiaries. In addition, they provided evidence that communities used broader definitions of poverty than the central government, which defined poverty only in terms of per capita consumption. The implication of this finding was that rule violations at the community level arose from genuine differences in how the government and local communities perceived poverty.

With the exception of Atalas et al (2012) and Clay et al. (1999), none of the studies cited earlier have tried to dig deeper into the analysis of allocation errors with the aim of identifying the root causes of inclusion and exclusion errors. This study expands the literature in this area. Particularly, it builds and estimates separate models of inclusion and exclusion errors to identify factors influencing the likelihood of a deserving household being excluded from or a non-deserving household being included into the targeted programs. This study abstracts from the analysis of allocation decisions at higher levels of authority. It looks at whether the ultimate allocation conforms to rankings based on household experiences with consumption poverty, shocks and food insecurity.

1.3 Methodology

This essay has two main objectives. First, it examines factors influencing the selection of households for participation in free food aid and public works programs that were operational during the 2002/3 Ethiopian drought. The second and perhaps the most important objective pertains to the examination of factors influencing inclusion and exclusion errors in the allocation of benefits for each program. However, analysis of this sort requires that there be a metric or set of metrics that would enable program administrators not only distinguish aid deserving families from those that are not but also rank them in terms of their need.

In data collected in 2004, village authorities reported the criteria they use to select beneficiaries into both programs during the 2002/3 drought. Table 1.1 presents the top two criteria that local authorities reported to have used in allocating free food aid and public works employment. In nearly all villages, the free food aid program appears to target poor families with elderly and/or disabled members. But different villages appear to use different criteria in selecting beneficiaries for public works employment. For example, in nearly half of the villages, authorities reported using poverty or landlessness as the first criterion for selecting beneficiaries. In a third of the villages, selection is primarily based on family size and/or household members' ability to work. The other two villages report using a random or quota based allocation.

Table 1.1: Top 2 selection criteria in participating villages by program (September 2002 and April 2003)

Region	Village	Public Works		Free Food Distribution	
		Criteria 1	Criteria 2	Criteria 1	Criteria 2
Tigray	Haressaw	Less/ no land	Poor	age	poor
	Geblen	Poor	No land	age	poor
Amhara	Dinki	Equal odds for those who like to		Poor/ no ox	Poor/ one
	Shumshea	People who volunteer for free Dev.	Able to	disability	age
Oromia	Adele Keke	Able to work	Poor	age/	
	Korodegaga	Family size	Poor	age	disability
SNNPR	Azedebao	Poor	Family size	poor	
	Gara Godo	Less land	Family size	Age	Less land
	Doma	Quota	Family size	.	.

Source: 2004 Ethiopian Rural Household Survey – Community Survey.

These food aid programs target poor and/or the food insecure households with different labor endowments (Gilligan and Hoddinott, 2006). If this is true, then rankings based on household experiences with poverty, food insecurity and shocks

should be largely consistent rankings implied by the selection the selection criteria described in Table 1.1. But, the lack of universality in the selection criteria, particularly in the public works program, may seem at odds with the fact that this program targets the poor. However, the ERHS, which does more than collecting data, also contains village specific studies that provide the social, economic, cultural, demographic as well as political context for effective interpretations of the data. The village studies in ERHS provide critical evidence pointing to the similarity of targeting criteria that local authorities use in nearly all villages. It appears that the key to understanding the wild differences in targeting criteria shown in Table 1.1 lies in differences across communities in how poverty is perceived or how the poor are described.

In nearly all villages, people that have less or no land, less or no livestock are considered poor (ERHS Village Studies in ERHS, 2004). In addition, the localized beliefs and perceptions about poverty and landlessness in the ERHS village studies seem to enjoy support from several empirical studies. For example, studies by Horrell and Rock (2008), Dercon and Krishnan (1998) and Heady, et al. (2014) report similar findings affirming the presence of a very close association between landlessness and poverty in rural Ethiopia. The implication here is that by using land ownership as their top criterion for participation in public works, authorities in Haressaw and Gara Godo may, in fact, be trying to target the poor.

The use of family size as a targeting criterion may point to the fact that bigger households do have larger supply of labor. The village studies in the ERHS show that people in most villages regard children as “blessings from God” or “wealth.” In a society where children often help their families with both domestic and farm work, households with more members/children are more likely to provide more workers for public works employment. But, it may also point to the fact that bigger households are considered poor because whatever limited resources they have are shared between many of their members. This view is somehow echoed by Uruguchi (2011) who reported that larger families in rural Ethiopia tend to be more food insecure, which is consistent with poverty perceptions in some villages such as Dinki, where there are instances in which people with many children are considered poor.⁴ The poor in Dinki are described as those lacking in physical assets such as land and livestock, having more children, and sickly among others.⁵ So by using family size as one of their top criterion for selecting beneficiaries into the public works program, authorities may actually be trying to target poor families that are also able to work.

While both programs target the poor, ability to work appears to be the second most important criterion influencing which households get to participate in which

⁴ This view sharply contradicts with the view that highlights potential gains that larger families enjoy from economies of scale.

⁵ Respondents in Dinki describe poverty as having many features including “sickness, too many children, has nothing, cannot help others, gives land for fixed rent, no productive materials, too old, death of livestock, no oxen, only a cow, landless, no supply of inputs, no man in the household, too young, unlucky, etc.” (ERHS Village Studies in ERHS (2011), Dinki pp 6).

program. Given the context in the ERHS village studies, the general pattern we observe from Table 1.1 is that while free food aid targets poor families with elderly or disabled members, the public works component of the program focuses on poor families with members that are able to work. Having established this, the next step is to use the available data to rank potential beneficiaries in terms of how deserving they are of each program's benefits. We perform this analysis by devising three alternative rankings, the basic poverty ranking, the shock augmented ranking, and the food security augmented ranking. The latter two account for the flexibility that local program administrators may have in using their local (soft) information to determine the allocation of benefits.

The basic poverty ranking makes use of each household's history of consumption poverty, measured in terms of real per capita consumption. This ranking assumes that local authorities will have access to the same information that produced the 1999 ERHS data. By the time the intervention under consideration began in September 2002, we assume that local authorities used key metrics from the 1999 survey in selecting beneficiaries to each program.⁶ Assuming that older poverty episodes weigh less on the authorities' minds than more recent ones, we presume eligibility for participation in either program to be based primarily on the potential

⁶ By making this assumption, what we mean is that local authorities do have enough information about each potential beneficiary that, if quantified, would produce metrics similar to what is contained in the 1999 survey round.

beneficiary's poverty status in the survey round immediately prior to the 2002 intervention, the 1999 round.

The simplest way of doing this is ranking potential beneficiaries in each village in terms of their real per capita consumption in 1999. However, using rank generated in such fashion is problematic for two reasons. First, it assigns different ranks to households A and B with real monthly per capita incomes of Birr 40 and Birr 40.1 respectively although, arguably, there is little meaningful difference between the levels of poverty these two families experience. These numbers are merely snapshots and do not show us the full picture of each household's experience with consumption poverty. Second, given the positive (and possibly one to one) relationship between this naïve rank and real per capita consumption, using either variable in the regression models may yield similar results.⁷

To this effect, we design a slightly different ranking approach that incorporates the history of household consumption from survey rounds prior to the 1999 round in descending order of time. We first assign each household to a consumption block based on their 1999 real per capita consumption, rounded to the nearest integer. Each block represents a span of income of Birr 10, with households with real monthly per

⁷ In this case, there is no point in generating this rank when we can simply use real per capita consumption in our models.

capita incomes less than Birr 10 in the poorest block.⁸ The choice of Birr 10 consumption intervals for grouping households balances the need to have homogenous blocks by income and the need not to rank households differently based merely on slight differences in their real monthly per capita consumption in 1999. A smaller interval of Birr 5 yields a rank that is almost identical to the naïve rank discussed above. On the contrary, setting an interval of Birr 20 would bring in members with somehow different economic wellbeing together thereby making these blocks less homogenous. This method generates 21 separate 1999 consumption blocks per village, with the last block containing households with real monthly per capita incomes of at least 200 Birr.⁹

Within each 1999 consumption block, households are then ranked based on their Birr 10 consumption block in 1997. If multiple households appear in the same blocks based on 1999 and 1997 consumption, e.g. two households are in the Birr 11 to 20 block in 1999 and Birr 0 to 10 block in 1997, then households are compared using blocks of size Birr 5 from the 1999 round. Subsequent comparisons will be based on blocks of Birr 5 in 1997. The final iteration of this process compares households in terms of their real per capita consumption in 1999 and 1997, in that order. From this

⁸ The second poorest block would then consist of households with real monthly per capita incomes between Birr 11 and Birr 20, etc.

⁹ Some blocks in some villages are null if the villages under consideration have no member with real per capita consumption belonging to those blocks.

method, each household received a unique or nearly unique rank with the poorest household ranked first. Because allocation decisions are made at the village level, this ranking of potential beneficiaries is village specific, such that in each village the poorest family ranks first.

The second alternative, which we will refer to as the food security augmented poverty ranking, ranks households in terms of their poverty status in 1999 as well as their food security status during the 2002/3 drought. Put another way, this ranking first groups households in blocks of Birr 10 based on their real per capita consumption in 1999 and then uses a measure of household food security to rank members in each block. In 2004, respondents were asked about their experiences in the 2002/3 drought. The survey questions that are relevant for our food security ranking include: 1) “Did you cut back quantities served per meal to adult males?” 2) “Did you cut back quantities served per meal to adult females?” 3) “Did you cut back quantities served per meal to children?” 4) “Did anyone go a whole day without eating?”¹⁰ According to this ranking, which is based on the household’s poverty status in 1999 and a scale derived from household responses to the 4 questions above, a family that ranks first was the most food insecure during the 2002/3 drought among those households with 1999 consumption less than Birr 10.

¹⁰ Questions related to whether or not the household was forced to sell any livestock, jewelry or furniture to pay for food are not included in this metric because only the well-off do have the option of selling assets. The poor, who most likely will not answer such questions in the affirmative, are responding in such fashion not because they did not want to sell stuff to be able to pay for food but because they probably have nothing to sell.

However, augmenting the 1999 poverty ranking with the food security scale in 2002 is not free of problems. One critical problem relates to the possible endogeneity of this scale. Because the food security scale is based on household responses to a post-intervention survey, it may not be exogenous to whether or not the respondent participates in either program. Stated differently, whether or not a household participates in either program will have an impact on how it responds to questions about its drought experience. As a result, identifying the effect that this augmented ranking has in the selection process requires that there be a valid instrument that affects the selection process only through its effect on the household's food security status.

One possible instrument to consider is the households' assessment of how the recent drought affected people in their community or village. The idea here is that people that suffered badly during the drought are likely to extrapolate their suffering to their entire community. Fortunately, respondents were asked the question "How much of this village (peasant association) suffered badly during this most recent drought?" If we accept this idea of people extrapolating from their personal suffering, then one can assume that a particular household's assessment of how badly the 2002/3 drought affected their village is well correlated with that household's own drought experience. But it appears there is no reason for us to believe that a household's assessment of how badly the drought affected their village would influence the odds of it being selected for participation in either program.

Last but not least, to create the shock augmented poverty ranking households are ranked based on their consumption in 1999 as well as the number and severity of shocks they experienced between 1999 and 2002. This ranking underlies the importance of decentralizing the management of targeted programs. Due to a lack of information, an allocation scheme by the donor or the central government would very likely ignore any transient shocks households might have experienced between survey rounds. Information about shocks is particularly important in rural Ethiopia where poverty is rampant and where many communities are frequently exposed to drought and famine and a sizeable portion of the population qualifies for some kind of support (Jayne et al., 2001), making the selection process extremely difficult. In such circumstances, authorities may use their local information about the number and severity of shocks a household experiences in deciding whether or not it qualifies for participation in a particular program.

As part of the 2004 ERHS, respondents were asked to list the most important shocks that they experienced over the last two decades. For this purpose, we selected all shocks that respondents claimed to have experienced between 1999 and 2002. The most important shocks that are relevant for this ranking include drought and non-drought agricultural shocks as well as market and input related shocks that occurred in between the 1999 and 2002. The survey also asked respondents about the effect each shock they experienced had on their income, consumption and assets. We use this information to generate the augmenting scale based on the number and severity of

shocks that households experienced between 1999 and 2002.¹¹ To allow for possible non-linearity in the effects of a shock we assign more weight to shocks that occurred in years or months immediately prior to the start of the intervention in 2002.

Given the ranking of households for each program, the basic model for program participation can be specified as follows:

$$A_{ij} = \alpha + \beta_1 rank_{ij} + X_{ij}\gamma + \mu_j + \varepsilon_{ij} \quad (1.1)$$

where A_{ij} is a binary variable which equals 1 if household i in village j was a beneficiary and 0 otherwise. $rank_{ij} \in \{1, 2, \dots, n_j\}$ is household i 's ranking in village j where n_j is the number of households in village j . For a given program, a family that is ranked first is the most deserving of that program's benefits in its village. μ_j are village fixed effects. ε_{ij} is the error term while X_{ij} is a vector of observable household characteristics such as age, family size, sex, education, assets, land ownership, shocks as well as its social and political connections.¹² Variables measuring social and political connections are included to see if local authorities try to benefit their relatives or those that are well connected or perhaps those who agree with them politically.

¹¹ Non drought agricultural shocks include excessive rain, soil erosion and problems with pests affecting storage and livestock. Market related shocks include decrease in output prices, large increase in input prices as well as lack of demand for agricultural and non-agricultural products; and input related shocks refer to lack of access to agricultural inputs.

¹² The set of control variables X_i changes with the type of ranking used. If a given variable is part of a metric used in ranking potential beneficiaries, then its effect will be captured by the ranking itself.

Coefficient estimates on these and other related variables can measure the extent to which the allocation process is marred by “elite capture” (Dutrey, 2007 and Lavallee, 2010). Unfortunately, data on connections come from the 2004 survey round because no such data was collected in 1999. As such, results pertaining to these variables should be should be interpreted with caution.

Once we establish how allocation is made and whether or not it adheres to our rankings, the next step is to identify factors explaining aid misallocation. We utilize information on the number of beneficiaries each village selects to measure the extent to which aid is misallocated. For each program, Table 1.2 presents the number of participating and non-participating households in each of the 9 villages where these programs were operational. With a sample average of about 57 percent, public works participation rate ranges from 27 percent in Adele Keke to 93 percent in Korodegaga. Participation rate in the free food aid program ranges from a low of 14 percent in Doma to a high of 66 percent in Shumsheha, with a sample average of about 43 percent.

Table 1.2: Participation in public works and free food aid programs by village

Region	Village	Free Food Aid participation				Public works Participation			
		No	Yes	Total	% Yes	No	Yes	Total	% Yes
Tigray	Haresaw	45	39	84	46.4	41	43	84	51.2
	Geblen	29	36	65	55.4	27	38	65	58.5
Amhara	Dinki	52	29	81	35.8	41	40	81	49.4
	Shumsheha	42	80	122	65.6	42	81	123	65.9
Oromia	Adele Keke	60	31	91	34.1	67	25	92	27.2
	Korodegag	63	35	98	35.7	7	91	98	92.9
SNNPR	Aze Deboa	43	31	74	41.9	26	48	74	64.9

Gara Godo	48	46	94	48.9	48	46	94	48.9
Doma	57	9	66	13.6	39	27	66	40.9
Total	439	336	775	43.4	338	439	777	56.5

Source: Own calculation from the 2004 Ethiopian Rural Household Survey.

For each program, we define a “deserving” dummy (D_{ij}) based on our ranking and the number of households each village selects as beneficiaries. $D_{ij} = 1$ if $rank_{ij} \leq m_j$ and 0 otherwise, where m_j is the number of program participants or program slots in village j . By comparing the deserving dummy with the actual allocation, we will be able to see if a deserving household is excluded from or a non-deserving household is included into a program. For each household i in village j , the allocation error is 0 if it is deserving and actually receives aid or is non-deserving and did not receive any. If household i in village j is deserving but was not selected for participation (*i.e.*, $A_{ij} = 0$), then an allocation error of $1 = |D_{ij} - A_{ij}|$ measures the exclusion error. Likewise, including a non-deserving household into a program yields an inclusion error of $1 = |D_{ij} - A_{ij}|$. Explaining variations in inclusion and exclusion errors is the central goal of this essay. We do so by separately estimating exclusion and inclusion errors using sub-samples consisting of deserving and non-deserving households respectively.

$$(error_{ij} | D_{ij} = 1) = \alpha + \beta_1 rank_{ij} + P\theta + X\beta + \mu_j + u_{ij} \quad (1.2)$$

$$D_{ij} = 0 \rightarrow n_j > rank_{ij} > m_j$$

$$(error_{ij}|D_{ij} = 0) = \alpha + \beta_1 rank_{ij} + P\theta + X\beta + \mu_j + u_{ij} \quad (1.3)$$

$$D_{ij} = 1 \rightarrow m_j > rank_{ij} > 0$$

$error_{ij}|D_{ij} = 1$ in equation (1.2) is the exclusion error which equals 1 if a deserving household i in village j is not selected for participation and 0 otherwise. Likewise, $error_{ij}|D_{ij} = 0$ in equation (1.3) measures inclusion error which equals 1 if a non-deserving household i in village j is included into the program when it should not have been and 0 otherwise. As in equation (1.1), μ_j are village fixed effects and u_{ij} is the error term. Vector P_i consists of variables that measure the household's social and political connections. X_i is a vector of observable household characteristics such as age, sex, education, assets, shocks as well as prior participation as proxy for household's knowledge of each program's targeting criteria. As we will discuss in the data section, any household characteristic that is used in defining and/or generating a ranking will be excluded from the list of control variables. Additionally, with the exception of information about shocks, food security and measure of social and political connectedness, every right hand side variable in equations (1.2) and (1.3) variable is derived from the 1999 survey round.

The equations include variables measuring social and political connectedness because connections to local authorities can result in the inclusion of some non-deserving households at the expense of some deserving ones - local authorities trying to benefit their acquaintances or relatives. In this setting, estimates of θ from

equations (1.2) and (1.3) can help us identify how “elite capture”, if any, in equation (1.1) manifests itself. It may be that a deserving yet well-connected household is not excluded while another deserving and perhaps relatively poorer household lacking in connections is. In the sample of the non-deserving, elite capture may work by way of wrongly including those well-connected and/or rightly excluding those that are not.

Equations (1.1), (1.2) and (1.3) are all estimated as linear probability models. Given that the data are clustered on village level, we will fit lineal probability models with cluster-robust standard errors since failure to control for clustering will result in overestimating t-statistics by way of underestimating standard errors (Moulton, 1990). Cross-sectional data clustered on geographical region provides a good example of a situation where the presence of intra-cluster dependence between errors can lead to understatement of true standard errors if one fails to control for clustering (Cameron and Miller, 2013).

However, the cluster-robust OLS estimation assumes that the data represent large size of equal sized clusters, a requirement that our data does not satisfy. This methodological limitation of the robust-cluster OLS estimation has been a subject of numerous studies.¹³ Cameron, Gelbach and Miller (2008) studied this issue and suggested alternative methods of estimating cluster robust standard errors when the number of clusters is small. In their study, the authors considered samples consisting

¹³ Cameron, Gelbach and Miller (2008) and McKinnon and Webb (2014) are some examples.

of very few clusters (five clusters being smallest) and employed a variety of bootstrapping or re-sampling procedures. In the presence of few clusters, the procedure they introduced aims at achieving better inference for cluster-robust OLS estimation by way bootstrapping to achieve asymptotic refinement (Cameron, Gelbach and Miller, 2008). In this paper, we employ the wild cluster bootstrap method because it relaxes both assumptions of the standard cluster-robust OLS estimation, and allows for small number of clusters of different sizes. Our sample contains nine clusters of different sizes. An important limitation of the procedure they introduced is that it can only be performed with linear probability. In addition, it provides bootstrapped probabilities instead of standard errors.

To summarize, our main goal in this essay is to examine if the allocation of free food aid and public works employment benefits adhere to consumption based poverty ranking of potential beneficiaries. Additionally, we will try to identify factors influencing both inclusion and exclusion errors. For each program and ranking method, p-values corresponding to the coefficients in equations (1.1), (1.2) and (1.3) will be estimated using the wild bootstrap procedure suggested by Cameron, Gelbach and Miller (2008). In addition estimates from the standard cluster-robust and probit models will be presented as checks for robustness of our results. Further, all of our models will be re-estimated to allow for the possible endogeneity of the food security ranking. As additional robustness checks, all of our models will again be re-estimated

by excluding villages with unusually high or low participation rates.¹⁴ The next section describes the data we use for analysis.

1.4 Data

Data for this essay comes from multiple rounds of the Ethiopian Rural Household Survey (ERHS). The ERHS, a longitudinal dataset covering 15 villages in rural Ethiopia, is collected by the Economics Department of Addis Ababa University in collaboration with the Center for African Studies, University of Oxford and the International Food Policy Research Institute. This survey was initially launched in 1989. However, its scope was rather limited because much of Northern Ethiopia was not easily accessible due to the then civil war. Since then, ERHS data from 15 rural Ethiopian villages were collected in seven rounds spanning the period 1994-2009. Survey participants in each of the 15 peasant associations, selected to represent the country's major farming systems, were chosen randomly.¹⁵ The ERHS benefits from a very small attrition rate, which is attributed in part to the limits that public ownership of land places on household mobility (Dercon and Hoddinott, 2011). The ERHS data is not nationally representative. But key metrics drawn from the ERHS are comparable to those from other nationally representative surveys, and except for the 1989 round,

¹⁴ While more than 90 percent of households in Korodegaga participated in the public works program, only less than 15 percent of households in Doma participated in the free food aid program (see Table 1.2).

¹⁵ For additional details on the ERHS, see Dercon and Hoddinott (2011).

the other seven rounds are viewed as representative of rural households in non-pastoralist farming systems (Dercon and Hoddinott, 2011).

The ERHS provides detailed information on household demographics, consumption, income and assets in all survey rounds. While all survey rounds that are of interest for this analysis (namely 1997, 1999 and 2004) contain information about household participation both in free food aid and public works programs, only the 2004 round contains crucial information about the household's "social" and "political"¹⁶ connections as well as "consumption habits" or coping mechanisms in the presence of a drought shock. In this analysis, households whose family members, friends or relatives hold an official position in local government are considered politically connected and those whose parents were or still are important in village social life are considered as having greater social capital. It should be clear that all rounds of the ERHS do contain information about consumption habits in the real sense of the word, and "consumption habits" in this context refer to coping mechanisms and/or consumption adjustments that households make when they face a drought shock, such as that in 2002/3. These adjustments may include cutting the sizes of meals or perhaps skipping some or worse yet going a whole day without food.

¹⁶ In the 2004 survey round, households were asked if their parents were/are important in village social life. They were also asked if a member of their family or any of their friends or associates hold an official position.

This essay utilizes the households' history of consumption poverty, measured in terms of real monthly consumption per capita, as the primary tool for ranking potential beneficiaries, and the progressiveness of the actual allocation is judged on whether it adheres to this ranking or not. Data for generating this ranking come from two survey rounds immediately prior to the 2004 round. This ranking is primarily based on grouping households in terms of their monthly real per capita consumption in the 1999 survey round. As mentioned in the previous section, households in each group will then be ranked in accordance to which consumption block they fall into in the 1997 survey round. We repeat this process of grouping and ranking in smaller intervals until we achieve a one-to-one or nearly on-to-one correspondence between a household and the rank it is assigned.

The food security augmented ranking adds information about household food security to the 1999 real per capita consumption brackets defined in the previous section. This augmentation is based on information collected in the 2004 survey round with the aim of assessing the effects of the 2002/3 drought. In 2004, households were asked if this drought forced them to cut the number of meals served to children, adult males and adult females, and if anyone in their family went a whole day without food. Possible responses to all these questions are 1 for yes, all the time; 2 for yes, often; 3 for yes, sometimes; 4 for yes, a few times; and 5 for no. The most food secure family that answers "no" to all four questions would have a score of 20. The minimum score, belonging to the most food insecure family, if it exists, equals 4. To see if household

responses to all these questions are consistent with one another, we computed Cronbach's alpha consisting of these four items. The result shown in Table A1 of Appendix A, reporting a Cronbach's alpha of 0.77, suggests that the scale has an acceptable level of internal consistency. In fact, the result shows that removing the fourth item, relating to households' responses about whether or not anyone in the family spent a whole day without food, from the scale improves the scale's reliability from 0.77 to 0.85. This indicates that there is a significant correlation between the households' responses to questions (1) through (3). We apply this scale on each consumption block from the 1999 survey round to generate the food security augmented poverty ranking.

Data for augmenting the poverty ranking with information about shocks come from the 2004 survey round. This information consists of the number and severity of shocks that households endured between 1999 and 2002. The rationale for limiting the lower bound to 1999 is the belief that any shock that had occurred prior to the 1999 survey round is part of the information set that produced the 1999 survey data, and accounting for it in 2002 would result in overestimating its true effect. In fact, the 1999 round does not contain such information. While the 1995 round asked respondents to list the number of drought shocks they experienced in order of severity, there is little reason for us to believe that authorities will consider this old information as relevant when deciding which households get to participate in these programs in 2002. The idea is that recent shocks do matter most not only because they are part of a

new information set but also because their effects are still fresh and perhaps more visible.

The 2004 round asks households about the most important shocks they experienced over the last 20 years, and what effect each shock had on their consumption, income and asset holdings. As mentioned in the last section, the most important shocks that are relevant for this ranking include drought and non-drought agricultural shocks as well as market and input related shocks that occurred in between 1999 and 2002. The severity of each shock ranges from 0, if the shock has no effect at all, to 3 if the shock is strong enough it reduces both family income, consumption and assets at the same time. This naïve definition assigns same weight to every effect a shock is said to have caused. It also assigns same weight to every shock that occurred between 1999 and 2002. To allow for possible non-linearity in the effects of a shock we assign more weight to shocks that occurred in 2002 and lesser weight to those that occurred in earlier years.¹⁷ This modification also allows for the possibility that a household experiencing a single shock that lowers its income, consumption and asset holdings to be worse off than a comparable household experiencing two or more minor shocks, each having either one or no effect at all. We sum up the severity of all the shocks mentioned above to generate a scale which together with the households' 1999 poverty status produces the shock augmented poverty ranking.

¹⁷ We considered assigning increased weights from 1999 to 2002 in a linear and exponential fashion and the rankings did not change significantly.

During the 2002 intervention, the free food aid and public works employment programs were operational only in 9 out of the 15 villages in the survey. As a result, the remaining 6 are excluded from our analysis. For a sample consisting of these 9 villages, Table 1.3 reports inclusion and exclusion errors in the allocation of free food aid and public works employment that result from using each ranking as the underlying allocation rule. The results show that the allocation of benefits in each program is marred by inclusion and exclusion errors. For example, the consumption based poverty ranking includes 38 percent of non-deserving households into and excludes 49 percent of deserving households from the free food aid program. This same ranking allows 48 percent of non-deserving households to participate while preventing 37 percent of the deserving poor from participating in public works. Inclusion and exclusion errors of about same magnitude result from using either the food security or shock augmented rankings as the allocation rule in each program. However, the results in Table 1.3 also show that while relatively richer households are less likely to be targeted for both programs, they tend to have a much higher rate of participation in the public works program. About 62 and 52 percent of non-deserving households did not participate in free food aid and public works programs respectively. This indicates that all three rankings perform better in the allocation of free food aid than in the allocation of public works benefits.

Table 1.3: Targets and Mis-targets by Program and Ranking Type

Category	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
Participating ND HHs as % of all ND HHs	37.6	47.9	38.5	48.5	37.1	48.8
Non-participating D HHs as % of all D HHs	48.8	36.7	50.0	37.1	48.5	37.6
Non-participating ND HHs as % of all ND HHs	62.4	52.1	61.5	51.5	62.9	51.2
Participating D HHs as % of all D HHs	51.2	63.3	50.0	62.9	51.5	62.4

Source: Own Calculation from ERHS. * ND and D refer to Non-deserving and Deserving respectively.

Details on village level inclusion and exclusion errors by program and ranking type are shown in Table 1.4. Inclusion errors in the allocation of free food aid range from a low of 11 percent in Doma to a high of about 55 percent in Shumsheha. For public works employment, these errors run from about 27 percent in Adele Keke to 100 percent in Korodegaga. One should exercise caution when interpreting these numbers though. The 100 percent inclusion error in Korodegaga should not be viewed as a reflection a very lousy job on the part of local authorities. It is rather a reflection of the fact that more than 90 percent of the respondents in this village did participate in public works – i.e., nearly all of the deserving households (84 out of 91) and all of the non-deserving families (7 out of 7) were included. Likewise, the very low inclusion error in Doma’s free food aid program is a consequence of its very low participation rate¹⁸, suggesting that only a few deserving and non-deserving households were included.

¹⁸ See Table 1.2

Table 1.4: Village level Inclusion and Exclusion Errors (percentages) by Program and Ranking Type

Region	Village	Poverty Ranking				FS Ranking				Shock Ranking			
		Inclusion		Exclusion		Inclusion		Exclusion		Inclusion		Exclusion	
		FFD	PW	FFD	PW	FFD	PW	FFD	PW	FFD	PW	FFD	PW
Tigray	Haresaw	49	51	56	49	51	51	59	49	47	51	54	49
	Geblen	48	56	39	40	52	56	42	40	52	59	42	42
Amhara	Dinki	35	46	62	48	33	51	59	53	31	46	55	48
	Shumsheha	55	62	28	31	57	74	29	37	60	74	31	38
Oromia	Adele Keke	37	27	71	72	35	25	68	68	35	27	68	72
	Korodegaga	27	100	49	8	27	100	49	8	27	100	49	8
SNNPR	Aze Deboa	42	69	58	38	54	65	74	35	44	77	61	42
	Gara Godo	52	48	54	50	48	44	50	46	44	42	46	44
	Doma	11	39	67	56	11	36	67	52	14	33	89	48
Entire Sample		38	48	49	37	39	49	50	37	37	49	49	38

Source: Own Calculation from ERHS.

In comparison to the figures shown in Table 1.4, excluding Korodegaga from the sample decreases/increases the public works program's average inclusion/exclusion errors by about 1 and 7 percentage points respectively. This implies that the public works program now targets 1 percent fewer members of the non-deserving group and excludes 7 percent more members of the deserving group. Conversely, excluding Doma from the analysis of the free food aid program increases the inclusion error by about 5 percent while it marginally decreases exclusion error by 0.5 percent. To minimize any bias that may result from including outliers of this sort, we will re-estimate all the models described in the last section by excluding villages with unusually high or low participation rates from the analysis.

Table 1.5 shows summary statistics for recipients and non-recipients of free food aid. The difference between the aid recipient's basic poverty rank and its village

cut-off rank averages around -1.4. This implies that the average recipient of free food aid is aid-deserving and stands around 1.4 ranks below the village cut-off rank.

Standing around 8.7 ranks above the rank represented by the village cutoff point, we see that the average non-recipient of free food aid is in fact non-deserving.

Table 1.5 also shows that at least one village excludes a deserving and perhaps very poor family that stands at 79 ranks below the village cut-off rank and that at least one village includes a non-deserving household with a poverty rank of 63 ranks above its village's cut-off rank. The average recipient of free food aid is poorer than its non-recipient counterpart both in terms of having lower per capita real consumption, smaller land size and fewer livestock units in 1999. Also compared to average non-recipient, the free food aid recipient household has smaller family size, tends to be headed by less educated older women and has better connections to people in positions power.

Table 1.5: Characteristics of Recipients and Non-recipients of Free Food Aid

Variable	FFD Non participants				FFD Participants			
	Mean	Std. dev	Min	Max	Mean	Std. dev	Min	Max
Poverty rank minus village FFD cutoff	8.7	26.6	-79	62	-1.4	30.2	-78	63
Real consumption per capita in 1999	77.1	65.9	7.1	541	76.7	75.5	4.2	564
Land Area owned in 1999 (in hectares)	1.19	1.03	0.00	5.00	1.02	0.97	0.00	5.00
Livestock Units owned in 1999	2.41	2.24	0.00	15.3	2.27	2.14	0.00	14.5
Age of Household Head in 2002	47.1	14.1	20.0	95.0	50.5	15.0	22.0	90.0
Household size in 2002	6.0	2.8	1.0	17.0	5.5	2.5	1.0	17.0
Proportion of HH members <10 & >64 yrs. old	0.33	0.21	0.00	1.00	0.34	0.23	0.00	1.00
Head's Marital Status (Married=1, else 0)	0.69	0.46	0.00	1.00	0.63	0.48	0.00	1.00
Household Head is female yes=1; no=0	0.27	0.44	0.00	1.00	0.35	0.48	0.00	1.00
Household Head is a farmer yes=1; no=0	0.75	0.44	0.00	1.00	0.67	0.47	0.00	1.00

Highest grade completed by HH head	2.34	2.62	1.00	16.0	2.16	2.57	1.00	14.0
Head's associates in off. position yes=1; no=0	0.35	0.48	0.00	1.00	0.43	0.50	0.00	1.00
Head is a Village official yes=1; no=0	0.20	0.40	0.00	1.00	0.18	0.39	0.00	1.00
Head's parents important in village soc. life	0.71	0.45	0.00	1.00	0.64	0.48	0.00	1.00
Husb/wife seriously ill(1999-02) yes=1,no=0	0.13	0.34	0.00	1.00	0.15	0.36	0.00	1.00
Husb/ wife died (1999-20) yes=1; no=0	0.05	0.23	0.00	1.00	0.07	0.26	0.00	1.00
Severity of drought shocks (1999-02) - a scale	0.92	0.91	0.00	4.34	0.94	0.91	0.00	3.67
Severity of Market shocks (1999-02) - a scale	0.43	1.06	0.00	6.35	0.47	1.10	0.00	10.1
Severity of Input hocks(1999-02) - a scale	0.15	0.46	0.00	4.00	0.21	0.57	0.00	3.00
Received Free Food Aid in 1999 yes=1; no=0	0.31	0.46	0.00	1.00	0.38	0.49	0.00	1.00
Received non FFD transfers 1999 yes=1; no=0	0.17	0.37	0.00	1.00	0.13	0.33	0.00	1.00
Observations	386				291			

Source: Own calculations from ERHS

Summary statistics for recipients and non-recipients of public works

employment is shown in Table 1.6. Standing around 14 ranks below its village's cut-off rank, the average beneficiary of public works employment is aid-deserving. But the average non-recipient, standing right around the cut-off rank, is also aid-deserving. This implies that the basic poverty ranking does a better job of distinguishing between potential beneficiaries in the free food aid program than in public works employment.

Table 1.6: Characteristics of Public Works Participants and Non-participants

Variable	PW Non Participants				PW Participants			
	Mean	Std. dev	Min	Max	Mean	Std. dev	Min	Max
Poverty rank minus village PW cutoff	-0.04	28.9	-87	63	-13.6	31.8	-90	61
Real consumption per capita, 1999	76.5	69.6	7.1	541.3	77.8	71.3	4.2	564.1
Land Area owned in 1999 (in hectares)	0.87	0.65	0.00	4.00	1.31	1.18	0.00	5.00
Livestock Units owned in 1999	2.09	1.86	0.00	9.70	2.55	2.40	0.00	15.25
Age of Household Head in 2002	50.6	14.9	22.0	95.0	47.1	14.2	20.0	92.0
Household size in 2002	5.5	2.9	1.0	17.0	6.0	2.5	1.0	17.0
Proportion of HH members <10 and >64 yrs old	0.34	0.24	0.00	1.00	0.33	0.20	0.00	1.00
HH Head's Marital Status (Married=1, else 0)	0.60	0.49	0.00	1.00	0.72	0.45	0.00	1.00

Household Head is female yes=1; no=0	0.34	0.48	0.00	1.00	0.26	0.44	0.00	1.00
Household Head is a farmer yes=1; no=0	0.68	0.47	0.00	1.00	0.74	0.44	0.00	1.00
Highest grade completed by HH head, 1999	2.2	2.6	1.0	16.0	2.3	2.6	1.0	14.0
Head's associates in off. position yes=1; no=0	0.34	0.47	0.00	1.00	0.42	0.49	0.00	1.00
Head is a Village (Kebele) official yes=1; no=0	0.18	0.38	0.00	1.00	0.21	0.41	0.00	1.00
Head's parents important in village social life	0.62	0.49	0.00	1.00	0.73	0.44	0.00	1.00
Husb/wife seriously ill (1999-2002) yes=1; no=0	0.17	0.37	0.00	1.00	0.12	0.33	0.00	1.00
Husb/wife died (1999-2002) yes=1; no=0	0.05	0.22	0.00	1.00	0.07	0.26	0.00	1.00
Severity of drought shocks (1999-2002) - a scale	1.02	0.90	0.00	4.34	0.86	0.91	0.00	3.67
Severity of Market shocks (1999-2002) - a scale	0.43	1.12	0.00	10.0	0.45	1.04	0.00	6.35
Severity of Input hocks(1999-2002) - a scale	0.21	0.56	0.00	4.00	0.15	0.46	0.00	3.00
PW participant in 1999 (yes=1; no=0)	0.15	0.36	0.00	1.00	0.20	0.40	0.00	1.00
Received non FFD remittances 1999 yes=1 no=0	0.15	0.36	0.00	1.00	0.14	0.35	0.00	1.00
Observations	297			382				
Source: Own calculation from ERHS								

Comparing the results in Tables 1.5 and 1.6, we notice that the average public works participant is younger, owns more livestock and land and has marginally higher real per capita consumption but then stands fewer ranks below its free food aid counterpart. One possible explanation for this could be that authorities are including relatively large numbers of poorer non-deserving households by excluding the same number of relatively richer deserving households. It may be that members of the excluded poor are too young, or too old or disabled. It may also be that the excluded poor lack connections to local authorities to enable them secure a benefit that they truly deserve.

With higher consumption per capita as well as larger land size and livestock units, the average public works participant is richer than the average non-participant.

Also, compared to the average non-participant the average participant lives in a household of larger size that is headed by younger men whose primary occupation is farming. We also notice that on average participants seem to have relatively better social as well as political connections. All of these suggest that local authorities probably screen potential beneficiaries in terms of their ability to work as well as their experience with farm activities. They also suggest that connections to local authorities may have played some role in the allocation process. Investigating these and other related issues is the subject of the next section.

1.5 Results

This section begins by presenting basic results from cluster-robust OLS estimations of the participation equations. The main results that follow will utilize a procedure that addresses the methodological limitations of the standard cluster-robust estimation in dealing with the small number of clusters our data represents. Later in this section, we present results from models of inclusion and exclusion errors for each program. To allow for different aspects of poverty and deprivation as well as the flexibility authorities may have in making allocation decisions, all models will be estimated using three alternative rankings that we described in section 1.3. In addition, all models will be re-estimated by excluding communities with unusually high or low participation rates to minimize the effect that such outliers may have on the models' estimates.

1.5.1 Participation Equations

Table 1.7 presents estimates of participation equations for both programs. Results from probit estimation of these equations, shown in Table A2 of Appendix A 1.2, are qualitatively similar to those presented here. Columns 1 and 2 of Table 1.7 employ the basic poverty ranking which is solely based on the households' history of consumption poverty. The food security ranking adds some measure of food security to each household's consumption poverty status in 1999. The augmenting metric in columns 5 and 6 is the severity of shocks that a household experiences in the months or years leading to the 2002 intervention. As explained in section 1.4, the augmented rankings are generated by first assigning households into a mutually exclusive blocks based on their real per capita consumption in 1999. These groups, defined by real per capita consumption intervals of Birr 10, are small enough to contain homogenous members and large enough to allow for consumption in prior years or household experiences with shock and food insecurity to influence the ranking.

The rationale for defining these alternative metrics is that per capita consumption may not be the only factor that authorities look at when selecting beneficiaries into each program. In fact, they may not even know the consumption figures reported in the survey that we use to generate the basic poverty ranking. It is, therefore, reasonable to assume that they could base their decisions on the magnitude and frequency of shocks and/or food insecurity that, we presume, they have some knowledge about. Besides, augmenting the consumption based poverty with shocks or

food security may allow our ranking to include some other dimensions in which poverty manifests itself. It is important to note that some important variables that characterize or are believed to have a close link with poverty such as assets, family size, etc. are included as control variables.

Table 1.7: Participation equations – LPM

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
	(1)	(2)	(3)	(4)	(5)	(6)
Rank	-0.002*** (0.000)	0.000 (0.000)	-0.002** (0.001)	-0.000 (0.001)	-0.002*** (0.001)	-0.000 (0.001)
<u>Assets</u>						
Land Owned in Hectares, 1999	-0.007 (0.018)	0.048 (0.026)	-0.007 (0.017)	0.049* (0.025)	-0.009 (0.016)	0.048* (0.025)
Livestock Units, 1999	-0.005 (0.012)	-0.013 (0.009)	-0.005 (0.012)	-0.012 (0.009)	-0.003 (0.012)	-0.013 (0.009)
<u>Demographics</u>						
Log of HH Head's Age, 2002	0.173* (0.089)	-0.273*** (0.061)	0.168* (0.088)	-0.272*** (0.062)	0.166 (0.090)	-0.273*** (0.061)
Log of Household Size in 2002	-0.057 (0.044)	0.079** (0.029)	-0.054 (0.045)	0.072** (0.029)	-0.063 (0.049)	0.075** (0.024)
Proportion of HH members <10 & >64 yrs.	-0.066 (0.103)	-0.020 (0.111)	-0.069 (0.104)	-0.024 (0.112)	-0.069 (0.109)	-0.022 (0.113)
HH Head is Married; Yes=1, No=0	0.007 (0.050)	0.104* (0.046)	0.008 (0.050)	0.106* (0.046)	0.008 (0.050)	0.104* (0.046)
HH Head is female; Yes=1, No=0	0.047 (0.053)	-0.092 (0.079)	0.046 (0.054)	-0.093 (0.078)	0.054 (0.051)	-0.092 (0.078)
HH Head is farmer; Yes=1, No=0	-0.014 (0.066)	-0.068 (0.062)	-0.014 (0.067)	-0.069 (0.062)	-0.011 (0.064)	-0.068 (0.062)
Highest grade Completed by HH Head	0.017 (0.011)	-0.011 (0.008)	0.016 (0.011)	-0.011 (0.008)	0.015 (0.011)	-0.011 (0.008)
<u>Connections</u>						
Friends or Associates hold official position	0.080** (0.031)	-0.015 (0.049)	0.083** (0.031)	-0.014 (0.049)	0.083** (0.031)	-0.015 (0.050)
Head's parents are important in village social life	-0.070 (0.053)	0.099* (0.046)	-0.071 (0.055)	0.100* (0.046)	-0.067 (0.055)	0.099* (0.046)
<u>Shocks</u>						
Husband/wife had serious illness	0.046 (0.034)	-0.131*** (0.031)	0.042 (0.033)	-0.132*** (0.032)	0.040 (0.032)	-0.131*** (0.032)
Husband/wife died	0.062 (0.087)	0.056 (0.080)	0.059 (0.090)	0.055 (0.079)	0.063 (0.088)	0.056 (0.080)
Severity of shocks (a composite metric)	0.083** (0.031)	0.009 (0.023)	0.080** (0.031)	0.009 (0.023)		

<u>Prior Participation</u>						
Household Received Free Food Aid in 1999	-0.006 (0.047)		-0.005 (0.047)		-0.006 (0.046)	
Household Participated in Public Works in 1999		0.063 (0.111)		0.062 (0.112)		0.063 (0.112)
Household received remittances/other transfers in	-0.068 (0.043)	-0.081 (0.058)	-0.066 (0.042)	-0.081 (0.059)	-0.070 (0.042)	-0.081 (0.058)
Constant	-0.113 (0.401)	1.418*** (0.265)	-0.101 (0.408)	1.424*** (0.266)	-0.067 (0.404)	1.424*** (0.265)
R-squared	0.081	0.169	0.081	0.169	0.081	0.170
Observations	691	693	691	693	691	693

Notes: * p<.10, ** p<.05, *** p<.01. Robust standard errors in parentheses are adjusted for clusters at the village level. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of the severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

The main result in Table 1.7 is that while the free food aid program targets the “consumption-poor”, the same does not appear to be the case with the public works program. Estimates shown in columns 3 through 6 indicate that this result is robust to changes in methods of ranking potential beneficiaries. The free food aid program targets not just the ‘consumption poor’ but also those that endured more severe shocks and/or are more food insecure. However, we refrain from interpreting this result as providing evidence that the public works program is not pro-poor.

The first and obvious reason is that the public works program requires that beneficiaries be able to work. A poor family that cannot provide physically able workers may not qualify for public works employment. Results shown in columns 2, 4 and 6 indicate that small sized households whose members are old or sickly are less likely to be chosen for public works employment, suggesting that the exclusion of some of the ‘consumption-poor’ may have to do with their lack of experience and/or inability to work. We also notice that families with older heads are more likely to

receive free food aid benefits. It is possible that authorities view families of larger size as less suited for free food aid but rather more suited for public works owing to the fact that some of their members may have the experience and ability to work. Although the estimate is not significant, we find that households with more land holdings are more likely to participate in the public works program.

Second, our ranking primarily captures only one of the numerous dimensions of poverty, consumption. It is possible for other aspects of poverty to manifest themselves in different variables of the model. For example, the preference toward households of large family size in the public works program may have to do with them being perceived as poor who are also capable of working. Our discussion of the ERHS village studies in section 1.3, which among others describes the poor as having too many children, lends some support to this explanation. But this contention seems to be contradicted by the negative effect that family size has in the free food aid participation equation. As expected, people with more livestock units are less likely to participate in either program although the estimates are not significant at the conventional level.

While the free food aid program primarily targets the poor, it also seems to favor those with connections to local authorities. The results suggest that households whose associates and/or relatives are in positions of power seem to enjoy some type of preferential treatment. Although not as significant as is the case with the free food aid program, some incidence of favoritism is also evident in the allocation of public works

employment. Households whose parents were or have been influential in village social life appear to have greater chance of securing employment in public works programs. On the other hand, a household's prior participation in either program does not seem to influence the likelihood of it participating in future episodes. Assuming a positive correlation between a household's prior participation in a program and its knowledge about that program's selection criteria, this result suggests that allocation errors are in part caused by the middle agent (or local authorities), not by people with history of receiving benefits trying to game the system.

As explained in the last section, for two villages participation in either program is unusually high or low. Including these outlier villages in the estimation may somehow bias the models' estimates. Accordingly, all models in Table 1.7 are re-estimated by excluding the outlier villages. To a large extent, these results, presented in Table A3 of Appendix A, are qualitatively similar to those presented in Table 1.7. Though the estimates are more significant now, families with older household heads are still more likely to participate in free food aid programs while they are less likely to secure public works employment. We also notice that now the free food aid program seems to target female headed households.

However, the results presented in Table 1.7 do suffer from one important methodological limitation. Although they are adjusted for heteroskedasticity, the asymptotic cluster-robust estimates presented above assume that the number of clusters is large and that the clusters are of equal size. Results from the wild bootstrap

estimation, a procedure that allows for small number of different sized clusters, are shown in Table 1.8. As in the results presented above, families with lower per capita real consumption are more likely to be selected for free food aid. While the main result reported above still remains true, we notice a dip in the significance of the variables across the board, and this has to do with the standard cluster-robust OLS estimation underestimating the true standard errors. The results suggest that ‘consumption poor’ households that experienced more severe shocks and/or are more food insecure are more likely to participate in the free food aid program. On the other hand, the public works program seems to target families with more members as well as younger and healthier heads. As explained earlier, this result should not be interpreted as this program being less pro-poor but rather as a reflection of the program’s requirement that the benefiting family be able to provide physically capable workers. Except for minor differences, the results presented here are qualitatively similar to those shown in Table A4 of Appendix A, where all models are re-estimated by, again, excluding villages with unusually high or low participation rates. These differences relate to female headed households now being more likely to participate in the free food aid program and married households being significantly more likely to secure public works employment.

Table 1.8: Wild Bootstrap Estimates of Participation Equations – Full Sample

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
	(1)	(2)	(3)	(4)	(5)	(6)
Rank	-0.002*** (0.004)	0.000 (0.869)	-0.002** (0.050)	0.000 (0.661)	-0.002** (0.016)	0.000 (0.883)

<u>Assets</u>						
Land Owned in Hectares, 1999	-0.007 (0.634)	0.048 (0.193)	-0.007 (0.626)	0.049 (0.157)	-0.009 (0.489)	0.048 (0.177)
Livestock Units, 1999	-0.005 (0.733)	-0.013 (0.106)	-0.005 (0.739)	-0.012 (0.134)	-0.003 (0.799)	-0.013 (0.102)
<u>Demographics</u>						
Log of HH Head's Age, 2002	0.173 (0.105)	-0.273** (0.017)	0.168 (0.113)	-0.272** (0.017)	0.166 (0.127)	-0.273** (0.017)
Log of Household Size in 2002	-0.057 (0.202)	0.079*** (0.008)	-0.054 (0.246)	0.072** (0.020)	-0.063 (0.252)	0.075*** (0.008)
Proportion of HH members <10 & >64 yrs.	-0.066 (0.505)	-0.020 (0.819)	-0.069 (0.482)	-0.024 (0.803)	-0.069 (0.517)	-0.022 (0.811)
HH Head is Married; Yes=1,	0.007 (0.911)	0.104* (0.060)	0.008 (0.901)	0.106* (0.060)	0.008 (0.897)	0.104* (0.058)
HH Head is Female; Yes=1,	0.047 (0.385)	-0.092 (0.355)	0.046 (0.415)	-0.093 (0.347)	0.054 (0.335)	-0.092 (0.351)
HH Head is Farmer; Yes=1,	-0.014 (0.824)	-0.068 (0.335)	-0.014 (0.828)	-0.069 (0.331)	-0.011 (0.874)	-0.068 (0.335)
Highest grade Completed by HH	0.017 (0.225)	-0.011 (0.257)	0.016 (0.213)	-0.011 (0.263)	0.015 (0.225)	-0.011 (0.263)
<u>Connections</u>						
Friends or Associates hold official position	0.080** (0.038)	-0.015 (0.741)	0.083** (0.034)	-0.014 (0.761)	0.083** (0.026)	-0.015 (0.749)
Head's parents are important in village social life	-0.070 (0.302)	0.099* (0.060)	-0.071 (0.310)	0.100** (0.048)	-0.067 (0.324)	0.099** (0.044)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	0.046 (0.168)	-0.131** (0.030)	0.042 (0.210)	-0.132** (0.034)	0.040 (0.210)	-0.131** (0.034)
Husband/wife died, 1999-2002	0.062 (0.664)	0.056 (0.806)	0.059 (0.672)	0.055 (0.814)	0.063 (0.666)	0.056 (0.802)
Severity of shocks (a composite)	0.083* (0.069)	0.009 (0.770)	0.080* (0.069)	0.009 (0.742)		
<u>Prior Participation</u>						
Household Received Free Food Aid in 1999	-0.006 (0.900)		-0.005 (0.920)		-0.006 (0.894)	
Household Participated in Public Works in 1999		0.063 (0.738)		0.062 (0.738)		0.063 (0.814)
Household Received other transfers/remittances in 1999	-0.068 (0.189)	-0.081 (0.173)	-0.066 (0.189)	-0.081 (0.191)	-0.070 (0.173)	-0.081 (0.177)
Observations	691	693	691	693	691	693

Notes: * p<.10, ** p<.05, *** p<.01. Wild cluster bootstrapped p-values are shown in parenthesis. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

We still notice some evidence of favoritism in the allocation of benefits in both programs. Families with relatives or associates in official position seem to have

greater chance of securing free food aid benefits. In the same manner, people whose parents were or have been important in village social life appear more likely to participate in public works programs. This result suggests that the allocation of benefits is not free of errors. In fact, it confirms the results shown in Tables 1.3 and 1.4, which showed that the allocation of benefits in either program is marred by inclusion and exclusion errors. It also suggests that allocation errors do not seem to be caused by families with history of receiving benefits trying to game the system but rather by local authorities trying to benefit their relatives or associates. Given the limited number of benefits in each program, for every household that is wrongly included into a program, there is exactly one household that is wrongly excluded from that program. In the next two sections, we will estimate separate equations for inclusion and exclusion errors with the objective of identifying factors that trigger them.

1.5.2 Inclusion Errors

Inclusion errors, modeled in this section, are estimated on sub-samples of non-deserving households resulting from using each ranking method as the underlying allocation rule. Conversely, exclusion error models are estimated on sub-samples of deserving households. The following points are in order. First, the sub-samples resulting from applying different rankings do not consist of same members although they may contain same number of households. This is because a household that is considered deserving under the basic poverty ranking may fall into the undeserving

group with any of the other two rankings. Two, for each program and ranking pair, the sizes of the sub-samples primarily depend on the number of available slots and the completeness of information used in generating the rankings. And three, as in the participation equations, rank is included as a regressor to see if there is any association between how undeserving family is and the chance of it being wrongly included. With exclusion errors, the estimates on rank will help us see whether how poor the family is has any impact on it being wrongly excluded.

Table 1.9 presents the wild bootstrap estimates of inclusion errors for each program under the three alternative rankings. Included in it are some important results that corroborate the full sample results reported in Tables 1.7 and 1.8.

Frist, regardless of which ranking method they use, authorities seem less likely to select elderly households into the public works program. All else the same, if an undeserving household is wrongly included into the public works program, then that household is more likely to be a younger one. This result is in agreement with that presented in Table 1.7, particularly the negative association between the age of household head and the likelihood of his/her family participating in public works.

Second, the results here also lend support to our earlier finding about households with greater social capital (or well-established family connections) being more likely to secure employment in public works programs. This phenomenon can manifest itself in two different ways. It could be that authorities are including non-

deserving but well-connected households into the program. It may also be that they do not exclude deserving yet well-connected households from the program. This result emphasizes that one of the reasons why households with connections seem to have greater odds of securing public works employment is that authorities seem to include them while preventing some deserving families with lesser social connections from participating in the program. Although the result is not robust to changes in ranking methods, some evidence of favoritism is also apparent in the free food aid program. Assuming that the food security augmented ranking is the underlying allocation rule, having friends or associates in positions of power increases the undeserving family's chance of receiving free food aid benefits.

Third, although the result is not robust, non-deserving families that experienced severe shocks or are headed by women appear to have higher chance of benefiting from free food aid relative to similar families that went through less severe shocks or are headed by men. With shock or food security augmented rankings defining the allocation rule, non-deserving female headed households seem more likely to receive free food aid. Likewise, non-deserving farmer headed households tend to have greater likelihood of receiving free food aid with the basic consumption and food security augmented rankings. In one of the two cases in which it is considered, variations in the severity of shocks seem to have a positive and significant effect on the likelihood of a non-deserving family wrongly receiving free food aid

benefits. This is in line with the full sample result where experience with shocks has a positive effect on one's chance of participating in the free food aid program.

Table 1.9: Wild Bootstrap Estimates of Inclusion Errors – Full Sample

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
	(1)	(2)	(3)	(4)	(5)	(6)
Rank	-0.002 (0.442)	0.000 (0.887)	-0.002 (0.318)	0.000 (0.873)	-0.001 (0.492)	0.002 (0.402)
<u>Assets</u>						
Land Owned in Hectares, 1999	-0.014 (0.705)	0.105 (0.220)	-0.006 (0.821)	0.096 (0.202)	0.049 (0.330)	0.072 (0.318)
Livestock Units, 1999	0.001 (0.929)	-0.035 (0.172)	0.001 (0.923)	-0.022 (0.458)	0.005 (0.713)	-0.025 (0.348)
<u>Demographics</u>						
Log of HH Head's Age, 2002	0.183 (0.204)	-0.266** (0.022)	0.174 (0.184)	-0.243** (0.048)	0.139 (0.242)	-0.261** (0.030)
Log of Household Size in 2002	-0.070 (0.258)	0.157** (0.050)	-0.044 (0.454)	0.113 (0.220)	-0.099 (0.132)	0.133 (0.100)
Proportion of HH members <10 & >64 yrs.	-0.016 (0.903)	-0.092 (0.470)	-0.052 (0.677)	-0.192 (0.200)	0.006 (0.927)	-0.184 (0.240)
HH Head is Married; Yes=1, No=0	-0.100 (0.284)	0.057 (0.326)	-0.026 (0.761)	0.088 (0.188)	-0.061 (0.561)	0.021 (0.709)
HH Head is female; Yes=1, No=0	0.092 (0.156)	-0.126 (0.342)	0.187** (0.046)	-0.139 (0.490)	0.135* (0.066)	-0.159 (0.292)
HH Head is farmer; Yes=1, No=0	0.144** (0.034)	-0.077 (0.456)	0.107* (0.060)	-0.124 (0.370)	0.077 (0.278)	-0.106 (0.436)
Highest grade Completed by HH Head	0.017 (0.272)	-0.006 (0.671)	0.009 (0.452)	-0.010 (0.527)	0.007 (0.428)	-0.002 (0.841)
<u>Connections</u>						
Friends or Associates hold official position	0.046 (0.450)	-0.055 (0.482)	0.113** (0.024)	-0.011 (0.867)	0.061 (0.264)	-0.046 (0.396)
Head's parents are important in village social life	-0.053 (0.553)	0.107** (0.012)	-0.058 (0.414)	0.131* (0.056)	-0.086 (0.384)	0.140** (0.020)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	-0.064 (0.128)	-0.089 (0.228)	-0.079 (0.535)	-0.103 (0.515)	-0.086 (0.218)	-0.023 (0.783)
Husband/wife died , 1999-2002	0.172 (0.236)	0.130 (0.338)	0.106 (0.553)	-0.008 (0.973)	0.156 (0.214)	0.003 (0.897)
Severity of shocks, 1999-2002 (a composite metric)	0.094*** (0.000)	-0.049 (0.170)	0.065 (0.150)	-0.060 (0.164)		
<u>Prior Participation</u>						
Household Received Free Food Aid, 1999	0.032 (0.490)		0.045 (0.436)		0.059 (0.242)	
Household Participated in Public		0.102		0.051		0.073

Works, 1999		(0.474)		(0.625)		(0.545)
Household Received other transfers/remittances, 1999	-0.036	-0.061	-0.062	-0.056	-0.071	-0.086
	(0.553)	(0.336)	(0.352)	(0.547)	(0.334)	(0.218)
Observations	392	296	388	292	389	293

Notes: * p<.10, ** p< .05, *** p<.01. Wild cluster bootstrapped p-values are shown in parenthesis. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

The inclusion error results presented here do include all nine villages in the survey in which these programs were operational. But in the two villages where participation rates are unusually high or low, either too few or too many households will be members of either the group of the wrongly included or of the wrongly excluded. For example, owing to the extremely high rate of participation in public works in Korodegaga (about 93 percent) and the fact that the actual allocation includes all non-deserving (7 percent) households, the resulting inclusion error is 100 percent. What this means is that there is no variation in the dependent variable in the subsample of non-deserving households coming from this particular village. As a result, we will need to re-estimate this model by excluding this outlier village. Likewise, a very low participation rate that leads to a very few households being deserving can result in unusually high exclusion error or unusually low inclusion error. This too will require that we exclude such a village from the analysis. Table 1.10 presents results from a wild bootstrap estimation of inclusion errors by excluding Doma and Korodegaga from free food aid and public works equations respectively.¹⁹

¹⁹ Korodegaga and Doma are villages with unusually high and low participation rates in the public works and free food aid programs respectively. See Table 1.2.

Table 1.10: Wild Bootstrap Estimates of Inclusion Errors – Excluding Outliers

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
	(1)	(2)	(3)	(4)	(5)	(6)
Rank	-0.003 (0.350)	0.000 (0.921)	-0.003 (0.220)	0.000 (0.883)	-0.001 (0.525)	0.002 (0.410)
<u>Assets</u>						
Land Owned in Hectares, 1999	-0.022 (0.607)	0.112 (0.240)	-0.020 (0.529)	0.104 (0.196)	0.048 (0.374)	0.081 (0.330)
Livestock Units, 1999	0.003 (0.871)	-0.037 (0.190)	0.002 (0.827)	-0.024 (0.458)	0.007 (0.655)	-0.027 (0.364)
<u>Demographics</u>						
Log of HH Head's Age, 2002	0.261* (0.076)	-0.258** (0.046)	0.248** (0.040)	-0.236* (0.066)	0.214** (0.038)	-0.261** (0.030)
Log of Household Size in 2002	-0.051 (0.388)	0.155* (0.060)	-0.020 (0.685)	0.111 (0.228)	-0.064 (0.310)	0.131 (0.114)
Proportion of HH members <10 & >64 yrs. Old	-0.027 (0.857)	-0.088 (0.502)	-0.063 (0.663)	-0.186 (0.210)	0.010 (0.915)	-0.185 (0.240)
HH Head is Married; Yes=1, No=0	-0.079 (0.388)	0.068 (0.322)	-0.002 (0.961)	0.097 (0.192)	-0.032 (0.735)	0.029 (0.645)
HH Head is female; Yes=1, No=0	0.122* (0.090)	-0.117 (0.396)	0.222** (0.026)	-0.133 (0.539)	0.169** (0.036)	-0.150 (0.300)
HH Head is farmer; Yes=1, No=0	0.169*** (0.006)	-0.077 (0.456)	0.131** (0.028)	-0.123 (0.370)	0.094 (0.218)	-0.100 (0.454)
Highest grade Completed by HH Head	0.027 (0.154)	-0.006 (0.681)	0.015 (0.320)	-0.009 (0.559)	0.014 (0.198)	-0.002 (0.847)
<u>Connections</u>						
Head's Friends or Associates hold official position	0.033 (0.635)	-0.054 (0.523)	0.113* (0.054)	-0.011 (0.867)	0.057 (0.328)	-0.045 (0.406)
Head's parents are important in village social life	-0.070 (0.490)	0.107** (0.012)	-0.074 (0.390)	0.134** (0.048)	-0.100 (0.382)	0.139** (0.020)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	-0.087** (0.028)	-0.082 (0.256)	-0.093 (0.557)	-0.102 (0.541)	-0.134* (0.058)	-0.020 (0.801)
Husband/wife died , 1999-2002	0.182 (0.236)	0.142 (0.328)	0.118 (0.531)	-0.011 (0.991)	0.170 (0.230)	-0.015 (0.989)
Severity of shocks, 1999-2002 (a composite metric)	0.100*** (0.000)	-0.049 (0.174)	0.066 (0.186)	-0.060 (0.164)		
<u>Prior Participation</u>						
Household Received Free Food Aid, 1999	-0.004 (0.993)		0.018 (0.731)		0.031 (0.513)	
Household Participated in Public Works, 1999		0.103 (0.474)		0.052 (0.609)		0.071 (0.545)
Household Received other transfers/remittances, 1999	-0.042 (0.553)	-0.069 (0.336)	-0.067 (0.370)	-0.057 (0.559)	-0.073 (0.370)	-0.081 (0.230)
Observations	339	289	335	286	336	286

Notes: * p<.10, ** p<.05, *** p<.01. Wild cluster bootstrapped p-values are shown in parenthesis. Estimates for village dummies are not shown in this result. FFD equation in columns 1, 3 and 5 exclude Doma, a village with free

food aid participation rate of less than 15 percent while the PW equations in columns 2, 4 and 6 exclude Korodegaga, a village whose public works participation rate exceeds 90 percent. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experienced between 1999 and 2002.

While the results shown in Table 1.10 are very similar to those presented in Table 1.9, the following observations are worth noting. We notice that if a non-deserving family is chosen to receive free food aid, then that family is also likely to be headed by an elderly member. This result, which is robust to the changes in the methods of ranking, may partly explain why age of household head positively influences free food aid participation in the full sample results. Further, the estimate on the variable indicating whether the household is headed by a woman is now significant no matter which ranking method is used as the allocation rule. Finally, we observe that a family that wrongly receives free food aid benefits is not likely to be one with sickly husband or wife. While this result is not robust, it appears to somehow contradict with the notion that free food aid targets poor families with elderly or sickly members. A non-deserving family with sickly members should have had greater chance of being wrongly included to receive this benefit than a comparably non-deserving family with no health related problems. But the result shown here does not conform to this line of reasoning. However, it is important to note that this particular variable is not significant in the participation equations presented earlier, and the result shown here may explain why.

Though the estimates on rank are not significant, we notice marked difference in the sign they take in the inclusion error models for both programs. The less well-off

a non-deserving household is, the more likely it is to be wrongly included into the free food aid program. The opposite seems to be the case for public works employment. If a non-deserving family wrongly obtains public works employment, then that family is less likely to be among the poorest in the group of non-deserving families. While this result is not important in and in itself, its implication to the significance of rank in the participation equations is apparent.

1.5.3 Exclusion Errors

In this section, we direct our attention to the group of deserving families and try to identify factors influencing the household's chance of being wrongly excluded from receiving benefits. For each program, Table 1.11 presents results from the wild bootstrap estimation of exclusion errors. For reasons explained earlier, the results presented here exclude households from villages with extremely high or low participation rates. Exclusion error estimates with data from all villages are shown in Table A5 of Appendix A. It is important to point out that the results shown in Table A5 are qualitatively similar to those presented here.

Table 1.11: Wild Bootstrap Estimates of Exclusion Errors – Excluding Outliers

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
	(1)	(2)	(3)	(4)	(5)	(6)
Rank	0.003*** (0.000)	0.000 (0.867)	0.002 (0.376)	0.000 (0.837)	0.001 (0.573)	0.000 (0.841)
<u>Assets</u>						
Land Owned in Hectares, 1999	-0.008 (0.879)	0.011 (0.905)	0.009 (0.873)	-0.013 (0.771)	0.080 (0.208)	-0.041 (0.252)
Livestock Units, 1999	0.017 (0.336)	-0.001 (0.981)	0.007 (0.699)	0.010 (0.821)	0.012 (0.434)	0.009 (0.611)

<u>Demographics</u>						
Log of HH Head's Age, 2002	-0.153 (0.302)	0.239* (0.100)	-0.161 (0.244)	0.256** (0.046)	-0.189 (0.166)	0.245* (0.054)
Log of Household Size in 2002	0.000 (0.995)	0.003 (0.945)	0.033 (0.613)	-0.029 (0.617)	-0.007 (0.943)	-0.017 (0.677)
Proportion of HH members <10 & >64 yrs.	0.132 (0.192)	-0.054 (0.757)	0.014 (0.895)	-0.092 (0.631)	0.104 (0.448)	-0.054 (0.799)
HH Head is Married; Yes=1, No=0	-0.132* (0.094)	-0.179** (0.042)	-0.075 (0.266)	-0.189** (0.026)	-0.098 (0.202)	-0.233* (0.010)
HH Head is female; Yes=1, No=0	-0.030 (0.811)	0.107 (0.190)	0.054 (0.677)	0.072 (0.543)	0.011 (0.871)	0.035 (0.669)
HH Head is farmer; Yes=1, No=0	0.168 (0.272)	0.112 (0.216)	0.135 (0.306)	0.069 (0.478)	0.115 (0.364)	0.080 (0.340)
Highest grade Completed by HH Head	-0.016 (0.330)	0.010 (0.482)	-0.029* (0.058)	0.005 (0.699)	-0.034 (0.130)	0.009 (0.482)
<u>Connections</u>						
Head's Friends or Associates hold official position	-0.124** (0.032)	0.013 (0.911)	-0.045 (0.324)	0.040 (0.677)	-0.099* (0.062)	0.010 (0.913)
Head's parents are important in village social life	0.075* (0.092)	-0.139* (0.066)	0.089 (0.156)	-0.103 (0.166)	0.076 (0.126)	-0.104 (0.200)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	-0.162** (0.028)	0.158*** (0.002)	-0.142 (0.280)	0.129* (0.066)	-0.189** (0.034)	0.184*** (0.000)
Husband/wife died , 1999-2002	0.025 (0.841)	-0.048 (0.963)	-0.008 (0.943)	-0.110 (0.591)	0.030 (0.771)	-0.160 (0.456)
Severity of shocks, 1999-2002 (a composite metric)	-0.063* (0.078)	-0.102* (0.096)	-0.088 (0.158)	-0.102 (0.226)		
<u>Prior Participation</u>						
Household Received Free Food Aid, 1999	0.046 (0.527)		0.047 (0.480)		0.093 (0.236)	
Household Participated in Public Works, 1999		-0.083 (0.505)		-0.109 (0.581)		-0.088 (0.563)
Household Received other transfers/remittances, 1999	0.126* (0.094)	0.107 (0.388)	0.108 (0.230)	0.140 (0.192)	0.076 (0.348)	0.093 (0.444)
Observations	294	314	298	317	297	317

Notes: * p<.10, ** p< .05, *** p<.01. Wild cluster bootstrapped p-values are shown in parenthesis. Estimates for village dummies are not shown in this result. FFD equation in columns 1, 3 and 5 exclude Doma, a village with free food aid participation rate of less than 15 percent while the PW equations in columns 2, 4 and 6 exclude Korodegaga, a village whose public works participation rate exceeds 90 percent. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

In line with the participation equation results, we notice here that deserving households with connections to people in positions of power seem less likely to be wrongly excluded from receiving free food aid benefits. Deserving households with

such connections being less likely to be wrongly excluded along with non-deserving households with similar connections being more likely to be wrongly included explain why such connections matter in the free food aid participation equations presented in section 1.5.1. With the basic consumption and shock augmented poverty rankings, the significance of this variable in the participation equations mainly comes from authorities not wrongly excluding deserving families with connections to people in positions of power.²⁰ With the food security augmented ranking, on the other hand, authorities being more likely to include non-deserving but well-connected families appears to be the primary reason behind the significance of such connections in the free food aid participation equations. These results seem to suggest that errors in the allocation of free food aid benefits are in part explained by authorities trying to include some of the relatively ‘rich’ but connected families into the program.²¹

Connections also seem to matter when it comes to who, among those deserving, are more or less likely to secure employment in public works programs. While the result is not robust to changes in ranking methods, it shows that deserving households that come from socially recognized parents are less likely to be excluded from the program. Along with the findings presented in Table 1.10, this result also

²⁰ The flip side of this statement is that an equally deserving family lacking in such connections is more likely to be excluded from the program.

²¹ The premise here is that the inclusion into the program of a deserving household with connections to authorities contributes nothing to the allocation error.

helps explain why a household's social connections have a positive influence on the odds of it participating in public works programs. But the primary driver of this result, it seems, is the tendency for authorities to include non-deserving but socially connected households into the program.²²

The story is quite simple. Whether or not a household participates in a program and which program it gets to participate in are influenced by the kind of connections it enjoys. Political and social connections seem to play similar roles in the allocation of free food aid and public works benefits respectively. The significance of connections in free food aid participation equations is mainly driven by authorities not preventing deserving but politically connected families from getting benefits although there is some evidence that they also allow some non-deserving and connected families to receive them. On the other hand, the main reason behind the significance of social connections in public works participation equations is the fact that authorities are including well connected non-deserving households into the program. This indicates that household connections do cause more allocation errors in the public works program than they do in the free food aid program. All else equal, this result suggests that the distribution of public works benefits is more prone to allocation errors than that of free food aid.²³ While the main result that connections do matter is quite

²² See columns 2,4 and 6 of Table 1.10.

²³ This finding lends support some support to fact we observed in Table 1.3 – that all three rankings perform better in the allocation of free food aid than in the allocation of public works.

reasonable, we are in no position to explain why only political connections matter in the allocation of free food aid and not public works or vice versa.²⁴

Results in Table 1.11 also show that deserving families with older heads or sickly husband or wife are less likely to participate in public works programs. Albeit the estimates being not significant, the results also show that these households are more likely to receive free food aid benefits. This is in line with our expectation that such households are the likely targets of the free food aid program as they are less likely to provide physically able workers to participate in public works. We also notice that deserving families that experienced severe shocks are less likely to be excluded from either program. This is particularly true of models that use the basic consumption ranking as the underlying allocation rule. The insignificance of this variable in columns 3 and 4 of Table 1.11 may be due to the possible positive association between a poor household experiencing severe shocks and it becoming more food insecure. Along with non-deserving families experiencing severe shocks being more likely to receive free food aid benefits, the result here lends some support to positive influence that shocks have in the free food aid participation equations.²⁵

Finally, a simple thought about the sign that rank takes in the exclusion error models is in order. While the estimates are not significant, they indicate that the better-

²⁴ This is an interesting issue for future research.

²⁵ See Table 1.10.

off among those deserving a household is, the less likely it is to secure public works employment.²⁶ Likewise, if a family that qualifies for free food aid benefits is prevented from receiving them, then that family is more likely to be near the village cut-off point or that it is among the ‘richest’ in the group of the ‘poor’ or deserving. This is particularly true when allocation of benefits is dictated by the basic consumption poverty ranking, where the estimate is significant.

1.5.4 Endogeneity Issues

One of the methodological issues described in section 1.3 is that the food security ranking may be endogenous to program participation. Information about household food security that we augmented the basic consumption poverty ranking with comes from the 2004 survey round. Clearly, household responses in 2004 to whether or not they cut the number of meals served or anyone in the family went a day without food during the peak of the peak of the 2002 drought will likely be influenced by whether or not this household received any type of aid. In this case, the estimates we reported earlier will be biased. To account for this, we will re-estimate all relevant models by instrumenting the food security ranking used in earlier sections with another ranking that augments 1999 real per capita consumption blocks with a variable presumably well correlated to how food insecure a family is but not to the odds of it

²⁶ This is in sharp contrast to the estimated sign of rank in the inclusion error models presented in the previous section.

receiving benefits. Our hypothesis goes like this: If a family did really suffer during the 2002/3 drought, it will likely report that more members of its community did also suffer. Likewise, a family that did well will likely be more optimistic in its assessment of how the drought affected its community. But the household's assessment of how the drought affected its community has no influence on whether it is selected to receive benefits.

Table 1.12: 2SLS IV estimates of Participation equations with endogenous FS Ranking

	Free Food Aid		Public Works	
	OLS (1)	2SLS (2)	OLS (3)	2SLS (4)
Rank	-0.002** (0.001)	-0.001*** (0.000)	-0.000 (0.001)	-0.000 (0.001)
<u>Assets</u>				
Land Owned in Hectares, 1999	-0.007 (0.017)	-0.024 (0.019)	0.049* (0.025)	0.050** (0.024)
Livestock Units, 1999	-0.005 (0.012)	-0.004 (0.011)	-0.012 (0.009)	-0.008 (0.008)
<u>Demographics</u>				
Log of HH Head's Age, 2002	0.168* (0.088)	0.154* (0.091)	-0.272*** (0.062)	-0.286*** (0.064)
Log of Household Size in 2002	-0.054 (0.045)	-0.056 (0.037)	0.072** (0.029)	0.063* (0.034)
Proportion of HH members <10 & >64 yrs.	-0.069 (0.104)	-0.085 (0.083)	-0.024 (0.112)	-0.022 (0.102)
HH Head is Married; Yes=1, No=0	0.008 (0.050)	-0.003 (0.045)	0.106* (0.046)	0.103** (0.042)
HH Head is female; Yes=1, No=0	0.046 (0.054)	0.028 (0.047)	-0.093 (0.078)	-0.092 (0.074)
HH Head is farmer; Yes=1, No=0	-0.014 (0.067)	-0.014 (0.060)	-0.069 (0.062)	-0.077 (0.060)
Highest grade Completed by HH Head	0.016 (0.011)	0.015 (0.010)	-0.011 (0.008)	-0.010 (0.007)
<u>Connections</u>				
Head's Friends or Associates hold official	0.083** (0.031)	0.085*** (0.029)	-0.014 (0.049)	-0.018 (0.048)
Head's parents are important in village social	-0.071 (0.055)	-0.062 (0.053)	0.100* (0.046)	0.088** (0.043)
<u>Shocks</u>				
Husband/wife had serious illness, 1999-2002	0.042 (0.033)	0.042 (0.033)	-0.132*** (0.032)	-0.132*** (0.035)
Husband/wife died , 1999-2002	0.059	0.068	0.055	0.045

	(0.090)	(0.101)	(0.079)	(0.069)
Severity of shocks, 1999-2002 (a composite	0.080**	0.077***	0.009	0.013
	(0.031)	(0.028)	(0.023)	(0.021)
<i>Prior Participation</i>				
Household Received Free Food Aid, 1999	-0.005	0.001		
	(0.047)	(0.049)		
Household Participated in Public Works, 1999			0.062	0.062
			(0.112)	(0.102)
Household Received other	-0.066	-0.058	-0.081	-0.076
transfers/remittances, 1999	(0.042)	(0.037)	(0.059)	(0.054)
Constant	-0.101	-0.017	1.424***	1.501***
	(0.408)	(0.410)	(0.266)	(0.269)
R-squared	0.081	0.079	0.169	0.164
Joint sig of instruments (F-stat)		157.8	157.8	67.4
Exogeneity of regressors (F-stat)		.682		.0299
		p = 0.433		(p = 0.867)
Observations	691	669	693	670

Notes: * p<.10, ** p< .05, *** p<.01. Robust standard errors in parentheses are adjusted for clusters at the village level. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002. First stage regression are not reported here

Table 1.12 presents a comparison of OLS and IV estimates of the participation equations. Similar comparisons for inclusion and exclusion errors are shown in Tables A6 and A7 of Appendix A respectively. The results show that there are no significant differences between the estimates of these two models. The first stage regressions (results not shown here) show no evidence of our instrument being weak. In a situation where errors are clustered and there is only one endogenous variable and one instrument, the square of the t-statistic based on cluster-robust variance matrix estimates provides the standard test for the presence of a weak instrument (Cameron and Miller, 2014).²⁷ Further, a comparison of the OLS and IV estimates indicate that the suspected endogenous variable may in fact be exogenous. The idea behind this test

²⁷ It is also called Kleibergen and Paap weak instrument test. The Ivreg2 procedure in STATA automatically reports this test as Kleibergen and Paap test for weak instrument.

is that the OLS and IV estimates have same probability limits if there is no endogeneity and different probability limits otherwise (Cameron and Miller, 2014). This test, also referred to as the Hausman endogeneity test, requires that we first regress the suspected endogenous variable on the instrument and other exogenous variables by OLS with adjustments for clustering. We then regress the dependent variable in the second stage on the suspected endogenous variable as well as other exogenous variables and the residual from the first stage by OLS. If the suspected endogenous variable is truly endogenous then the estimate on the residual in the second stage should be significantly different from zero. In our case, a square of the t-statistic on the residual in the second stage yields the F-statistic for testing the null that the FS ranking is exogenous.²⁸

We suspect that the very high correlation between the FS ranking and its instrument may have to do with the way the rankings are generated.²⁹ Figure A1 of Appendix A plots the original FS rank against the instrumenting rank and evidently the correlation between them is very strong. The original FS rank augments 1999 real per capita consumption blocks with food security scales described in section 1.4. On the other hand, the instrumenting rank augments these consumption blocks with the households' perceptions of how the 2002/3 drought affected their communities.

²⁸ In STATA, *estat endogenous* post-estimation command following *Ivreg* implements this test.

²⁹ See section 1.4 about for a detailed description of the FS ranking.

Obviously, the smaller the interval that defines these consumption blocks, the stronger the association between the original FS rank and the instrumenting rank. In other words, the restriction that consumption imposes on both rankings may be too strong that it explains most, if not all, of the association between these two rankings.

Our hypothesis here is that that people's assessment how things went for their communities during the 2002/3 drought is a reflection of their own drought experiences. If this is true, then a regression of the food security scale on a scale representing household assessments of their communities' drought experiences should yield a strong association between these two scales in a manner similar to how the two rankings were strongly associated in the first stages of the IV regressions reported earlier. Table 1.13 presents LPM regressions of the food security scale on scale representing household assessments of community drought experiences as well as the same set of exogenous variables that appeared in the first stage of the IV regressions. Put another way, 1.13 reports results from what would have been the first stage regressions of a 2SLS procedure if food security scale (rather than the rank augmented by it) was it itself a regressor in the participation as well as the allocation error equations. The results indicate that in participation and inclusion error models, people's assessments of how badly the 2002/3 drought affected their communities tend to reflect how good or bad things went for them. But in exclusion error models, the food security scale generated from personal drought experiences is not associated with household assessments of their community's drought experiences. With the exception

of this result and given the similarity of the OLS and IV estimates reported earlier, the results seem to indicate that endogeneity may not be that big of a problem.

Table 1.13: Food security and household assessments of drought experiences

Variable	Participation		Inclusion Error		Exclusion Error	
	FFD (1)	PW (2)	FFD (3)	PW (4)	FFD (5)	PW (6)
Effect on Community of the 2002 drought, 1-5 scale	-0.103** (0.035)	-0.106** (0.033)	-0.151*** (0.033)	-0.143*** (0.030)	-0.025 (0.047)	-0.069 (0.045)
<u>Assets</u>						
Land Owned in Hectares, 1999	0.106 (0.080)	0.115 (0.084)	0.019 (0.077)	0.059 (0.099)	0.142 (0.159)	0.104 (0.130)
Livestock Units, 1999	0.030 (0.022)	0.028 (0.023)	0.020 (0.035)	0.041 (0.059)	0.031 (0.020)	0.007 (0.020)
<u>Demographics</u>						
Log of HH Head's Age, 2002	-0.151 (0.167)	-0.166 (0.171)	-0.143 (0.174)	-0.208 (0.175)	-0.211 (0.249)	-0.161 (0.208)
Log of Household Size in 2002	-0.200** (0.080)	-0.183* (0.079)	-0.052 (0.103)	-0.080 (0.089)	-0.078 (0.135)	0.042 (0.132)
Proportion of HH members <10 & >64 yrs.	-0.366 (0.246)	-0.399 (0.255)	-0.166 (0.265)	0.096 (0.307)	-0.181 (0.217)	-0.482** (0.202)
HH Head is Married; Yes=1, No=0	0.053 (0.069)	0.069 (0.077)	0.011 (0.067)	-0.054 (0.047)	0.122 (0.139)	0.116 (0.107)
HH Head is female; Yes=1,	-0.389* (0.196)	-0.365* (0.177)	-0.393 (0.246)	-0.532 (0.302)	-0.341 (0.207)	-0.213 (0.184)
HH Head is farmer; Yes=1,	-0.269 (0.168)	-0.237 (0.155)	-0.261 (0.218)	-0.236 (0.262)	-0.285 (0.168)	-0.317** (0.103)
Highest grade Completed by HH Head	-0.011 (0.010)	-0.011 (0.010)	-0.021 (0.015)	-0.041** (0.013)	-0.005 (0.013)	0.014 (0.022)
<u>Connections</u>						
Head's Friends or Associates hold official position	0.187* (0.094)	0.188* (0.091)	0.216* (0.099)	0.140 (0.136)	-0.023 (0.118)	0.173 (0.125)
Head's parents are important in village social life	-0.066 (0.129)	-0.089 (0.117)	-0.063 (0.141)	-0.002 (0.157)	-0.105 (0.152)	-0.195 (0.106)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	-0.058 (0.110)	-0.061 (0.111)	-0.026 (0.099)	-0.062 (0.217)	0.003 (0.153)	-0.047 (0.079)
Husband/wife died , 1999-2002	-0.167 (0.189)	-0.202 (0.202)	-0.264 (0.239)	-0.312 (0.194)	-0.073 (0.243)	-0.120 (0.174)
Severity of shocks, 1999-2002 (a composite metric)	-0.035 (0.097)	-0.033 (0.095)	-0.086 (0.106)	-0.069 (0.080)	0.032 (0.091)	-0.070 (0.101)
<u>Prior Participation</u>						
Household Received Free Food Aid, 1999	-0.124 (0.075)		-0.252* (0.118)		0.081 (0.097)	
Household Participated in Public Works, 1999		-0.321*** (0.069)		0.078 (0.088)		-0.542*** (0.052)
Household Received other transfers /remittances, 1999	0.095 (0.096)	0.106 (0.090)	0.053 (0.084)	0.123 (0.128)	0.104 (0.174)	0.009 (0.130)

Constant	5.379*** (0.643)	5.525*** (0.628)	5.654*** (0.760)	5.736*** (0.706)	4.649** (1.196)	5.027*** (1.046)
R-squared	0.110	0.117	0.111	0.065	0.108	0.128
Observations	662	662	372	279	290	383

Notes: * p<.10, ** p<.05, *** p<.01. Robust standard errors in parentheses are adjusted for clusters at the village level. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

1.6 Conclusion

This essay examines factors influencing the allocation and/or misallocation of free food aid and public works employment benefits in rural Ethiopia. In particular, it examines if the actual allocation decisions adhere to rankings based household experiences with consumption poverty, food security and shocks. It also tries to identify factors that influence the odds of a household being incorrectly identified as a target or a non-target. Our analysis here depends on ranking households in each village based on their history of consumption poverty as well as their experiences with shocks and food insecurity. Included in all of our models is a very expansive list of social, economic as well as demographic variables as controls. Owing to the small number of clusters that the data represents, all of our models are estimated using the wild cluster bootstrap method suggested by Cameron, miller and Gelbach (2008).

Results from the participation equations show that authorities mainly target consumption-poor households with older heads for participation in free food aid programs. Village authorities also target households who experienced chronic agricultural, drought and/or market shocks in the years or months leading to the 2002/3 intervention. In addition, the results show that a household's association to

people in positions of power increases the likelihood of it receiving free food aid benefits. This result is particularly robust to changes in ranking methods as well as to the exclusion of villages with unusually high or low participation rates from the sample. There is also some evidence pointing to women receiving preferential treatment in the allocation of free food aid benefits. On the other hand, the allocation of public works employment benefits does not depend on the potential beneficiary's rank. This result, which is robust to changes in ranking and estimation methods, should not be viewed as providing evidence that the public works program is not pro-poor. Rather, it should be viewed as a reflection of the program's requirement that benefit recipients be able to work. In fact, households with older heads and/or sickly members are less likely to participate in this program. The fact that larger households are more likely to secure public works employment may have to do with them having more labor to supply or perhaps, in some cases, with them being perceived as poor. We also notice that families with greater social connections are more likely to receive public works employment benefits.

Inclusion errors models for each program are estimated using sub-samples of non-deserving households resulting from applying alternative ranking methods as underlying allocation rules. If a non-deserving household receives free food aid benefits, that household is likely to be headed by an elderly woman. This household is also somehow likely to be headed by a farmer. In line with our results from the participation equations, we also find that this non-deserving family is more likely to

have connections to people in positions of power. On the other hand, a non-deserving family that receives public works employment benefits is more likely to be headed by a younger person with greater social connections and, in some cases, larger household size. Again, this result is robust to changes in ranking and estimation methods.

Results from exclusion error models, estimated on sub-samples of deserving households, indicate that a deserving family that suffered more health related shocks and is well connected to village authorities enjoys a very low chance of being excluded from receiving free food aid benefits. Although not robust to changes in ranking methods, the results also show that a deserving family that is wrongly excluded from receiving free food aid is more likely to have a higher ranking or is among the richest in the group of deserving families. As expected, deserving families with older and sickly heads have lower chance of securing public works employment. On the other hand, a deserving family that headed by a married member has a lower chance of being excluded from receiving public works benefits.

Chapter 2

THE IMPACT OF EMERGENCY FOOD AID ON HOUSEHOLD WELFARE IN RURAL ETHIOPIA

2.1 Introduction

In a world where poverty and food insecurity are far too common, some members of a community could not survive without some type of external assistance. In fact, many poor communities in developing economies have had a long history of receiving transfers in the form of food aid. This is especially the case in Sub-Saharan Africa, a region that received more than half of global food aid deliveries by the World Food Program between 2008 and 2012 (WFP, 2012). In the absence of adequate and timely emergency aid, natural disasters can have long-term catastrophic effects on human and physical capital, which can then lead to reduced productivity as well as increased poverty and vulnerability in the future (Barrett, 2006).

Although food aid programs traditionally had a variety of motives including the promotion of trade and the disposal of surplus agricultural output by donor countries, their main objective today is the provision of insurance against chronic food shortages in vulnerable communities (Barrett, 2006). In times of heightened vulnerability triggered by war, famine or other natural disasters, these programs play a critical role in mitigating the effects chronic food insecurity on malnutrition and the

loss of human life and productive assets. In addition to providing immediate relief to prevent the loss of life and chronic malnutrition, these programs also serve as instruments for development, where program resources are primarily aimed at reducing chronic poverty by making investments in social capital as well as the provision of employment opportunities in vulnerable communities (Barrett et al., 2002). This is particularly the case if the timing of the intervention allows for beneficiaries to provide labor in exchange for receiving benefits.

However, the efficacy of food aid programs in achieving their stated goals with little or no adverse effects has been an issue of contention (Barrett, 2006). While food aid interventions, particularly in emergency situations, appear welfare enhancing, critics of these programs often argue that food aid transfers generally discourage work effort and create more dependence on the part of their recipients. But several authors have argued against studies alleging the dependency hypothesis from a variety of angles, including their lack of robust econometric methodology as well as their implicit assumption about the irrationality of potential food aid recipients to depend on resources that are often poorly timed and inefficiently targeted (Lentz et al., 2005; Little, 2008; Gupta et al., 2003).

The literature identifies the timing and targeting of benefits as critical factors influencing the effectiveness of food aid programs. In addition to providing the necessary relief early on to prevent loss of life or severe malnutrition, a well-timed intervention can improve welfare in the long-term by relieving beneficiaries of severe

liquidity constraints and thus preventing the loss of critical household assets. A poorly timed intervention not only fails to prevent the loss of human life and the destruction of assets (Harvey and Lind, 2005) but it can also hamper local production activities especially when the provision of food for work employment coincides with peak farming seasons (FAO, 2006). Yet, proper timing alone cannot guarantee that these programs will be effective. A well-timed but poorly targeted intervention prevents aid resources from reaching those who need them the most. In fact, poorly targeted resources will most likely have large income effects that tend to increase demand for leisure along the lines of the dis-incentive hypothesis (Barrett, 2006). The implication is that well-timed and properly targeted emergency food aid interventions can have long-term welfare effects by helping prevent malnutrition and the depletion of assets in the short-term. However, there is little empirical literature that examines whether well-timed and properly targeted emergency food aid interventions can improve the welfare of their beneficiaries in the long term, and this essay aims to contribute to this literature.

In this essay, we try to examine if emergency aid interventions during the 2002/3 Ethiopian drought had any effect on the wellbeing of their beneficiaries about a year and half after the peak of the crisis using data from multiple rounds of the Ethiopian Rural Household Survey. Specifically, we will examine if participation in free food aid and public works programs during the 2002/3 drought had any effect on household consumption and asset holdings nearly a year after all aid disbursements

have ceased. In addition, we will try to see if the receipt of program benefits had any influence on the views that households hold toward program administrators or on their ratings of the allocation process post-intervention. This essay is organized as follows. The next section reviews the literature. Section 2.3 lays out the methodology. Section 2.4 provides a detailed description of the data. In section 2.5, we report the results and section 2.6 concludes.

2.2 Literature

The necessity of food aid programs in saving lives, preventing malnutrition and protecting productive assets, especially in the face of humanitarian emergencies, is widely accepted by policy makers and the development community alike. However, the effectiveness of these programs has been a subject of heated debate. The main issue of contention in this debate revolves around whether or not food aid programs are effective in achieving their stated goals with little or no adverse consequences (Barrett, 2006). Critics of these programs argue that food aid transfers send wrong signals and often discourage work effort, ultimately creating more aid-dependence on the part of aid-receiving households or even their governments who also stand to benefit from them. The persistence of this argument has at times influenced decisions by aid agencies in favor of withholding critical aid from being delivered to those who need them at the time that they need them (Harvey and Lind, 2005).

However, the dependency argument has been argued against on many grounds. For example, Barrett (2006) notes that most arguments alleging aid dependence are largely based on mere coexistence of aid and recipients being dependent on them. These broad generalizations on the link between food aid and dependency are not based on rigorous cause and effect analysis of household data (Lentz et al., 2005). Refuting the mostly anecdotal studies alleging negative effects of food aid are several econometric studies with results that question and/or reject the disincentive effects associated with food aid programs (for example, see Abdulai, et al, 2005; Bezu and Holden, 2008; Dayton-Johnson and Hoddinott, 2003, among others). In addition, food aid deliveries have, in many situations, been too little for people to form habitual dependence on them (Siyoun et al., 2012; Little, 2008; Gupta et al., 2003). Lind and Harvey (2005) also cite several studies showing this to be the case in parts of Ethiopia, Sudan, and Malawi. Even when the amount of aid deliveries is adequate, the timing these deliveries has been too inconsistent, and people know not to expect benefits when they need them the most (Little, 2008). Besides, the targeting of these benefits has been far too irregular and prone to significant inclusion and exclusion errors (Clay et al., 1999; Uraguchi, 2011). With significant uncertainties about the selection of beneficiaries as well as the timing and amount of transfers, potential beneficiaries would be too naïve to factor in potential aid receipts in making decisions (Little, 2008; Harvey and Lind, 2005).

Food aid programs commonly provide insurance against short-term chronic food shortages induced by a multitude of shocks including war, famine, or other manmade and natural disasters. But, these programs have also been used as instruments for development, where program resources are primarily aimed at improving livelihoods and reducing chronic poverty and future vulnerability by making investments in social capital and the provision of employment opportunities in vulnerable communities. This component of the food aid program has become very popular and accounts for a significant portion of food aid distributions in Sub-Saharan Africa as part of broader development and poverty reduction initiatives (Dercon and Krishnan, 2003; Barrett et al., 2002).³⁰ Thus, any analysis on the effectiveness of food aid programs needs to take account of the outcomes they are designed to achieve. If these interventions are transitory in nature, they can be evaluated by the short-term boost to consumption and/or income they provide as well as the protection of wealth and assets they make possible. But if these programs are aimed at reducing abject poverty and susceptibility to shocks, the issue becomes whether they help minimize both short-term and long-term vulnerability (Barrett et al., 2002). In this case, an effective program not only helps vulnerable households or communities smooth their consumption and protect their assets in the short-term but it also creates a suitable environment for them to move away from aid and be self-sufficient in the long-term.

³⁰ The Government of Ethiopia channels 80 percent of food aid resources toward food for work programs (see Barrett et al., 2002).

One critical issue that arises in the literature on the effectiveness of food aid programs is that of timing and targeting efficiency (Barrett et al, 2002). A well timed intervention provides the necessary relief early enough to prevent severe malnutrition and other health related issues that can have serious long-term consequences. It can also relieve beneficiaries of severe liquidity constraints early enough to prevent the loss of critical household assets. However, in many situations aid does not reach its beneficiaries when it is needed the most. This is particularly the case when food aid is shipped from donor countries and/or pleas for aid are not issued early enough to allow for significant lags between the shipment and delivery dates (Harvey and Lind, 2005). For example, Barrett and Maxwell (2005) estimated the lag between the shipment and delivery dates of US food aid to be about five months on average. A delayed delivery of aid limits the effectiveness of food aid by failing to prevent hunger, malnutrition, and the destruction of assets especially in emergency situations. In making the case against the implications of the dependency argument to food aid deliveries, Harvey and Lind (2005) cite the devastating effects associated with the significant shortfall in the amount of emergency aid in Sudan in 1998. In addition, a poorly timed delivery of food aid that arrives during harvest season will likely flood local markets with significant effects on food prices (Abdulai et al. 2004; Tschirley et al., 1996; OXFAM, 2005). This can have serious consequences on the welfare farming households particularly in remote areas with poor storage facilities and less integrated markets. Equally important, food for work programs that coincide with the peak farming season

can have a negative impact on farm production due to substitution of farm activities with food for work employment (FAO, 2006).

Even when aid is delivered on time, its effectiveness may be limited because of errors in targeting. While there is a great deal of empirical evidence pointing to the progressive nature of food aid programs in many developing countries, targeting errors have always posed a serious problem to the efficacy of these programs (Barrett et al., 2002; Dutrey, 2007). In their survey of this literature, Harvey and Lind (2005) point to some case studies in Ethiopia and Kenya where the allocation of food aid benefits was marred by local elite capture in which connections and political considerations were factors in allocation decisions. A less progressive allocation that excludes a large portion of the vulnerable group will not prevent both the short-term and long-term consequences of chronic food shortages on the affected population. Non-deserving beneficiaries of free food aid face relatively less severe consumption and liquidity constraints such that aid resources that are directed toward them will most likely have large income effects that increase demand for leisure along the lines of the disincentive hypothesis (Barrett, 2006). On the contrary, directing these resources toward the very poor will likely boost consumption and prevent the liquidation of the farm household's most important assets such as livestock. In food for work programs, disincentive effects of poor targeting tend to be driven by substitution effects particularly when returns from food for work programs are greater than those from the beneficiaries' own farm or business activities (Barrett, 2006). The implication is that

poor targeting may be the reason not just behind the ineffectiveness of some food aid programs in achieving their stated short-term objectives but also behind the disincentive effects they may cause.

Emergency food aid programs are mainly designed to provide insurance against short-term consumption shortfalls. While these programs have been credited for saving millions of lives that could otherwise have been lost to a host of natural and man-made disasters, empirical evidence on their nutritional effects has been inconclusive. For example, Stifel and Alderman (2006) found that expenditures in Peru's well targeted Vaso de Leche program did not have any impact on the nutritional status of young children. Webb and Kumar (1995) also showed that the prevalence of child malnutrition increased with the rate of participation in Niger's public works program. In contrast, Yamano et al (2005) and Quisumbing (2003) reported food aid programs in response to shocks in rural Ethiopia as having some positive impact on the nutritional status of children in participating households. Similarly, Bezuneh and Deaton (1997) credited Kenya's food for work program for improving the nutritional status of its beneficiaries.

Apart from their nutritional effects in the short-term, emergency food aid programs can function as social safety nets with long-term consequences on the wellbeing of their beneficiaries (Gilligan and Hoddinott, 2006; Barrett, 2006). A timely, well-targeted and sufficiently funded emergency aid program can reduce future vulnerability and food insecurity by helping prevent the liquidation of assets in

response to emergency situations. However there is little rigorous empirical evidence on the nexus between emergency food aid and the welfare of its beneficiaries in the long-term (Gilligan and Hoddinott, 2006). Besides, most studies on non-immediate effects of food aid, which mainly revolve around the examination of disincentive effects, provide mixed results. In their study involving the adoption of fertilizers by rural households in Northern Ethiopia, Bezu and Holden (2008) found that benefits from the food for work program led to the adoption and increased intensity of fertilizer use by beneficiaries. They argue that food for work benefits were effective in relieving participating households of severe liquidity constraints associated with poor credit markets. However, they did not address if this increased use of farm inputs led to increased land productivity and reduced vulnerability in the long-term. Similarly, Dayton-Johnson and Hoddinott (2003) reported that labor disincentive effects that are big and significant in simple bivariate regressions tend to dissipate when controls for household characteristics such as age, sex, education, etc. are used. Their results indicate that these transfers led to increases in the rural households' farm and non-farm activities. Other studies that reported similar results include Abdulai, et al. (2005), Gilligan, et al. (2008) in Ethiopia, and Bezuneh (1988) in Kenya, among others. In contrast, some studies have shown food aid to be ineffective with negative long-term effects along the lines of the dependency syndrome. For example, Matongera, et al. (2017) found that the food aid program in Chigodera, Zimbabwe resulted in negative long-term effects including reduced farm labor and food production. Using computable general equilibrium model, Gelan (2006) also showed that food aid led to

a decrease in domestic food production in Ethiopia. His simulation results suggest that poor rural households are worse off with in kind food aid than without it.

Gilligan et al. (2008) examined the effect of Ethiopia's Productive Safety Net Program (PSNP) and Other Food Security Program (OFSP) interventions using three alternative definitions for program participation. The public works component of the PSNP provided beneficiaries with employment in labor intensive activities aimed at building community assets. The direct support component targeted poor households with elderly and disabled members who were not capable of taking part in public works projects. Households selected for OSFP program enjoyed such benefits as easier access to credit, technology transfers and/or agricultural extension. Using Propensity Score Matching, Gilligan et al. (2008) showed that differences in mean outcomes between the treatment and control groups were sensitive to changes in the definition of program participation. Defining the treatment group to include households who received any payment from the PSNP alone resulted in little impact. Program participation resulted in some improvement in household food security when the treatment group was defined as consisting of households who received at least half of the planned PSNP payments. However, participation in both PSNP and OFSP programs was associated with both improved household food security and increased likelihood of beneficiaries adopting new and improved farming techniques, borrowing for investment purposes as well as engaging in non-farm activities of their own.

The study closest to ours is one by Gilligan and Hoddinott (2006). Using data from multiple rounds of the Ethiopian Rural Household Survey (ERHS), Gilligan and Hoddinott (2006) examined the effect of emergency food aid disbursements during the 2002/3 Ethiopian drought on indicators of household wellbeing about a year and half after the peak of the intervention. They used a propensity score matching based difference-in-difference estimator to see the impact of free food aid and public works benefits in 2002/3 on household consumption, food security and asset holdings in 2004. Their results show that participation in each program resulted in significant growth in real consumption per adult equivalent. They also showed that while households who participated in the public works program experienced reduced famine risk, the opposite was the case for those who received free food aid. In their study, they estimated treatment effects using the entire sample and their baseline estimates were sensitive to the presence of outliers in the data. Our study aims to address this problem by excluding outliers to estimate the effects of program participation at the margin using regression discontinuity.

In this essay, we utilize same data as that of Gilligan and Hoddinott (2006) to assess the long-term effects of emergency food aid disbursements on some indicators of household wellbeing. Similar to Gilligan and Hoddinott (2006), we separately estimate treatment effects for free food aid and public works programs. Using an alternative approach, this study contributes to the literature on welfare effects of emergency food aid. Our approach is different for three reasons. First, we allow for

differences in village and program level selection criteria in estimating participation probabilities for each program. We do this by generating a ranking of potential beneficiaries by using pre-intervention household characteristics in conjunction with the village and program specific selection criteria. Second, we measure treatment effects by comparing the outcomes of recipients and non-recipients at the margin, using fuzzy-regression discontinuity design. And third, as a test for influence that favoritism and elite capture have in the allocation of benefits, our study also tests if program participation shapes the views that households hold toward program administrators or the government. The next section lays out the methodology.

2.3 Methodology

Since emergency food aid programs are designed to alleviate drought related food shortages, recipients of these benefits are expected to do relatively well in terms of not experiencing significant adverse shocks to their consumption. By insuring beneficiaries against drought induced consumption shortfalls, these programs will likely increase future production and consumption by preventing malnutrition as well the liquidation of assets in the short-term. Equally important, allocation fairness, or lack thereof, of program resources may shape the views that households hold toward program administrators or the government. This is particularly true in situations where local authorities have more discretionary power over the allocation process and perhaps use their positions as opportunities to receive bribes, benefit associates or buy political loyalty (Dutrey, 2007). Therefore, this essay has two main objectives. First,

we examine if participation in free food aid and public works employment is associated with increased consumption growth and lower likelihood of asset depletion. Second, we assess if participation in either program results in beneficiaries holding more favorable views toward those in charge of making allocation decisions.

If selection into these programs is completely random, then one would expect little systematic difference in both observed and unobserved characteristics of beneficiaries and non-beneficiaries. Accordingly, the average difference in outcomes between beneficiaries and non-beneficiaries can measure the effect of treatment (Lee and Lemieux, 2010). That is, simple OLS regression as in equation (2.1) can yield unbiased estimates of treatment effect.

$$Y = \alpha + \beta B + \varepsilon \quad (2.1)$$

Where Y is the outcome variable, B is the treatment variable indicating if a household receives program benefits and ε is a random error term.

However, by design, selection into targeted programs is never random. Participation in either program depends on potential beneficiaries satisfying some predetermined selection criteria. This results in B and ε in equation (2.1) being correlated, rendering the treatment effect estimates biased. Therefore, a meaningful comparison between the outcomes of beneficiaries and non-beneficiaries with similar pre-treatment characteristics requires that there be some source of exogenous variation. Fortunately, community surveys in ERHS (2004) provide data on the list of

household attributes village authorities reported as using to select households for participation in the free food aid and public works programs during the 2002/3 intervention. It is important to point out that most of the household attributes identified as selection criteria are somehow crude and subject to measurement errors and possibly a range of interpretations. However, village study reports in ERHS (2004) provide enough context to transform these crude selection criteria into objective measurements to rank potential beneficiaries. We take advantage of the exogenous variation that these measurements provide to estimate the effect of receiving benefits on some measures of household wellbeing using fuzzy regression discontinuity.

The regression discontinuity design measures program impact by comparing the outcomes of households who almost received program benefits with those of households who almost did not receive them. The main assumption is that these two groups have similar observed and unobserved pre-treatment characteristics such that post-treatment differences in outcome variables are easily attributable to the effects of treatment (Lee and Lemieux, 2010). Accordingly, this procedure depends on devising some quantifiable metrics and/or scores to help rank potential beneficiaries in terms of their eligibility to receive treatment. In addition, it requires a clear boundary separating those who are eligible to receive benefits from those that are not.

We use the community surveys in ERHS (2004) in conjunction with household data from prior survey rounds to extract information on village level selection criteria and rank households by their eligibility for selection into either program. The ERHS

provides detailed data on household consumption, income, assets, demographics and other household attributes that can be used in generating key metrics for ranking households in terms of their susceptibility to shocks such as drought and famine. But for the purpose at hand, we devise village and program specific ranks based primarily on the criteria village authorities reportedly used in making allocation decisions. We will refer to this ranking as the criteria based ranking.

As part of the ERHS (2004), community leaders were asked to list the criteria they used to select beneficiaries into the free food aid and public works programs during the 2002/3 intervention. For each program, Table B1 of Appendix B lists the top 3 metrics that village authorities reported to have based their allocation decisions on. Looking at the list in Table B1 in Appendix B, note the lack of uniformity in the selection criteria across villages. Different villages used different metrics in making allocation decisions. Needless to say, the selection criteria in a given village differed by program type. All of these suggest that an effective ranking of potential beneficiaries will have to take village and program level differences in selection criteria into account. The criteria based ranking accomplishes this. But before we describe the criteria based ranking, the following observations from Table B1 are in order. First, the inclusion, in many villages, of family size as one criterion for selecting recipients of public works benefits may have to do with these families' ability to provide more labor. But it may also have to do with such families being regarded as poor and/or food insecure owing to their limited resources being shared

among their many members (Uraguchi, 2011). Any reference to family size being used in selecting beneficiaries to the free food aid program will likely have to do with such households being resource poor on per capita basis since this program does not require recipients to provide labor in exchange for receiving benefits. Second, by using age in selecting beneficiaries into the free food aid program, community leaders are likely targeting older and/or disabled households since these households have little or no ability to work. Conversely, younger households are given priority in the selection of beneficiaries into public works programs. Third, authorities in many villages report using poverty in selecting beneficiaries into both programs. But our data provides no additional information elaborating on how village authorities define the ‘poor’, the descriptions of which differ from community to community. In the absence of such data, we resort to village study reports contained in ERHS (2004) and summarized in Table B2 of Appendix B to obtain accurate descriptions of poverty in every village with the aim of identifying quantifiable poverty metrics to rank potential beneficiaries with.³¹ The key assumption here is that village authorities do share perceptions and/or definitions of the ‘poor’ that are held by members of their community.

In villages with multiple selection criteria (shown in Table B1 of Appendix B), households are primarily ranked based on criteria 1. If any two households rank same based on criteria 1, we perform further ranking of these households on the basis of

³¹ The village study documents in the ERHS provide important background information about the social, cultural, demographic and economic realities as well as beliefs of inhabitants in each village.

criteria 2 and so forth. If we still have same rank assigned to multiple households after multiple rounds of ranking, then we perform further distinction between these households based on their real per capita consumption from the 1999 survey round. For example, the first round of ranking for public works in Haressaw ranks households in terms of the size of land they own, placing those who own no land at the top. Conditional on any two households owning lands of same size, ranking in the second round is based on their poverty status where the poor are described as those with no livestock or have little or no land (Tewodros and Derbew, 1996 in ERHS, 2004).³² But, given that land ownership has already been used in the initial ranking, we use ownership of livestock units as a measure of poverty in ranking households of same rank from the first round in this particular village. Conditional on multiple households having the same rank after two rounds of ranking, further distinction between them is based on the age of household head (as proxy for how young or old the household is) where priority is given to younger households owing to their ability to work. Therefore, the final ranking in this village places households with younger heads lacking in land and livestock at the top as most deserving of public works employment benefits. Likewise, the selection criteria in Gara Godo suggests that a household that is headed by an elderly person that owns no land and has many members with

³² The rich and the poor in Haressaw are described as follows. “The rich can be described as those owning on average 2 oxen, 1 mule, 10 sheep or goats. Poor households do not own livestock or land (or have very little land)” (Tewodros and Derbew, 1996; pp25).

disabilities is ranked first and thus given priority in the allocation of free food benefits in this village. We rank households in each village in similar fashion to generate the criteria based ranking. In villages with missing criteria, we derive rankings based on metrics derived from localized perceptions of poverty contained in the village study reports summarized in Table B2 of Appendix B. Data for generating this ranking come from survey rounds prior to the 2002 intervention, which we presume cannot be manipulated by potential beneficiaries.

In addition to the criteria based ranking, we also consider a ranking based primarily on household experiences with consumption poverty. We consider this ranking for two reasons. First, most household attributes that community leaders use to select beneficiaries are closely associated with how poverty is perceived in their respective communities. With these criteria, therefore, village authorities are presumably targeting the poor, with ability to work being the deciding factor on which households receive which benefit. Second, numerous studies have reported a close link between poverty and some of the metrics (such as landlessness and family size) that community leaders reported as using to select beneficiaries.³³ This ranking, which we refer to as poverty ranking,³⁴ initially places households into mutually exclusive consumption blocks of Birr 10 based on their monthly real per capita consumption in

³³ See Horrell and Rock (2008) and Dercon and Krishnan (1998) for example.

³⁴ This ranking was used in our examination of the allocation of benefits in Essay I.

the 1999 survey round. The rationale behind this is that ranking households with monthly real per capita consumptions of Birr 31 and Birr 32 differently makes little sense when in fact there is little difference between the levels of poverty these families experience. The choice of Birr 10 as a consumption block balances between the need to have a homogenous group in each block and the need for consumption in prior survey rounds to influence the ranking. Households in each consumption block are then ranked based on similar blocks derived from the 1997 survey round. We repeat this process with consumption blocks of Birr 5. Final distinction between any two households of same rank is based on real per capita consumption in 1999. This yields a unique or nearly unique rank for each household in each village.

Having ranked households in terms of the program specific selection criteria or their experiences with consumption poverty, the next step is to establish clear boundaries that separate those eligible to receive program benefits from those that are not. For each village, Table B3 of Appendix B shows the number of participating and non-participating households by program type. Apparently, village authorities have limited resources to allocate and differences in participation rates across villages possibly reflect differences in how aid is allocated among various regions by authorities higher up. Given this, the ranking of potential beneficiaries can be used as a forcing variable in our RD design, where the number of participants in each village-program pair serves as an effective cut-off rank. In a ranking of n_j households in village j , with m_{jk} open slots, the ideal program would select the m_{jk} most eligible

households for participation in program k .³⁵ In this setting, household i in village j will participate in program k if the rank it is assigned is less than or equal to the village's program quota or cut-off rank, i.e., $rank_{ijk} \leq m_{jk}$. For example, a family ranked 43rd is the last “yes” while that ranked 44th is the first “no” for public works employment in Haressaw.³⁶

However, participation does not depend on ranking alone implying that compliance to the ranking rule will be imperfect. This suggests that the appropriate design here is a ‘fuzzy’ regression discontinuity, where the probability of participation jumps by less than 1 at the cut-off point. Following in Lee and Lemieux (2010), the probability that family i in village j is selected to participate in program k can be specified as follows.

$$Pr(B_{ijk} = 1 | rank = rank_{ijk}) = \gamma + \delta T_{ijk} + g(rank_{ijk} - m_{jk}) \quad (2.2)$$

Where $rank_{ijk}$ is household i 's program k ranking in village j , m_{jk} is village j 's cut-off rank for program k and $T_{ijk} = 1(rank_{ijk} \leq m_{jk})$ indicates if the forcing variable falls below the pre-determined participation threshold or the village and program

³⁵ Assuming that the sample is representative and that $\frac{m_{jk}}{n_j} = \frac{M_{jk}}{N_j}$ (where N_j and M_{jk} are population counterparts of n_j and m_{jk} respectively) we can think of m_{jk} as village j 's quota in the sample.

³⁶ See Table B3 of Appendix B.

specific cut-off rank.³⁷ $B_{ijk} = 1$ if household i in village j participates in program k (or is treated) and 0 otherwise.

Because treatment does not depend on rank alone, the treatment dummy D_{ijk} can be expressed as the sum of the probability of participation shown in equation (2.2) and an error term, v_{ijk} , that is independent of rank, i.e.,

$D_{ijk} = Pr(B_{ijk} = 1 | rank = rank_{ijk}) + v_{ijk}$. Given this and following Lee and Lemieux (2010), we can specify the fuzzy RD design by the following system of two equations.

$$D = \gamma + \delta T + g(rank - m) + X\theta + v \quad (2.3)$$

$$Y = \alpha + \tau D + f(rank - m) + X\beta + \varepsilon \quad (2.4)$$

Where Y is an outcome variable measuring changes in consumption, assets as well as some measures of household views toward program administrators, and X a vector of control variables such as age, sex, marital status, occupation, family size, land ownership as well as dummies accounting for differences in village characteristics.

The entry of control variables into any of our models depends on the type ranking the model employs. If the analysis is based on the criteria based ranking, variables such as

³⁷ The sharp RD design is a special case of the specification in equation (3.2) where $\delta = 1$ and $g(rank_{ijk} - m_{jk}) = 0$ and the probability of participation jumps from 0 to 1 at the cut-off (Lee and Lemieux, 2010).

age, family size, land ownership, etc. will be excluded from the list of control variables as their effect is captured by the ranking itself.

Since the participation threshold is village and program specific, functions $f(.)$ and $g(.)$ in equations (2.3) and (2.4) can be expressed as functions of $r_i = rank_{ijk} - m_{jk}$ and that for each household i , $T_i = 1$ if $r_i \leq 0$. Then, for each household i , the first and second stages of the rank centered RD design for the system of equations shown in (2.3) and (2.4) can be specified as follows.

$$D_i = \gamma + \delta T_i + g(r_i) + X\theta + v_i \quad (2.3a)$$

$$Y_i = \alpha + \tau D_i + f(r_i) + X\beta + \varepsilon_i \quad (2.4a)$$

The objective here is, therefore, to estimate the effect of program participation (τ) by using T as an instrument for D (Lee and Lemieux, 2010).³⁸ In this setting, a household's rank falling below its village's cut-off rank influences his/her outcome variable only through influencing the probability that he/she participates in the program. Our baseline specification assumes $g(r_i)$ and $f(r_i)$ are linear in r_i .

³⁸ Substituting (2.3) into (2.4) yields the following reduced form.

$$Y = \alpha_r + \tau_r T + f_r(rank - m) + X\lambda + \varepsilon_r \quad (R)$$

Where $\tau_r = \tau_r / \delta$. Because the number of instruments in the system of equations (3.3) and (3.4) equals the number of endogenous variables, the treatment effect τ can be estimated as a ratio of τ_r and δ (i. e., $\tau = \frac{\tau_r}{\delta}$) on condition that equations (5) and (R) are estimated using the same bandwidth when using local linear regression and are of the same order when using polynomial regression (Lee and Lemieux, 2010: pp 328).

However, specifications with higher order polynomials and interaction terms will also be considered to check the robustness of our estimates.

Because RD is a non-experimental design some conditions must be satisfied for it to produce unbiased estimates of program impact (Jacob et al, 2012). First, in the absence of a treatment, the outcome variable is a continuous function of the assignment variable such that any discontinuity at the cut-off point can be attributed to program participation. Second, the one thing that is discontinuous in the analysis interval is the treatment status. That is, the probability of participation changes discontinuously at the cutoff of point, $r_i = 0$. Third, the assignment variable is based on pre-treatment characteristics and that potential beneficiaries do not have the ability to manipulate them. If this is true, then “...the variation in treatment near the threshold is randomized as though from a randomized experiment” (Lee and Lemieux, 2010: pp283). If all these conditions are met and if households that almost received treatment have similar observed and unobserved characteristics as those that almost did not, then the fuzzy RD design can yield unbiased estimates of the effects treatment.

2.4 Data

Data for this essay comes from multiple rounds of the Ethiopian Rural Household Survey (ERHS). A longitudinal dataset covering 15 villages in rural Ethiopia, the ERHS is collected by the Economics Department of Addis Ababa

University in collaboration with the Center for African Studies, University of Oxford and the International Food Policy Research Institute. This survey was initially launched in 1989 although its scope was rather limited because much of Northern Ethiopia was not easily accessible due to the then civil war. Since then, ERHS data from 15 rural Ethiopian villages were collected in seven rounds spanning the period 1994-2009. Survey participants from these villages, selected to represent the country's major farming systems, were chosen randomly. The ERHS benefits from a very small attrition rate, which is attributed in part to the limits that public ownership of land places on household mobility (Dercon and Hoddinott, 2011). While ERHS data are not nationally representative, key metrics derived from it are largely similar to those from other nationally representative surveys.

To implement the fuzzy regression discontinuity design outlined in the last section, this essay utilizes the criteria and poverty based rankings of potential beneficiaries in each program. The criteria based ranking is both village and program specific. In contrast, the poverty ranking uses same set of metrics to rank households for participation in both programs and across all villages in the same fashion. The criteria based ranking utilizes data from community surveys of the 2004 survey round in conjunction with household data from survey rounds prior to the 2002/3 intervention.³⁹ Differently stated, the placement of households into either program

³⁹ There were no ERHS surveys in between 1999 and 2004, and data on the selection criteria used during the 2002 interventions were collected in the 2004 survey round.

depends on the household attributes in the selection criteria and the values of these attributes from the 1999 and 1997 survey rounds. If a particular program's selection criteria consist of 3 household attributes, then households in this particular village will be ranked on the basis of criteria 1, 2 and 3 in that order. For example, the initial placement of households for public works employment in Haressaw relies on land size where families with no land are ranked at the top. If this initial placement assigns same rank to multiple households, then we base ranking in the second round on poverty where the 'poor' in this village are defined as having little or no livestock, among others. Subsequent ranking of households in this village relies on age of household head where younger families are ranked at the top. Similarly, the selection criteria in Geblen are such that older and poor households with more disabled members are given priority for participation in the free food aid program. In situations where there are not enough household attributes in the selection criteria, such as Dinki for public works, the initial ranking based on willingness to work is followed by a subsequent ranking which relies on household attributes associated with the perceptions of poverty in this village. Likewise, the criteria based ranking of households for free food aid in Doma, where there are no selection criteria, is based on household attributes that are associated with how people in Doma perceive poverty. The assumption here is that most household attributes that village authorities identify as their selection criteria are closely associated with how members of their community perceive poverty.

Data for generating the poverty ranking, which is solely based on household experiences with consumption poverty, come from two survey rounds immediately prior to the 2004 round. This consumption based poverty ranking is primarily based on grouping households in terms of their monthly real per capita consumption in the 1999 survey round. As mentioned in the previous section, households in same consumption block are then ranked in based on similar blocks of same interval derived from the 1997 survey round. Conditional on multiple households having same rank, we perform further re-grouping and ranking of potential beneficiaries with smaller consumption blocks. We repeat this process of grouping and ranking until we achieve a one to one or nearly on-to-one correspondence between a household and the rank it is assigned.

Data on outcome variables, namely growth in consumption, assets, household views on government and its officials as well as their views on the fairness of the allocation process come from the 1999 and 2004 survey rounds. Consumption growth is defined as logarithmic difference in real monthly per capita consumption between the 2004 and 1999 survey rounds. Change in livestock units is defined as a simple difference in the number of livestock units between these two rounds. The 2004 survey round asks respondents if they sold any livestock, jewelry or furniture in response to consumption shortfalls induced by the 2002/3 drought. We use this information on the sales of livestock and non-livestock assets to generate indicators of asset liquidation.

The 2004 survey round also asks respondents about the trust or confidence they have in the government and its officials. Specifically, respondents were asked if they agree or disagree with the following three statements: 1) “I believe that the government does what is right for the people”; 2) “I am confident of the ability of government officials to do their job”; and 3) “I am confident of the ability of Kebele officials to do their job”.⁴⁰ Possible responses to these questions are 1 for strongly disagree; 2 for disagree; 3 for slightly disagree; 4 for neither agree nor disagree; 5 for slightly agree; 6 for agree; and 7 for strongly agree. We use this information to generate a yes or no dummy distinguishing between those who tend to agree more with these statements by responding “slightly agree” at the minimum from those with strong reservations. In addition, respondents were asked to rate the fairness of the allocation of food and cash assistance 18 months after the intervention in 2002. Possible responses for this question are 1 for very fair; 2 for somewhat fair, 3 for just okay, 4 for somewhat unfair; and 5 for very unfair. We use information to generate a categorical variable which takes on value of 1 for those who rate the allocation process as somewhat or very fair, 2 for those who rate it as okay and 3 for those who rate it unfavorably. Finally, data on all control variables come from the 1999 survey round.

For all the villages in which these programs were operational, Table 2.1 shows the relationship between the poverty and criteria based rankings. The results indicate

⁴⁰ Kebele is the lowest administrative unit in the Ethiopian administrative hierarchy and Kebele officials are local authorities that households interact with on a daily basis.

that there exists no significant correlation between the two rankings at the village level. This suggests that consumption poverty has little to do with the household attributes that generate the criteria based ranking at the village level. In fact, in some cases, the correlation between them is negative. Households that are considered deserving with one ranking do not appear to be considered as such with the other. However, when potential beneficiaries in all villages are pooled together, the correlation between these two rankings becomes positive although marginally significant.⁴¹ This suggests that while the poverty ranking can result in an allocation scheme that is somehow similar to that resulting from the criteria based ranking at a national level, it fails to do so at the village level. But since allocation decisions are made at the local level and local level correlations between these two rankings are insignificant, we conclude that allocation schemes resulting from these rankings are materially different from one another.

Table 2.1: Correlation between Poverty and Criteria based Ranks

Region	Village	Public Works	Free Food Aid
Tigray	Haressaw	-0.062	0.026
	Geblen	0.060	0.089
Amhara	Dinki	0.026	0.159
	Shumsheha	-0.014	0.114
Oromia	Adele Keke	-0.051	0.220
	Korodegaga	-0.026	0.124
SNNPR	Aze Deboa	0.007	0.008
	Gara Godo	0.177	0.097

⁴¹ The existence of a weak positive correlation between the poverty rank and each program's criteria based ranks can also be seen from Figures B1 and B2 in Appendix B.

Doma	0.066	-0.243
Overall	0.316*	0.230*

Source: Own Calculations from ERHS 2004. *** Sig at 1%; ** Sig at 5%; *Sig at 10%.

In Table 2.2, we compare leakage and under-coverage that result from the poverty and criteria based rankings. The poverty ranking excludes 37 percent of deserving households from and includes about 49 percent of non-deserving households into the free food aid program. On the other hand, the criteria based ranking excludes 18 percent of deserving households from while including 33 percent of non-deserving households into this program. Compared to poverty ranking, the criteria based ranking results in an allocation with lower leakage and under-coverage of free food aid benefits. Similarly, leakage and under-coverage of public works benefits under the criteria based ranking are much lower than those resulting from the poverty ranking. The implication of all these is that allocation schemes based on criteria based rankings are much closer to the actual allocations of each program's benefits than those based on poverty ranking. By relying solely on consumption to rank households in all villages in the same fashion, the poverty ranking fails to account for village level differences in perceptions of poverty.

Table 2.2: Targets and Mis-targets (Percentages) of Poverty and Criteria based Ranks

Actual Allocation	Poverty Rank		Criteria based Rank	
	Non-deserving	Deserving	Non-deserving	Deserving
Did not Receive FFD Benefits	61.63	38.37	82.49	17.51
Received FFD Benefits	48.89	51.11	32.7	67.3
Did not Receive PW Benefits	50.78	49.22	75.55	24.45
Received PW Benefits	35.66	64.34	19.04	80.96

Source: Own calculation from ERHS 2004.

Given the superiority of the criteria based ranking in minimizing the leakage and under-coverage of benefits, one would expect to see this ranking outperform the poverty ranking in terms of having stronger correlation between indicators of eligibility and actual participation. Table 2.3 presents this correlation between potential beneficiaries satisfying the requirements to receive benefits and them actually receiving it by ranking type. While eligibility indicators resulting from both rankings predict that those eligible are more likely to receive benefits, we notice that the eligibility indicator implied by the criteria based ranking has greater correlation with the actual allocation of benefits in both programs. This result, which is consistent with that shown in Table 2.2, indicates that the criteria based ranking is superior to the poverty ranking in terms of including households that it considers deserving as well as excluding those it regards otherwise.

Table 2.3: Correlation between Indicators of Participation and Eligibility by ranking type

Participation Indicator	Deserving Indicator	
	Poverty Rank	Criteria based Rank
Free Food Aid	0.127*	0.506*
Public Works	0.152*	0.565*

Source: Own calculation from ERHS 2004. *** Sig at 1%; ** Sig at 5%; *Sig at 10%.

Table 2.4 compares summary statistics for recipients and non-recipients of free food aid in the RD sample implied by the criteria based ranking. The RD sample constitutes households that rank within 17 points ($|r_i| \leq 17$) of the cut-off point which is about half the standard deviation of 33.12.

Table 2.4: Characteristics of Recipients and Non recipients of Free Food Aid in RD Sample

Variable	FFD Non Participants				FFD Participants			
	Mean	St. dev	Min	Max	Mean	Std. Dev.	Min	Max
FFD Criteria based Rank	3.34	9.56	-17	17	-3.01	9.35	-17	17
Land Area owned in 1999 (in hectares)	1.09	1.03	0.00	5.00	1.00	1.01	0.00	5.00
Livestock Units owned in 1999	2.28	2.09	0.00	11.40	2.38	1.87	0.00	9.25
Age of Household Head in 2002	47.9	13.5	20.0	90.0	49.7	14.8	22.0	90.0
Household size in 2002	5.96	3.01	1.00	17.00	5.77	2.70	1.00	17.0
Proportion of HH members <10 & >64 yrs. old	0.32	0.21	0.00	1.00	0.34	0.22	0.00	1.00
Head's Marital Status (Married=1, else 0)	0.64	0.48	0.00	1.00	0.63	0.48	0.00	1.00
Household Head is female yes=1; no=0	0.34	0.47	0.00	1.00	0.32	0.47	0.00	1.00
Household Head is a farmer yes=1; no=0	0.69	0.46	0.00	1.00	0.73	0.45	0.00	1.00
Highest grade completed by HH head	2.42	2.73	1.00	14.00	2.30	2.75	1.00	14.00
Husb/wife seriously ill(1999-02) yes=1,no=0	0.17	0.38	0.00	1.00	0.13	0.33	0.00	1.00
Received Free Food Aid in 1999 yes=1; no=0	0.31	0.46	0.00	1.00	0.35	0.48	0.00	1.00
Received non FFD transfers 1999 yes=1; no=0	0.18	0.39	0.00	1.00	0.21	0.41	0.00	1.00
Growth in real food cons. per capita	0.08	1.10	-3.00	3.02	0.13	1.03	-2.26	3.23
Growth in real non-food cons. per capita	0.39	1.23	-2.38	4.42	0.24	1.36	-3.19	4.23
Growth in real overall consumption per capita	0.16	0.98	-2.46	2.91	0.15	0.95	-2.13	3.03
Change in Livestock units	0.11	1.86	-4.75	6.30	-0.05	1.61	-4.10	4.15
Sold Livestock yes=1; no=0	0.50	0.50	0.00	1.00	0.44	0.50	0.00	1.00
Allocation fairness 1=fair; 2=okay; 3=unfair	2.24	0.83	1.00	3.00	2.18	0.82	1.00	3.00
Observations	154				142			

Source: Own calculations from ERHS

As expected, the FFD criteria based ranking does very well in predicting who gets to receive benefits from this program. The average participant ranks 3 points below his/her village's cut-off point. On the contrary, the average non-participant places about 3 ranks above his/her relevant cut-off point. Likewise, the public works

criteria based rank does an effective job in transferring benefits to those it considers eligible to receive them.⁴²

The average recipient of free food aid in the RD sample is about a year and half older but has more or less similar characteristics as the average non-participant. Similarly, we notice in Table B4 of Appendix B that recipients and non-recipients of public works benefits in the RD sample do share more or less similar pre-intervention characteristics. Table 2.4 also shows that the average recipient of free food aid saw higher rates of growth in real per capita food consumption between 1999 and 2004 when compared to his/her non-recipient counterpart. Yet in Table B4, we observe that, compared to his/her non-recipient counterpart, the average recipient of public works benefits in the RD sample experienced slightly higher/lower growth in food/non-food consumption respectively between 1999 and 2004. However, we notice that recipients of either benefit were not any more or less likely than their non-recipient counterparts to rate the allocation of benefits as fair. Given the similar pre-intervention characteristics of recipient and non-recipients of these benefits in the RD sample, one can expect differences in some welfare outcomes in 2004 to reflect differences in treatment status 2002. The next section examines if this is actually the case.

⁴² See Table B4 in Appendix B.

2.5 Results

2.5.1 Consumption based Poverty Ranking and Program Participation

We begin this section by presenting results from first stage of the instrumental variable approach described in the last section, using poverty ranking as the underlying allocation rule. Figures 2.1 and 2.2 depict the relationship between the running variable (centered poverty rank) and the probability of participation in free food aid and public works programs respectively. For each program, the figures plot estimated probability of participation against the centered poverty rank, defined simply as the difference between the household's poverty rank and its village's program quota. They also show estimated regression lines on each side of the cut-off point, where the vertical distance between them measures the size, if any, of the discontinuity at the cut-off point.

Figure 2.1: Poverty Ranking and Probability of Receiving Free Food Aid

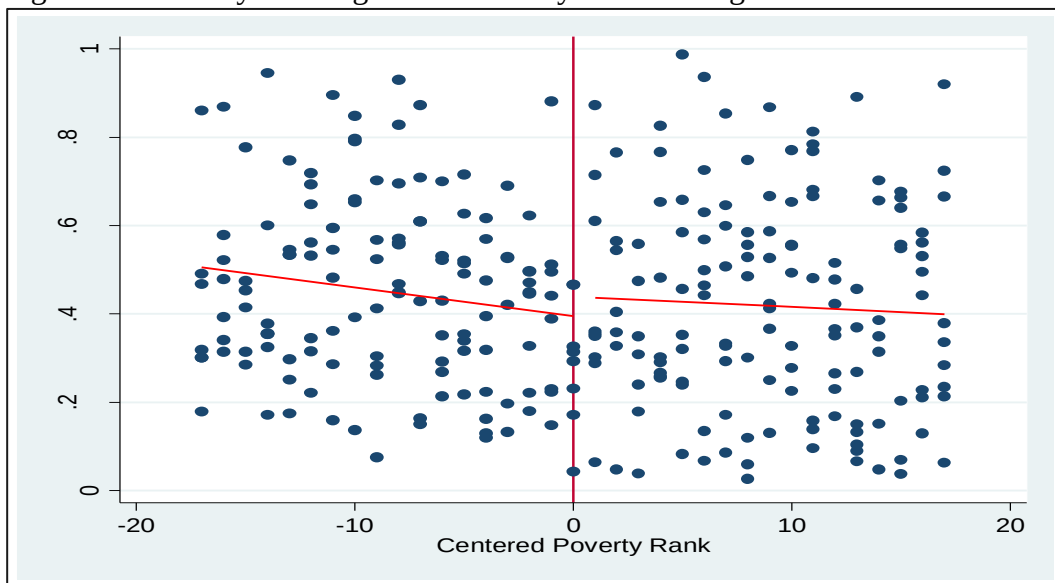
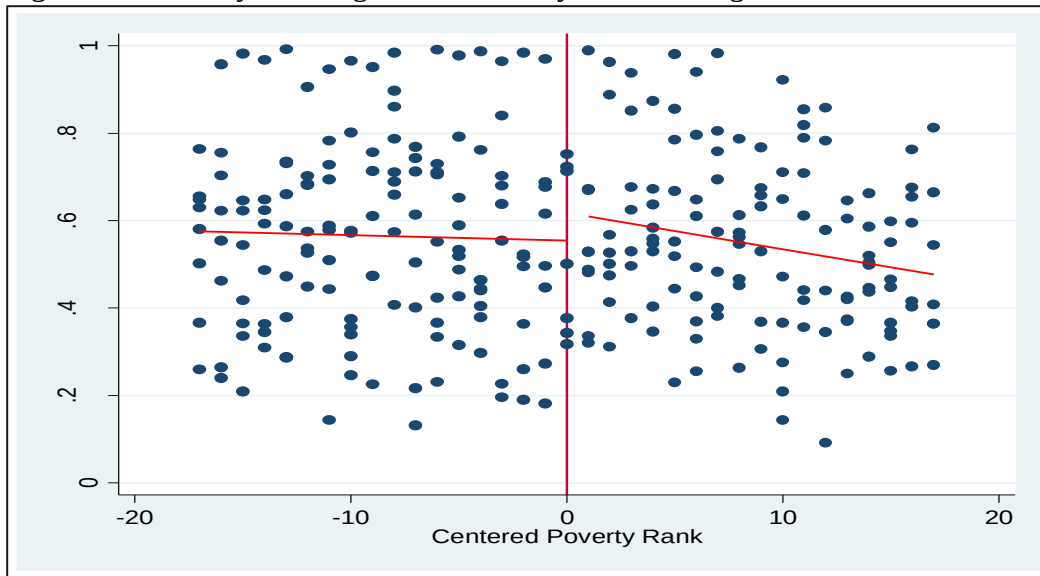


Figure 2.2: Poverty Ranking and Probability of Receiving Public Works Benefits



Figures 2.1 and 2.2 do not appear to show the presence of any relationship between the running variable and the likelihood of a potential beneficiary receiving benefits. They also show no evidence discontinuity at the cut-off point. OLS estimations of the first stage regressions, shown in Table 2.5, confirm our observations from these figures. Not only is there no evidence of significant discontinuity at the cut-off point but the direction of the discontinuity is contrary to our expectations that households below the cut-off point are considered relatively poorer and thus more deserving of receiving benefits. Probit estimates of the participation equations, shown in Table B5 of Appendix B, are qualitatively similar to those shown in Table 2.5.

Table 2.5: Poverty Ranking and the Probability of Receiving Benefits

Variable	All Villages		Excluding Outliers	
	FFD (1)	PW (2)	FFD (3)	PW (4)
Eligible to Receive Free Food Aid Benefits	-0.132 (0.121)		-0.181 (0.134)	
Eligible to Receive Public Works Benefits		-0.057 (0.103)		-0.054 (0.119)
Poverty Rank	-0.008 (0.005)	-0.002 (0.005)	-0.010 (0.006)	-0.002 (0.006)
Land Owned in Hectares, 1999	-0.030 (0.024)	0.069 (0.056)	-0.036 (0.027)	0.079 (0.084)
Livestock Units, 1999	-0.011 (0.019)	-0.029** (0.013)	-0.009 (0.020)	-0.040** (0.012)
Livestock Units, 1999	0.263* (0.132)	-0.312*** (0.092)	0.325** (0.130)	-0.295** (0.097)
Log of Household Size in 2002	-0.113** (0.049)	0.065 (0.086)	-0.068 (0.040)	0.070 (0.090)
Proportion of HH members <10 & >64 yrs.	-0.327* (0.168)	0.073 (0.135)	-0.380** (0.159)	0.096 (0.149)
HH Head is Married; Yes=1, No=0	0.048 (0.082)	0.143 (0.109)	0.105 (0.065)	0.182 (0.119)
HH Head is Female; Yes=1, No=0	-0.125 (0.154)	-0.199 (0.210)	-0.029 (0.126)	-0.165 (0.231)
HH Head is Farmer; Yes=1, No=0	-0.112 (0.108)	-0.162 (0.177)	-0.061 (0.093)	-0.126 (0.182)
Highest grade Completed by HH Head	0.031** (0.012)	0.001 (0.015)	0.041*** (0.010)	0.001 (0.016)
Husband/wife had serious illness, 1999-2002	-0.053 (0.056)	-0.075 (0.102)	-0.053 (0.060)	-0.073 (0.109)
Household Received Free Food Aid, 1999	-0.250** (0.093)	-0.097 (0.072)	-0.321*** (0.060)	-0.126 (0.087)
Household Participated in Public Works,	0.159 (0.102)	-0.054 (0.104)	0.137 (0.109)	-0.060 (0.104)
Household is a member of an Iddir (an informal insurance arrangement), 1999	0.114 (0.104)	-0.075 (0.094)	0.091 (0.098)	-0.070 (0.101)
Household Received other transfers remittances, 1999	0.368** (0.115)	0.095 (0.115)	0.438*** (0.103)	0.102 (0.128)
Constant	-0.188 (0.621)	1.841*** (0.474)	-0.566 (0.560)	1.717** (0.493)
R-squared	0.115	0.093	0.108	0.043
Observations	280	280	255	257
Window	+/-17	+/-17	+/-17	+/-17

Notes: * $p < .10$, ** $p < .05$, *** $p < .01$. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. FFD equation in columns 3 excludes Doma, a village with free food aid participation rate of less than 15 percent while the PW equation in column 4 excludes Korodegaga, a village whose public works participation rate exceeds 90 percent.

The lack of discontinuity as well as the insignificance of the running variable in the first stage regressions may have to do with the definition of the poverty rank itself. This ranking utilizes identical set of metrics to rank potential beneficiaries across all villages. It implicitly assumes that authorities in all villages have similar perceptions of poverty, use the same set of variables, assign same weight to each variable and ultimately rank households in all villages in the same fashion. This is tantamount to authorities in each village using some rigid national standard and/or having no discretion in deciding who gets to receive which benefit. However, responses from community surveys of the ERHS 2004, discussed in section 2.3, indicate that different villages use different guidelines in selecting beneficiaries into each program. Some villages use landlessness as the primary factor in identifying beneficiaries while others use such metrics as household size, age of household head, cattle ownership, etc. Besides, village studies contained in ERHS (2004) show that there exist differences in how different communities perceive poverty. Differences in the choice of selection criteria as well as differences in the perceptions of poverty point to the real possibility that the basic poverty ranking may not accurately capture the actual mechanism through which village authorities do the ranking, and that this shortcoming may be exacerbated when the analysis focuses on those at the margin. Owing to its failure in predicting program participation at the margin, the poverty

ranking cannot be used to estimate treatment effects using regression discontinuity. In the sections that follow, we use the criteria based ranking to predict the likelihood of participation in both programs and subsequently estimate the effects of receiving program benefits on the some measures of household wellbeing.

2.5.2 Criteria based Ranking and Program Participation

Unlike the poverty ranking, the criteria based ranking is both village and program specific. It differs by program as these two programs are designed to target different groups of households. It is also different across villages because different villages perceive poverty differently and thus utilize different set household traits in making allocation decisions. Figure 2.3 depicts the relationship between the estimated probability of receiving free food aid and our running variable – the free food aid criteria based ranking. Similarly, Figure 2.4 shows the relationship between the estimated probability of receiving public works benefits and this program’s criteria based ranking. In these first stage relationships, households below the cut-off point are considered eligible for treatment based on their village’s criteria for participation and the amount of aid their village has available. On the other hand, households with ranks above the cut-off point do not qualify to receive benefits. In each figure, the solid lines below and above the cut-off points represent separately estimated linear regression lines for the deserving and non-deserving groups respectively.

Figure 2.3: FFD Criteria based Ranking and the Probability of Receiving Free Food Aid

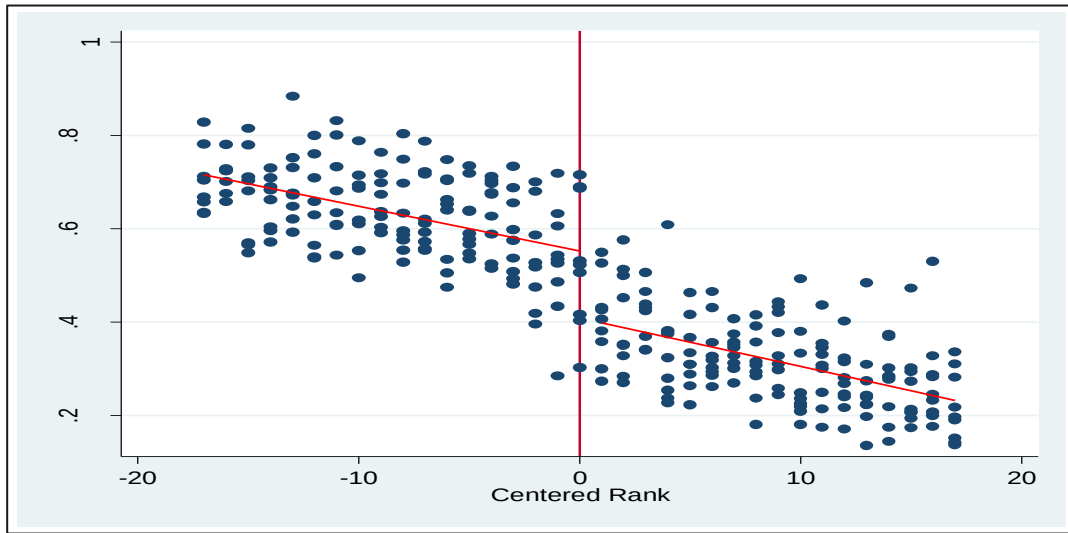
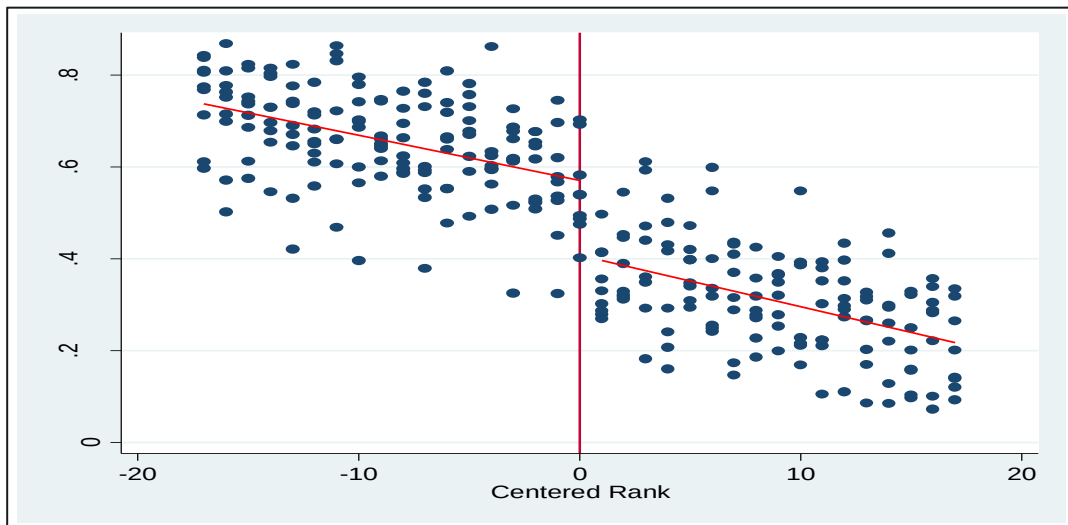


Figure 2.4: PW Criteria based Ranking and Probability of Receiving Public Works Benefits



The figures exhibit a clear negative association between each program's criteria based ranking and the probability of receiving that program's benefits. Although compliance is obviously imperfect, the figures seem to indicate that village

authorities did in fact follow the criteria they reported to have used in allocating benefits in each program. The vertical distance between the solid lines suggest that households with ranks below the cut-off point enjoyed higher chance of receiving benefits than ineligible households that almost qualified to receive these benefits. Corroborating these findings are estimates of equation 2.4*a*, shown in Table 2.6. Households that are considered deserving of free food aid had about 15 percent more chance of receiving free food aid benefits than non-deserving households that almost qualified to receive them. For the public works program, this number stands around 17 percent. For each program, results shown in columns 3 and 4 of Table 2.6 suggest that this result is robust to the exclusion of villages with unusually high or low participation rates.

Table 2.6: Criteria based Ranking and the Probability of Receiving Benefits

Variable	All Villages		Excluding Outliers	
	FFD (1)	PW (2)	FFD (3)	PW (4)
Eligible to Receive Free Food Aid Benefits	0.153* (0.069)		0.101* (0.051)	
Free Food Aid Criteria based Rank	-0.010* (0.005)		-0.010* (0.005)	
Eligible to Receive Public Works Benefits		0.171** (0.066)		0.143* (0.063)
Public Works Criteria based Rank		-0.011*** (0.002)		-0.013*** (0.002)
Proportion of HH members <10 & >64 yrs.	0.107 (0.079)	0.065 (0.098)	0.090 (0.091)	0.040 (0.098)
HH Head is Married; Yes=1, No=0	0.024 (0.031)	-0.046 (0.047)	0.040 (0.027)	-0.032 (0.053)
HH Head is Female; Yes=1, No=0	-0.012 (0.043)	0.135** (0.053)	-0.005 (0.044)	0.126 (0.067)
HH Head is Farmer; Yes=1, No=0	0.058 (0.048)	0.041 (0.042)	0.069 (0.051)	0.025 (0.047)

Highest grade Completed by HH Head	-0.007 (0.008)	0.006 (0.006)	-0.003 (0.009)	0.009 (0.006)
Husband/wife had serious illness, 1999-2002	-0.081 (0.054)	0.146** (0.052)	-0.097 (0.058)	0.159** (0.055)
Household Received Free Food Aid, 1999	0.022 (0.098)	0.031 (0.125)	-0.029 (0.100)	-0.031 (0.126)
Household Participated in Public Works, 1999	-0.080 (0.055)	-0.030 (0.062)	-0.076 (0.053)	-0.030 (0.059)
Household is a member of an Iddir (an informal insurance arrangement), 1999	-0.101 (0.071)	0.007 (0.082)	-0.113 (0.067)	0.002 (0.089)
Household Received other transfers remittances, 1999	0.065 (0.086)	0.013 (0.085)	0.116 (0.083)	0.053 (0.093)
Constant	0.329*** (0.072)	0.315*** (0.074)	0.338*** (0.081)	0.349*** (0.069)
R-squared	0.081	0.108	0.060	0.105
Observations	302	298	276	279
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p< .05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. FFD equation in columns 3 excludes Doma, a village with free food aid participation rate of less than 15 percent while the PW equation in column 4 excludes Korodegaga, a village whose public works participation rate exceeds 90 percent.

Probit estimates of equation 2.4a, shown in Table B6 of Appendix B, are qualitatively similar to those reported in Table 2.6. As a further check for robustness of these results, we considered including cubic and interaction terms in the specification for $g(r_i)$ in equation 2.4a. For various specifications of $g(r_i)$, Tables B7 and B8 of Appendix B contain these estimates for free food aid and public works programs respectively. The results indicate that the main result about the jump in the probability of receiving benefits at the cut-off point remains largely unchanged.

Excluding outlier villages from the analysis also does not appear to alter the results shown in Tables B7 and B8 of Appendix B.⁴³

In summary, our results here suggest that, albeit compliance being imperfect, village authorities were able to allocate benefits in accordance with the criteria they indicated to have used. This result is robust to changes in the specification of $g(r_i)$ in equation 2.4a as well as to the exclusion of outlier villages from the analysis. Given this, we use the deserving dummy (or an indicator of eligibility), defined on the basis of criteria based ranking, as instrument for receiving program benefits in estimating the effects of program participation on a host of outcome variables.

The next two sections present results from the second stage of the RD design outlined in section 2.3. We assess the effect of program participation on a host of outcome variables by instrumenting treatment with a deserving (or eligibility) dummy implied by the criteria based ranking. Section 2.5.3 presents results on the effect of receiving benefits on changes in real per capita consumption, changes in livestock units as well as variables indicating the liquidation of assets as a means of mitigating the effects of drought induced food shortages. In section 2.5.4, we examine if participation in either program had any effect on how favorably households view their local authorities or the government at large.

⁴³ See results in Tables B9 and B10 of Appendix B.

2.5.3 Effect of Receiving Benefits on Consumption and Assets

Table 2.7 presents baseline estimates on the effect of receiving free food aid benefits on household consumption as well as asset holdings about a year and half after the peak of the 2002/3 Ethiopian drought. These emergency food aid distributions were administered between September 2002 and April 2003. But data on outcome variables, contained in the 2004 survey round, were collected between April and July of 2004. This allows us to see if these interventions have any impact on the wellbeing of beneficiaries at least 12 months after nearly all food aid disbursements have ceased. Results contained in block (1) of Table 2.7 are from a simple OLS regression estimated over the entire sample. Results from this naïve estimation suggest that recipients and non-recipients of free food aid did not experience different rates growth in real per capita food and non-food consumption. We also notice that, compared to non-recipients, recipients of this benefit were not any more likely to grow their livestock units between 1999 and 2004. However, receipt of this benefit seems to be associated with lower likelihood of liquidating non-livestock assets as means of buffering consumption from the effects of drought. OLS estimates from the RD sample, shown in block (2), are qualitatively similar to those from the entire sample contained in block (1).

Block (3) of Table 2.7 contains results from the reduced form estimation. The results indicate that households that received free food aid benefits saw higher rates of growth in real per capita food and overall consumption growth compared to those that

did not. Similarly, results from the instrumental variable estimation, shown in block (4), show participation in the free food aid program has a positive and significant effect on rates of growth of real per capita food and overall consumption.⁴⁴ However, households who received this benefit were not any more or less likely to sell assets as a means of coping with the effects of drought.

Table 2.7: Effect of Free Food Aid Benefits on Household Consumption and Assets

Model	Variable	Growth in Real Per Capita Consumption			Asset Sales		Change in Livestock Units
		Food	Non-Food	Overall	Livestock	Non-Livestock	
		(1)	(2)	(3)	(4)	(5)	(6)
OLS (1)	Received FFD Benefits	0.093 (0.067)	0.038 (0.119)	0.069 (0.069)	-0.035 (0.036)	-0.050** (0.018)	-0.047 (0.155)
	R-squared	0.166	0.044	0.130	0.081	0.087	0.068
	Observations	690	690	691	692	689	681
	Window	All	All	All	All	All	All
OLS (2)	Received FFD Benefits	0.012 (0.073)	-0.105 (0.155)	-0.022 (0.085)	-0.071 (0.049)	-0.063** (0.027)	-0.070 (0.208)
	R-squared	0.196	0.112	0.151	0.105	0.107	0.044
	Observations	300	300	301	301	301	299
	Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17
Reduced Form (3)	Qualified for FFD Benefits	0.329* (0.159)	0.132 (0.262)	0.296* (0.138)	0.003 (0.062)	0.013 (0.027)	-0.130 (0.603)
	R-squared	0.217	0.110	0.165	0.098	0.104	0.041
	Observations	301	301	302	302	302	300
	Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17
IV Estimation (4)	Received FFD Benefits	2.233* (1.370)	0.905 (1.726)	1.977* (1.137)	0.022 (0.388)	0.087 (0.174)	-0.910 (3.761)
	R-squared	0.054	0.048	0.061	0.153	0.111	0.052
	Observations	300	300	301	301	301	299
	Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17

⁴⁴ Detailed results for the instrumental variable estimation, described in block (4) of Table 2.7, are shown in Table B11 of Appendix B.

Notes: * $p < .10$, ** $p < .05$, *** $p < .01$. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Block (1) fits OLS on the entire sample. Block (2) contains OLS estimates on the RD sample. Block (3) contains reduced form estimates on the RD sample. Block (4) contains instrumental variables estimates using the eligibility indicator implied by the free food aid criteria based ranking.

Results in Table B12 of Appendix B, which are qualitatively similar to those shown in Block (4) of Table 2.7, suggest that the main results described above remain largely unchanged when villages with unusually high or low participation rates are excluded from the analysis. The only change here is that changes in overall consumption no longer appear to mimic those of food consumption unless we allow for slightly higher margin of error. The baseline results shown in Block (4) of Table 2.7 assume $g(r_i)$ in equation 2.4a is linear in r_i . In Table B13 of Appendix B, we relax this assumption by allowing $g(r_i)$ to take a cubic specification. But relaxing this assumption does not appear to have changed the results discussed earlier, implying that our main results are robust to alternative specifications.

The main result here is that free food aid receipts during the 2002/3 Ethiopian drought had a significant effect on consumption at least a year after most aid deliveries have stopped. While the estimate is not robust to alternative specifications, participation in this program is also associated with increased rate of growth in overall real per capita consumption. The relative boost in food consumption on the part of free food aid beneficiaries is perhaps due to effectiveness of this program in targeting the very poor. Similar to Clay et al. (1999) and Gilligan and Hoddinott (2004), our results also indicate that free food aid programs were more effective than public works

programs in targeting poor households with elderly and/or disabled members.

Beneficiaries of this program (presumably the very poor) probably spend very little on non-food consumption items even when there is no drought such that drought induced substitution effects are negligible. In situations like this, one would expect free food aid benefits to directly boost food consumption on the part of beneficiaries.⁴⁵ Yet, non-beneficiaries of this program, who are of similar pre-intervention characteristics as beneficiaries, will likely not experience similar growth in their food consumption because they too may not have enough resources to buffer their food consumptions with. Also, it comes as no surprise that, in some cases, differences in rates of growth of overall real consumption between beneficiaries and non-beneficiaries reflect those of real food consumption.

Our main results are similar to those of Gilligan and Hoddinott (2006). Given that this component of the food aid program only accounts for about 10 percent of the total food aid resources, Gilligan and Hoddinott (2006) cite their results as providing some support to the notion that free food aid programs are effective in boosting food consumption in a manner that is cost effective. Because the outcome variables are observed at least a year after most free food distributions have stopped, they suggest that their results can be seen as providing some evidence about the long term effects of the free food aid programs. But because some households receiving free food aid also

⁴⁵ Gilligan and Hoddinott (2006) also find similar results.

receive public works employment, our results may also be capturing the effect of benefits received from public works programs. To test if this is the case, we re-estimated our baseline model by excluding households that received public works benefits from the program. Our results show that when these observations are excluded, free food aid receipts no longer appear to have a significant effect on the rate of growth of food consumption, suggesting that their effects may not last long.

Table 2.8 contains estimates on the effect of public works employment on household consumption and assets.⁴⁶ Results from the instrumental variable model, shown in block (4) of Table 2.8, indicate that recipients of this benefit were not any more or less likely to liquidate livestock or non-livestock assets to help cover the drought induced consumption gaps. Participation in this program is also not associated with changes in the participating household's stock of livestock units relative to those of non-participating households. In contrast to the results shown in Table 2.7, participation in public works employment is not associated with higher rates of growth in real per capita food or overall consumption. Rather, we notice participation in this program as causing a dip in the growth of real per capita consumption of non-food items. Estimates contained in Table B15 of Appendix B suggest that these results are robust to the exclusion of outlier villages from estimation. Results in Table B16 of

⁴⁶ Detailed results for the instrumental variable model, summarized in block (4) of Table 2.8, are shown in Table B14 of Appendix B.

Appendix B also show that these results are robust to alternative specifications of $g(r_i)$ in equation 2.4a.

Table 2.8: Effect of Public Works Benefits on Household Consumption and Assets

Model	Variable	Growth in Real Per Capita Consumption			Asset Sales		Change in Livestock Units
		Food	Non-Food	Overall	Livestock	Non-Livestock	
		(1)	(2)	(3)	(4)	(5)	(6)
OLS (1)	Received PW Benefits	0.038 (0.081)	-0.028 (0.174)	0.011 (0.068)	0.109** (0.043)	0.001 (0.020)	-0.054 (0.151)
	R-squared	0.188	0.070	0.151	0.112	0.107	0.093
	Observations	692	692	693	694	691	683
	Window	All	All	All	All	All	All
OLS (2)	Received PW Benefits	0.026 (0.098)	0.181 (0.186)	0.041 (0.088)	0.110 (0.093)	-0.038 (0.024)	-0.387 (0.252)
	R-squared	0.161	0.135	0.141	0.125	0.132	0.171
	Observations	298	298	298	297	295	292
	Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17
Reduced Form (3)	Qualified for PW Benefits	0.119 (0.250)	-0.368 (0.213)	0.042 (0.197)	0.122 (0.126)	-0.018 (0.083)	0.842 (0.703)
	R-squared	0.162	0.138	0.141	0.131	0.135	0.179
	Observations	298	298	298	297	295	292
	Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17
IV Estimation (4)	Received PW Benefits	0.696 (1.340)	-2.155* (1.230)	0.245 (1.051)	0.737 (0.754)	-0.105 (0.451)	4.030 (2.941)
	R-squared	0.070	0.075	0.093	0.061	0.104	0.115
	Observations	298	298	298	297	295	292
	Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17

Notes: * $p < .10$, ** $p < .05$, *** $p < .01$. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off ranks. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Block (1) fits OLS on the entire sample. Block (2) contains OLS estimates on the RD sample. Block (3) contains reduced form estimates on the RD sample. Block (4) contains instrumental variables estimates using the eligibility indicator implied by the public works criteria based ranking.

The negative and significant association between participation in public works programs and the rate of growth of non-food consumption is quite perplexing.

Nevertheless, we try to explain it in terms of increased substitution effects that can possibly be attributed to the inadequacy of this program's benefits to fully account for food consumption gaps created by the drought. The argument goes like this. The average public works participant is relatively younger, owns more livestock and land, and has marginally higher real per capita consumption than the average non-participant. The flip side of this premise is that non-participants of the public works program are relatively poorer, older, have fewer assets and perhaps more suited to receive free food aid benefits. The implication of this is that, compared to non-recipients, recipients of public works benefits have more resources they can shift toward food consumption when the need arises. It then follows that if the amount of public works benefits that reach the hands of program participants are not enough to make up for the drought induced food consumption shortfalls, then the consequent substitution effect will likely cause a dip in the consumption of non-food items on the part of participants. In addition, public works participants are required to work on public projects. Given that these households also work on their own farms, the additional work effort they provide to public works projects increases their need for more energy which then translates into increased food consumption and subsequently reduced non-food consumption. To see if our results are sensitive to the presence, in the sample, of households who participated in both programs, we re-estimated the model by only selecting those who participated in public works programs. However, this exercise does not seem to alter the main results shown in Table 2.8.

To summarize, our results show that neither program was effective in preventing beneficiaries from liquidating assets, livestock or otherwise, in an attempt to cover drought induced consumption shortfalls. Additionally, neither program was effective in growing the stock of livestock units of beneficiaries relative to non-beneficiaries. However, participation in the free food aid program appears to have a positive and significant effect on the rates of growth of food and overall consumption although this effect dissipates when households who also received public works benefits are excluded from the analysis. Conversely, participation in public works employment is found to have a significant but negative effect on the rate of growth of non-food consumption items.

2.5.4 Effect of Receiving Benefits on Household Views of Trust and Fairness

The lack of rigid standards dictating the allocation of benefits obviously increases the odds of some households being wrongly excluded and of others being wrongly included into these programs. This problem may be exacerbated by the lack reliable data to accurately gauge the level of need that potential beneficiaries may have. Besides, the incentives literature identifies problems associated with the possibility of local authorities trying to use their administrative roles as opportunities to demand bribes and/or buy votes or political loyalty. In situations like this, households that are excluded from participation may view the allocation process as unfair and perhaps hold unfavorable views toward their local authorities or the government at large. On the other hand, those that actually received benefits will

likely believe they were treated fairly and thus hold favorable views toward those in charge of making allocation decisions. This section tries to test the validity of this hypothesis.

Table 2.9 contains estimates measuring the effect of receiving free food aid on the favorability of views that households hold toward the fairness of the allocation process as well as their local administrators, other government officials and the government itself. Results from OLS and reduced form estimations do not show any significant difference between the views held by recipients and non-recipients of free food aid. Program participation does not appear to have any influence on how favorably households judge the allocation process or view the government and its officials. But estimates from the instrumental variable approach, shown in Block (4)⁴⁷, indicate that recipients of this benefit tend to hold more favorable views toward higher level government officials and the government itself although these favorable views do not extend to also include local authorities. Results estimated by excluding outlier villages from the analysis (not shown here) are similar to the ones presented in Table 2.9. Similarly, estimates contained in Table B18 of Appendix B show that this result about program beneficiaries holding a favorable view toward the government is robust to alternative specification of $g(r_i)$ in equation 2.4a. However, receipt of this benefit appears to have little to do with how households view government officials.

⁴⁷ Detailed results for the instrumental variable model are shown in Table B17 of Appendix B.

Table 2.9: Effect of Free Food Aid on Household Views of Trust and Allocation Fairness

Model	Variable	Trust in			Fairness of Allocation of Benefits
		Government	Government Officials	Village Officials	
		(1)	(2)	(3)	(4)
OLS (1)	Received FFD Benefits	0.010 (0.028)	0.026 (0.022)	-0.017 (0.048)	-0.086 (0.091)
	R-squared	0.052	0.064	0.050	0.030
	Observations	693	693	693	672
	Window	All	All	All	All
OLS (2)	Received FFD Benefits	0.013 (0.039)	0.005 (0.041)	-0.024 (0.063)	-0.052 (0.100)
	R-squared	0.079	0.090	0.075	0.069
	Observations	302	302	302	296
	Window	+/-17	+/-17	+/-17	+/-17
Reduced Form (3)	Qualified for FFD Benefits	0.112 (0.077)	0.126 (0.074)	-0.051 (0.121)	0.010 (0.185)
	R-squared	0.080	0.095	0.077	0.073
	Observations	303	303	303	297
	Window	+/-17	+/-17	+/-17	+/-17
IV Estimation (4)	Received FFD Benefits	0.738* (0.423)	0.826** (0.392)	-0.338 (0.751)	0.066 (0.952)
	R-squared	0.071	0.081	0.068	0.067
	Observations	302	302	302	296
	Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Block (1) fits OLS on the entire sample. Block (2) contains OLS estimates on the RD sample. Block (3) contains reduced form estimates on the RD sample. Block (4) contains instrumental variables estimates using the eligibility indicator implied by the free food aid criteria based ranking.

Results on the effect of public works employment on household confidence in the government and the fairness of the allocation process are shown in Table 2.10. OLS estimates in Blocks (1) and (2) suggest that program participation has no influence on their assessment of allocation fairness as well as on their ratings of the government and its officials, including those in charge of making allocation decisions.

However, results from the reduced form and instrumental variable approaches, shown in Blocks (3) and (4)⁴⁸, indicate that participation in public works employment is associated with households viewing their local authorities and the government more favorably. But our results also indicate that program participation does not appear to influence post-intervention household ratings of the allocation fairness. Again, results in Table B19 of Appendix B, which are similar to the ones shown in Table B20, suggest that the results described above are robust to alternative specifications of $g(r_i)$ in equation 2.4a.

Table 2.10: Effect of Receiving PW Benefits on Household Views of Trust and Allocation Fairness

Model	Variable	Trust in			Fairness of Allocation of benefits
		Government	Government Officials	Village Officials	
		(1)	(2)	(3)	(4)
OLS	Received PW Benefits	0.035 (0.022)	0.035 (0.025)	0.018 (0.043)	0.007 (0.093)
	R-squared	0.526	0.654	0.048	0.026
	Observations	695	695	695	674
	Window	All	All	All	All
OLS	Received PW Benefits	-0.010 (0.043)	-0.003 (0.047)	-0.027 (0.050)	0.090 (0.113)
	R-squared	0.073	0.094	0.047	0.054
	Observations	298	298	298	292
	Window	+/-17	+/-17	+/-17	+/-17
Reduced Form	Qualified for PW Benefits	0.254* (0.120)	0.170 (0.119)	0.205** (0.077)	0.048 (0.220)
	R-squared	0.090	0.102	0.059	0.052
	Observations	298	298	298	292
	Window	+/-17	+/-17	+/-17	+/-17
IV	Received PW	1.491**	0.994	1.203**	0.271

⁴⁸ Detailed results for the instrumental variable model are shown in Table B19 of Appendix B.

Estimation	Benefits	(0.738)	(0.743)	(0.595)	(1.078)
	R-squared	0.065	0.048	0.059	0.043
	Observations	298	298	298	292
	Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p< .05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Block (1) fits OLS on the entire sample. Block (2) contains OLS estimates on the RD sample. Block (3) contains reduced form estimates on the RD sample. Block (4) contains instrumental variables estimates using the eligibility indicator implied by the public works criteria based ranking.

To summarize, the results in this section seem to indicate that receiving benefits from either program does not have any influence on household ratings of the allocation process post-intervention. Program beneficiaries were not likely to rate the allocation process any more or less favorably than non-beneficiaries. On the contrary, participation in either program tends to influence the views that households hold toward the government and its officials. Beneficiaries of either program appear to be more trusting of the government and/or its officials than their non-participant counterparts. However, we refrain from interpreting this result as providing evidence on local authorities bending allocation rules to benefit those that they like and recipients returning the favor by being loyal to them and/or the government. Our results from the first stage regressions, described earlier in this section, show that the village authorities were successful in allocating benefits in accordance with the selection criteria they reported to have used. The implication here is that post-intervention ratings on program fairness will not exhibit much variance in part due to the lack of significant leakage and under-coverage of benefits resulting from a very successful targeting of benefits. This is consistent with our observations in section 2.4 that recipients of either program did not rate the allocation process any more or less

favorably than their non-recipient counterparts. Thus, the increased confidence that beneficiaries have in their government or its officials may simply be a reflection of the relief and/or optimism that results from being able to receive some help when they need it most.

2.6 Conclusion

This essay tries to examine the effect of emergency aid interventions during the 2002/3 Ethiopian drought on measures of household wellbeing about a year and half after the peak of the drought. These emergency interventions distributed resources in the form of free food aid and public works benefits, a program that requires households to provide labor resources in exchange for receiving benefits. The allocation of benefits was targeted, with each program targeting different groups of households based on a multitude of pre-intervention household characteristics including land ownership, assets and demographics. We use the exogenous variation that these criteria provide to estimate the effect program participation on some measures of household wellbeing using fuzzy regression discontinuity. Specifically, we rank households in each village for eligibility to participate in either program based on the selection criteria that village authorities reported to have used in making allocation decisions. We use this criteria-based ranking of potential beneficiaries as a forcing variable in our RD design.

Results from the first stage of our baseline model indicate that, although compliance is imperfect, village authorities were able to allocate benefits in accordance with the criteria they reported to have used. In each program, households that were deemed eligible based on the criteria-based ranking had a higher chance of receiving benefits. Our estimates show that households that this ranking deemed eligible to receive free food aid benefits had about 15 percent more chance of actually receiving these benefits than those it almost deemed eligible to receive them. For the public works program, this number stands around 17 percent. This result is robust to alternative specifications as well as to the exclusion of outlier villages from the analysis.

Despite the allocation of benefits being progressive, our results from the second stage of the RD estimation seem to indicate that neither program was effective at preventing beneficiaries from depleting assets, livestock or otherwise, often triggered by drought induced consumption shortfalls. Compared to their non-recipient counterparts, recipients of either benefit did not do any better in terms of growing their livestock units. But, participation in the free food aid program appears to have a positive and significant effect on the rates of growth of food and overall consumption. We explain this result in terms of the relative success of free food aid programs in identifying the very poor, elderly and/or disabled members of community with little to no support system. Because the very poor, often beneficiaries of free food aid programs, have little non-food consumption items to smooth their food consumptions

with, most, if not all, of any assistance they receive will likely be used to boost their food consumption. In contrast, non-recipients of this benefit, who by design have similar pre-intervention characteristics as their recipient counterparts but are lacking in resources to boost their food consumptions with, will likely experience a dip in their food consumption. While this result is robust to alternative specifications and the exclusion of outlier villages, we were not able to replicate it when we exclude households who received public works benefits from the analysis. All of these suggest that the effect that free food aid benefits have on household food consumption may not be long lasting.

Participation in public works employment appears to have a significant but negative effect on the rate of growth of non-food consumption items. While this result is contrary to our expectations, we try to explain it in terms of the substitution effects possibly caused by the inadequacy of program benefits to fully account for the drought induced gaps in food consumption. Assuming that public works participants are relatively richer, the inadequacy of public works benefits may lead to a decrease in non-food consumption items due to the substitution effect. The increase in work effort that these programs require could lead to an increase in calorie requirements on the part of participants. Faced with inadequate benefits, participants of this program may resort toward transferring resources from the consumption of non-food items as a means of buffering their food consumption.

As a test for the presence of deliberate misallocation of benefits, we also attempted to see if participation in either program shapes post-intervention household

views toward program administrators and the programs themselves. Our results seem to show that program participation does not appear to have any influence on post-intervention household assessments of allocation fairness. But receipt of benefits from either program is associated with households holding more favorable views toward the government and its officials. Given the progressive nature of the allocation process, we refrain from interpreting this result as recipients being loyal toward those who selected them for participation. Rather, we interpret it in terms of the relief and optimism associated with securing help during a crisis situation.

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Appendix A
ADDITIONAL TABLES FROM ESSAY I

Table A1: Food Security Scale

Item	Observations	item-test correlation	item-rest correlation	avg. inter item correlation	alpha
Cut food – adult males	776	0.85	0.70	.66	0.64
Cut food – adult females	776	0.88	0.75	.61	0.61
Cut food – children	776	0.80	0.60	.75	0.70
Day without food	776	0.53	0.27	1.24	0.85
Test scale				.82	0.77

Source: Own calculation from ERHS (2004)

Table A2: Probit Participation Equations – Full Sample

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
Rank	-0.005*** (0.001)	0.000 (0.001)	-0.005*** (0.002)	-0.001 (0.002)	-0.006*** (0.002)	-0.000 (0.002)
<u>Assets</u>						
Land Owned in Hectares,	-0.028 (0.045)	0.198** (0.080)	-0.028 (0.043)	0.202*** (0.074)	-0.031 (0.040)	0.199*** (0.075)
Livestock Units, 1999	-0.013 (0.034)	-0.044 (0.030)	-0.011 (0.033)	-0.042 (0.029)	-0.008 (0.032)	-0.042 (0.028)
<u>Demographics</u>						
Log of HH Head's Age, 2002	0.460* (0.250)	-0.825*** (0.196)	0.448* (0.248)	-0.824*** (0.197)	0.439* (0.252)	-0.826*** (0.196)
Log of Household Size in	-0.166 (0.126)	0.226** (0.088)	-0.158 (0.128)	0.207** (0.088)	-0.182 (0.140)	0.216*** (0.072)
Proportion of HH members <10 & >64 yrs.	-0.182 (0.271)	-0.023 (0.329)	-0.193 (0.274)	-0.036 (0.334)	-0.189 (0.286)	-0.029 (0.337)
HH Head is Married; Yes=1, No=0	0.008 (0.138)	0.332*** (0.127)	0.010 (0.137)	0.338*** (0.126)	0.008 (0.139)	0.332*** (0.125)
HH Head is female; Yes=1, No=0	0.126 (0.154)	-0.269 (0.228)	0.125 (0.156)	-0.269 (0.226)	0.141 (0.154)	-0.265 (0.225)
HH Head is farmer; Yes=1, No=0	-0.051 (0.182)	-0.225 (0.177)	-0.053 (0.183)	-0.225 (0.175)	-0.045 (0.177)	-0.223 (0.176)
Highest grade Completed by HH Head	0.046 (0.030)	-0.034 (0.024)	0.044 (0.030)	-0.034 (0.024)	0.042 (0.029)	-0.035 (0.024)
<u>Connections</u>						
Head's Friends or Associates hold official position	0.219** (0.086)	-0.032 (0.146)	0.230*** (0.084)	-0.029 (0.147)	0.228*** (0.082)	-0.029 (0.148)
Head's parents are important in village social life	-0.193 (0.144)	0.287** (0.133)	-0.196 (0.148)	0.290** (0.132)	-0.185 (0.150)	0.290** (0.133)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	0.137 (0.097)	-0.373*** (0.087)	0.128 (0.095)	-0.375*** (0.089)	0.122 (0.090)	-0.374*** (0.089)
Husband/wife died , 1999- 2002	0.171 (0.225)	0.126 (0.243)	0.161 (0.233)	0.121 (0.241)	0.171 (0.230)	0.127 (0.245)
Severity of shocks, 1999- 2002 (a composite metric)	0.232*** (0.087)	0.038 (0.064)	0.223** (0.087)	0.040 (0.064)		
<u>Prior Participation</u>						
Household Received Free Food Aid, 1999	-0.009 (0.135)		-0.007 (0.134)		-0.009 (0.131)	
Household Participated in Public Works, 1999	0.171 (0.303)	0.171 (0.303)		0.168 (0.305)		0.171 (0.304)
Household Received other transfers/remittances, 1999	-0.195* (0.114)	-0.265 (0.168)	-0.189* (0.110)	-0.265 (0.169)	-0.200* (0.112)	-0.265 (0.167)
Constant	-1.592 (1.162)	2.762*** (0.794)	-1.556 (1.176)	2.780*** (0.795)	-1.451 (1.178)	2.782*** (0.794)
R-squared						
Observations	691	693	691	693	691	693

Notes: * p<.10, ** p<.05, *** p<.01. Robust standard errors in parentheses are adjusted for clusters at the village level. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

Table A3: LPM Participation Equations - Excluding Outliers

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
Rank	-0.002*** (0.000)	-0.000 (0.001)	-0.002** (0.001)	-0.000 (0.001)	-0.002*** (0.001)	-0.000 (0.001)
<u>Assets</u>						
Land Owned in Hectares,	-0.009 (0.019)	0.062 (0.037)	-0.009 (0.018)	0.065* (0.034)	-0.011 (0.017)	0.063 (0.035)
Livestock Units, 1999	-0.004 (0.013)	-0.019 (0.015)	-0.003 (0.013)	-0.018 (0.015)	-0.002 (0.012)	-0.018 (0.014)
<u>Demographics</u>						
Log of HH Head's Age, 2002	0.219** (0.083)	-0.261*** (0.065)	0.215** (0.082)	-0.260*** (0.066)	0.213** (0.083)	-0.261*** (0.065)
Log of Household Size in 2002	-0.040 (0.044)	0.070* (0.032)	-0.037 (0.044)	0.061* (0.030)	-0.046 (0.049)	0.067** (0.025)
Proportion of HH members <10 & >64 yrs.	-0.076 (0.110)	-0.019 (0.129)	-0.079 (0.112)	-0.024 (0.131)	-0.079 (0.116)	-0.020 (0.132)
HH Head is Married; Yes=1, No=0	0.039 (0.039)	0.132** (0.049)	0.039 (0.039)	0.135** (0.048)	0.039 (0.039)	0.132** (0.048)
HH Head is female; Yes=1, No=0	0.092** (0.032)	-0.105 (0.087)	0.091** (0.034)	-0.105 (0.086)	0.097** (0.031)	-0.104 (0.086)
HH Head is farmer; Yes=1, No=0	0.014 (0.066)	-0.094 (0.068)	0.013 (0.066)	-0.095 (0.067)	0.015 (0.063)	-0.094 (0.067)
Highest grade Completed by HH Head	0.023* (0.011)	-0.009 (0.009)	0.023* (0.011)	-0.009 (0.009)	0.021* (0.010)	-0.009 (0.009)
<u>Connections</u>						
Head's Friends or Associates hold official position	0.079* (0.034)	-0.027 (0.059)	0.083** (0.033)	-0.025 (0.060)	0.083** (0.033)	-0.026 (0.061)
Head's parents are important in village social life	-0.073 (0.058)	0.120** (0.048)	-0.074 (0.060)	0.121** (0.047)	-0.070 (0.060)	0.121** (0.048)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	0.045 (0.041)	-0.123*** (0.034)	0.041 (0.040)	-0.124*** (0.034)	0.043 (0.038)	-0.124*** (0.034)
Husband/wife died , 1999-2002	0.067 (0.091)	0.093 (0.096)	0.063 (0.094)	0.090 (0.095)	0.065 (0.092)	0.093 (0.096)
Severity of shocks, 1999-2002 (a composite metric)	0.083** (0.035)	0.013 (0.024)	0.079* (0.035)	0.014 (0.024)		
<u>Prior Participation</u>						
Household Received Free Food Aid, 1999	-0.028 (0.047)		-0.026 (0.046)		-0.027 (0.045)	
Household Participated in Public Works, 1999		0.067 (0.115)		0.065 (0.115)		0.067 (0.115)
Household Received other transfers /remittances, 1999	-0.085 (0.045)	-0.098 (0.073)	-0.082 (0.044)	-0.098 (0.073)	-0.087* (0.044)	-0.098 (0.072)
Constant	-0.372 (0.350)	1.383*** (0.279)	-0.361 (0.360)	1.390*** (0.281)	-0.325 (0.355)	1.390*** (0.279)
R-squared	0.057	0.102	0.056	0.102	0.057	0.103
Observations	630	602	630	602	630	602

Notes: * p<.10, ** p<.05, *** p<.01. Robust standard errors in parentheses are adjusted for clusters at the village level. FFD equations exclude Doma, a village with very low FFD participation rate while the PW equations in exclude Korodegaga, a village with very high PW participation rate.. Estimates for village dummies are not shown in this result.

Table A4: Wild Bootstrap Estimates of Participation Equations - Excluding Outliers

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
Rank	-0.002*** (0.006)	0.000 (0.941)	-0.002* (0.062)	0.000 (0.442)	-0.002** (0.018)	0.000 (0.793)
<u>Assets</u>						
Land Owned in Hectares, 1999	-0.009 (0.579)	0.062 (0.226)	-0.009 (0.561)	0.065 (0.164)	-0.011 (0.442)	0.063 (0.220)
Livestock Units, 1999	-0.004 (0.805)	-0.019 (0.172)	-0.003 (0.815)	-0.018 (0.200)	-0.002 (0.895)	-0.018 (0.168)
<u>Demographics</u>						
Log of HH Head's Age, 2002	0.219* (0.054)	-0.261** (0.022)	0.215* (0.054)	-0.260** (0.022)	0.213* (0.060)	-0.261** (0.022)
Log of Household Size in 2002	-0.040 (0.414)	0.070** (0.040)	-0.037 (0.416)	0.061* (0.052)	-0.046 (0.374)	0.067*** (0.010)
Proportion of HH members <10 & >64 yrs.	-0.076 (0.474)	-0.019 (0.839)	-0.079 (0.464)	-0.024 (0.813)	-0.079 (0.478)	-0.020 (0.831)
HH Head is Married; Yes=1, No=0	0.039 (0.342)	0.132** (0.026)	0.039 (0.346)	0.135** (0.024)	0.039 (0.342)	0.132** (0.026)
HH Head is Female; Yes=1, No=0	0.092** (0.042)	-0.105 (0.340)	0.091** (0.050)	-0.105 (0.338)	0.097** (0.040)	-0.104 (0.340)
HH Head is Farmer; Yes=1, No=0	0.014 (0.739)	-0.094 (0.260)	0.013 (0.779)	-0.095 (0.256)	0.015 (0.741)	-0.094 (0.260)
Highest grade Completed by HH Head	0.023* (0.080)	-0.009 (0.410)	0.023* (0.072)	-0.009 (0.418)	0.021* (0.074)	-0.009 (0.416)
<u>Connections</u>						
Friends or Associates hold official position	0.079** (0.048)	-0.027 (0.653)	0.083** (0.042)	-0.025 (0.669)	0.083** (0.038)	-0.026 (0.665)
Head's parents are important in village social life	-0.073 (0.334)	0.120** (0.026)	-0.074 (0.346)	0.121** (0.024)	-0.070 (0.338)	0.121** (0.026)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	0.045 (0.324)	-0.123* (0.058)	0.041 (0.374)	-0.124* (0.066)	0.043 (0.302)	-0.124* (0.066)
Husband/wife died, 1999-2002	0.067 (0.659)	0.093 (0.537)	0.063 (0.661)	0.090 (0.551)	0.065 (0.675)	0.093 (0.533)
Severity of shocks (a composite metric)	0.083 (0.114)	0.013 (0.623)	0.079 (0.114)	0.014 (0.631)		
<u>Prior Participation</u>						
Household Received Free Food Aid in 1999	-0.028 (0.561)		-0.026 (0.591)		-0.027 (0.565)	
Household Participated in Public Works 1999		0.067 (0.733)		0.065 (0.737)		0.067 (0.807)
Household Received transfers/other remittances in	-0.085 (0.114)	-0.098 (0.196)	-0.082 (0.130)	-0.098 (0.200)	-0.087* (0.092)	-0.098 (0.184)
Observations	630	602	630	602	630	602

Notes: * p<.10, ** p<.05, *** p<.01. Robust standard errors in parentheses are adjusted for clusters at the village level. FFD equations exclude Doma, a village with very low FFD participation rate while the PW equations in exclude Korodegaga, a village with very high PW participation rate.. Estimates for village dummies are not shown in this result.

Table A5: Wild Bootstrap Estimates of Exclusion Errors – Full Sample

Variable	Poverty Ranking		FS Ranking		Shock Ranking	
	FFD	PW	FFD	PW	FFD	PW
Rank	0.003*** (0.004)	0.000 (0.837)	0.002 (0.384)	0.000 (0.845)	0.001 (0.617)	0.000 (0.985)
<u>Assets</u>						
Land Owned in Hectares, 1999	-0.005 (0.943)	-0.015 (0.422)	0.014 (0.811)	-0.025 (0.138)	0.089 (0.170)	-0.039 (0.108)
Livestock Units, 1999	0.020 (0.274)	0.001 (0.893)	0.010 (0.563)	0.006 (0.645)	0.014 (0.364)	0.004 (0.605)
<u>Demographics</u>						
Log of HH Head's Age, 2002	-0.142 (0.308)	0.253** (0.048)	-0.153 (0.240)	0.278** (0.012)	-0.196 (0.140)	0.273** (0.026)
Log of Household Size in 2002	-0.003 (0.953)	-0.021 (0.761)	0.033 (0.607)	-0.048 (0.380)	-0.026 (0.783)	-0.033 (0.452)
Proportion of HH members <10 & >64 yrs.	0.125 (0.234)	-0.047 (0.665)	0.008 (0.919)	-0.076 (0.621)	0.089 (0.484)	-0.046 (0.773)
HH Head is Married; Yes=1, No=0	-0.107 (0.152)	-0.138* (0.076)	-0.051 (0.454)	-0.142* (0.050)	-0.086 (0.222)	-0.167** (0.040)
HH Head is female; Yes=1, No=0	0.012 (0.929)	0.063 (0.330)	0.092 (0.416)	0.047 (0.599)	0.042 (0.631)	0.017 (0.773)
HH Head is farmer; Yes=1, No=0	0.194 (0.206)	0.062 (0.330)	0.159 (0.242)	0.034 (0.583)	0.146 (0.276)	0.027 (0.661)
Highest grade Completed by HH Head	-0.016 (0.346)	0.013 (0.248)	-0.028** (0.042)	0.010 (0.306)	-0.035 (0.130)	0.013 (0.200)
<u>Connections</u>						
Head's Friends or Associates hold official position	-0.128** (0.032)	-0.022 (0.755)	-0.050 (0.270)	0.008 (0.935)	-0.100** (0.046)	-0.010 (0.915)
Head's parents are important in village social life	0.092** (0.038)	-0.100 (0.136)	0.106 (0.142)	-0.072 (0.256)	0.087* (0.080)	-0.073 (0.274)
<u>Shocks</u>						
Husband/wife had serious illness, 1999-2002	0.163*** (0.006)	0.160*** (0.000)	-0.146 (0.254)	0.141* (0.056)	-0.175** (0.042)	0.193*** (0.000)
Husband/wife died , 1999-2002	0.029 (0.811)	-0.007 (0.967)	-0.006 (0.951)	-0.060 (0.671)	0.030 (0.771)	-0.088 (0.611)
Severity of shocks, 1999-2002 (a composite metric)	-0.050 (0.172)	-0.084 (0.144)	-0.078 (0.238)	-0.085 (0.256)		
<u>Prior Participation</u>						
Household Received Free Food Aid, 1999	0.047 (0.517)		0.050 (0.436)		0.092 (0.218)	
Household Participated in Public Works, 1999		-0.073 (0.521)		-0.105 (0.571)		-0.083 (0.519)
Household Received other transfers/remittances, 1999	0.106 (0.164)	0.082 (0.372)	0.089 (0.306)	0.110 (0.162)	0.055 (0.458)	0.069 (0.432)
Observations	302	398	306	402	305	401

Notes: * p<.10, ** p< .05, *** p<.01. Wild cluster bootstrapped p-values are shown in parenthesis. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

Table A6: 2SLS IV estimation of inclusion errors with endogenous FS ranking

Variable	Free Food Aid		Public works	
	OLS	2SLS	OLS	2SLS
Rank	-0.002 (0.002)	-0.001 (0.002)	0.000 (0.002)	-0.000 (0.003)
<u>Assets</u>				
Land Owned in Hectares, 1999	-0.006 (0.025)	-0.023 (0.026)	0.096 (0.084)	0.086 (0.076)
Livestock Units, 1999	0.001 (0.008)	0.001 (0.009)	-0.022 (0.017)	-0.018 (0.014)
<u>Demographics</u>				
Log of HH Head's Age, 2002	0.174 (0.107)	0.175* (0.101)	-0.243** (0.092)	-0.222*** (0.086)
Log of Household Size in 2002	-0.044 (0.059)	-0.043 (0.057)	0.113 (0.078)	0.103 (0.089)
Proportion of HH members <10 & >64 yrs.	-0.052 (0.124)	-0.031 (0.131)	-0.192 (0.146)	-0.186 (0.139)
HH Head is Married; Yes=1, No=0	-0.026 (0.078)	-0.025 (0.072)	0.088 (0.058)	0.102* (0.053)
HH Head is female; Yes=1, No=0	0.187** (0.070)	0.170** (0.066)	-0.139 (0.136)	-0.121 (0.124)
HH Head is farmer; Yes=1, No=0	0.107** (0.038)	0.110*** (0.029)	-0.124 (0.120)	-0.123 (0.113)
Highest grade Completed by HH Head	0.009 (0.013)	0.009 (0.012)	-0.010 (0.017)	-0.007 (0.017)
<u>Connections</u>				
Head's Friends or Associates hold official position	0.113** (0.048)	0.112** (0.047)	-0.011 (0.068)	-0.008 (0.060)
Head's parents are important in village social life	-0.058 (0.077)	-0.054 (0.072)	0.131* (0.057)	0.116** (0.052)
<u>Shocks</u>				
Husband/wife had serious illness, 1999-2002	-0.079 (0.102)	-0.062 (0.097)	-0.103 (0.131)	-0.094 (0.132)
Husband/wife died , 1999-2002	0.106 (0.135)	0.104 (0.119)	-0.008 (0.118)	-0.009 (0.110)
Severity of shocks, 1999-2002 (a composite metric)	0.065 (0.045)	0.062 (0.040)	-0.060* (0.031)	-0.052 (0.032)
<u>Prior Participation</u>				
Household Received Free Food Aid, 1999	0.045 (0.049)	0.056 (0.047)		
Household Participated in Public Works, 1999			0.051 (0.072)	0.045 (0.062)
Household Received other transfers/remittances, 1999	-0.062 (0.065)	-0.067 (0.058)	-0.056 (0.071)	-0.062 (0.062)
Constant	-0.251 (0.430)	-0.271 (0.406)	1.401** (0.448)	1.330*** (0.442)
R-squared	0.066	0.054	0.133	0.121
Joint sig of instruments (F-stat)				
Exogeneity of regressors (F-stat)				
Observations	388	376	292	283

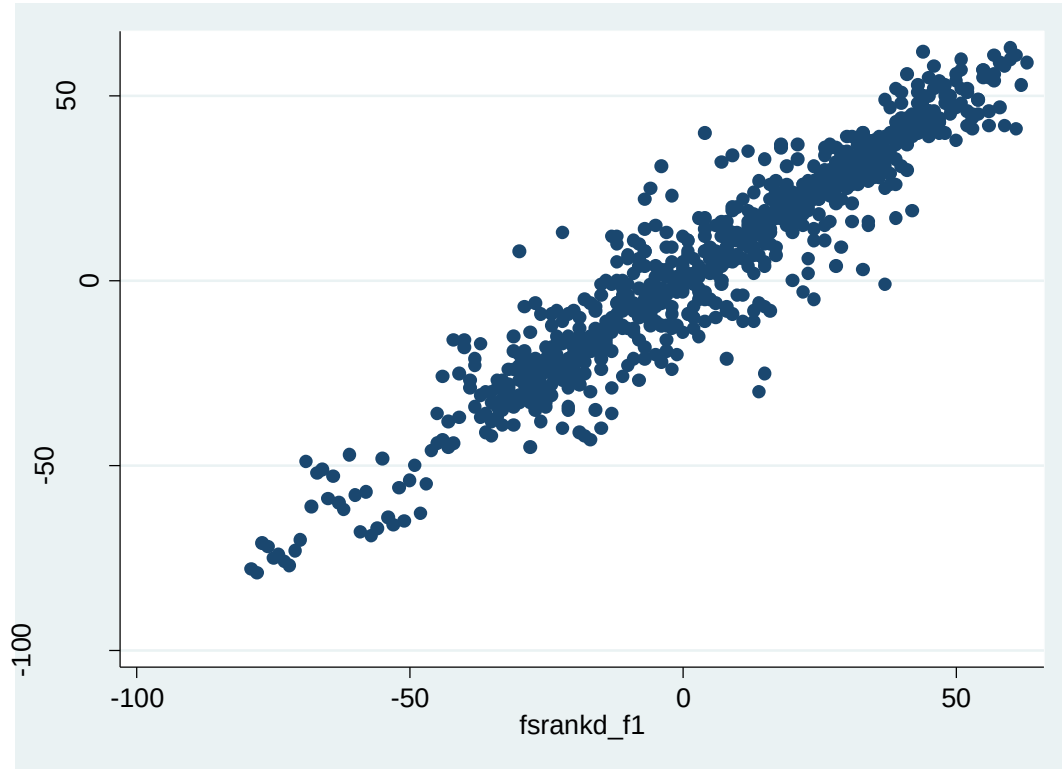
Notes: * p<.10, ** p<.05, *** p<.01. Robust standard errors in parentheses are adjusted for clusters at the village level. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

Table A7: 2SLS IV estimation of exclusion errors with endogenous FS ranking

Variable	Free food aid		Public works	
	OLS	2SLS	OLS	2SLS
Rank	0.002 (0.002)	-0.001 (0.003)	-0.000 (0.001)	-0.000 (0.001)
<u>Assets</u>				
Land Owned in Hectares, 1999	0.014 (0.053)	0.026 (0.052)	-0.025 (0.018)	-0.029 (0.019)
Livestock Units, 1999	0.010 (0.018)	0.009 (0.015)	0.006 (0.007)	0.001 (0.006)
<u>Demographics</u>				
Log of HH Head's Age, 2002	-0.153 (0.118)	-0.119 (0.136)	0.278*** (0.079)	0.322*** (0.080)
Log of Household Size in 2002	0.033 (0.055)	0.046 (0.051)	-0.048 (0.048)	-0.034 (0.041)
Proportion of HH members <10 & >64	0.008 (0.149)	0.093 (0.094)	-0.076 (0.137)	-0.054 (0.124)
HH Head is Married; Yes=1, No=0	-0.051 (0.062)	-0.023 (0.059)	-0.142** (0.058)	-0.130** (0.053)
HH Head is female; Yes=1, No=0	0.092 (0.103)	0.108 (0.097)	0.047 (0.062)	0.059 (0.057)
HH Head is farmer; Yes=1, No=0	0.159 (0.113)	0.151 (0.108)	0.034 (0.065)	0.050 (0.059)
Highest grade Completed by HH Head	-0.028* (0.013)	-0.025** (0.012)	0.010 (0.009)	0.011 (0.008)
<u>Connections</u>				
Head's Friends or Associates hold official position	-0.050 (0.038)	-0.060* (0.036)	0.008 (0.079)	0.014 (0.073)
Head's parents are important in village social life	0.106 (0.070)	0.097 (0.062)	-0.072 (0.065)	-0.068 (0.060)
<u>Shocks</u>				
Husband/wife had serious illness, 1999-2002	-0.146 (0.092)	-0.120 (0.078)	0.141*** (0.040)	0.156*** (0.044)
Husband/wife died , 1999-2002	-0.006 (0.092)	-0.022 (0.112)	-0.060 (0.120)	-0.041 (0.108)
Severity of shocks, 1999-2002 (a composite metric)	-0.078 (0.067)	-0.070 (0.054)	-0.085 (0.055)	-0.091** (0.045)
<u>Prior Participation</u>				
Household Received Free Food Aid, 1999	0.050 (0.055)	0.050 (0.062)		
Household Participated in Public Works, 1999			-0.105 (0.144)	-0.112 (0.128)
Household Received other transfers/remittances, 1999	0.089 (0.071)	0.064 (0.058)	0.110 (0.070)	0.101 (0.063)
Constant	0.962 (0.559)	0.692 (0.643)	-0.332 (0.232)	-0.565** (0.230)
R-squared	0.073	0.066	0.141	0.139
Joint sig of instruments (F-stat)		87.98		134.8
Exogeneity of regressors (F-stat)		2.43		.0176
		p = 0.160		(p = 0.898)
Observations	306	295	402	388

Notes: * p<.10, ** p<.05, *** p<.01. Robust standard errors in parentheses are adjusted for clusters at the village level. Estimates for village dummies are not shown in this result. Severity of shocks is defined as the sum of severity of agricultural, market and input related shocks that households report to have experiences between 1999 and 2002.

Figure A1: Scatter plot of the FS rank and its Instrumenting Rank



Note: *fsrankd_f* ranks households in terms of their real per capita consumption in 1999 and a food security scale generated from 2004 survey round. *fsrankd_f1* augments 1999 consumption figures with household assessments of how the 2002 drought affected their communities. The ranks are centered around zero.

Appendix B
ADDITIONAL TABLES FROM ESSAY II

Table B1: Top 3 Selection Criteria by Program and Village (September 2002 - April 2003)

Region	Village	Public Works			Free Food Aid		
		Criteria 1	Criteria 2	Criteria 3	Criteria 1	Criteria 2	Criteria 3
Tigray	Haressaw	Less/ no land	Poor	Age	age	poor	Family size / no land
	Geblen	Poor	No land		age	poor	Disability
Amhara	Dinki	Equal odds for those who like to work			Poor with no ox	Poor with one ox	Rich with two oxen
	Shumshea	People who volunteer for free Dev. work	Able to work	Resides in village	disability	age	No support
Oromia	Adele Keke	Able to work	Poor	Family size	Age/ disability	Physical disability	
	Korodegaga	Family size	Poor	Female headed households	age	disability	Poor
SNNPR	Azedeboa	Poor	Family size	Age	poor		disability
	Gara Godo	Less land	Family size	No Children	Age	Less land	disability
	Doma	Quota	Family size		.	.	.

Source: 2004 Ethiopian Rural Household Survey – Community Survey.

Table B2: Descriptions of Poverty by Village

Region	Village	Descriptions of Poverty	Source
Tigray	Haressaw	“The rich can be described as those owning on average 2 oxen, 1 mule, 10 sheep or goats. Poor households do not own livestock or land (or have very little land).”	Tewodros and Derbew (1996; pp25) in ERHS (2004)
	Geblen	“The richest households are those with a number of livestock and hives. A self-sufficient household is one which has a pair of oxen, a medium is one with only an ox, and a poor household is one which does not have draught power.”	Gebre Egziabher and Tegegne (1996; pp34) in ERHS(2004)
Amhara	Dinki	Descriptions of the poor include many dimensions such as “sickness, too many children, has nothing, cannot help others, gives land for fixed rent, no productive materials, too old, death of livestock, no oxen, only a cow, landless, no supply of inputs, no man in the household, too young, unlucky, etc.	Kenaw and Tegegne (1996; pp18) in ERHS (2004)
	Shumshea	“The wealthy are those who are able to produce enough to eat three meals a day throughout the year, maybe with some surplus.”	Ali and Tefesse (1996; pp23) in ERHS (2004)
Oromia	Adele Keke	“The poorest people in the community are those who do not have fertile land or only a very small amount and hence <i>chat</i> plantations. They are often widows, those who have many children and/or are old and sick.”	Gashaw, Bekele and Tibebe (1996; pp21) in ERHS (2004)
	Korodegaga	“The poorest households are characterized by lack of food and not being owners of cattle, goats, sheep, donkeys or poultry.”	Tolera and Tadesse (1996; pp29) in ERHS (2004)
SNNPR	Azedeboa	“The poorest households are those with a small plot of infertile land, demobilized soldiers, formerly resettled residents, those with few animals and those who do not work hard. People with a larger plot of land are richer. The younger ones are relatively richer since they are more active.”	Dea, Desta and Tafese (1996; pp27) in ERHS (2004)
	Gara Godo	“The poor are those with no farm stock, no cattle, with perhaps 1 or 2 sheep or goats and very small landholdings.”	Seba and Tibebe (1996; pp25) in ERHS (2004)
	Doma	“The poorest are those who have no oxen and no land, or no irrigated land. A farmer who cannot plough because he has no oxen will not have grain to feed his family. Some became poor because they lost their livestock due to disease.”	Feyissa, Yntiso, Kebede, Tadesse (1996; pp27) in ERHS (2004)

Table B3: Participation in public works and free food aid programs by village

Region	Village	Free Food Aid participation				Public works Participation			
		No	Yes	Total	% Yes	No	Yes	Total	% Yes
Tigray	Haresaw	45	39	84	46.4	41	43	84	51.2
	Geblen	29	36	65	55.4	27	38	65	58.5
Amhara	Dinki	52	29	81	35.8	41	40	81	49.4
	Shumsheha	42	80	122	65.6	42	81	123	65.9
Oromia	Adele Keke	60	31	91	34.1	67	25	92	27.2
	Korodegaga	63	35	98	35.7	7	91	98	92.9
SNNPR	Aze Deboa	43	31	74	41.9	26	48	74	64.9
	Gara Godo	48	46	94	48.9	48	46	94	48.9
	Doma	57	9	66	13.6	39	27	66	40.9
Total		439	336	775	43.4	338	439	777	56.5

Source: Own calculation from the 2004 Ethiopian Rural Household Survey.

Figure B1: Relationship between Poverty and Criteria based FFD Rankings

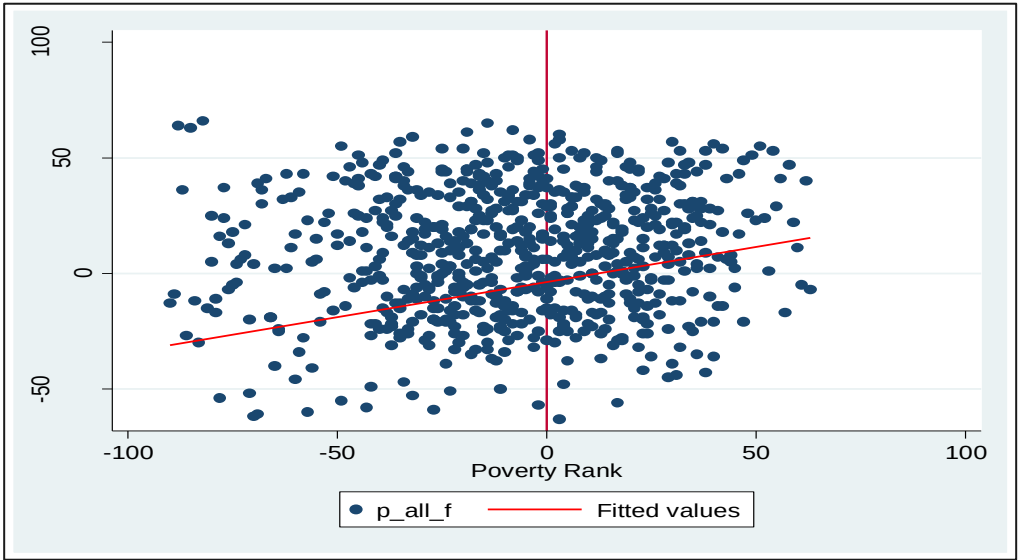


Figure B2: Relationship between Poverty and Criteria based PW Rankings

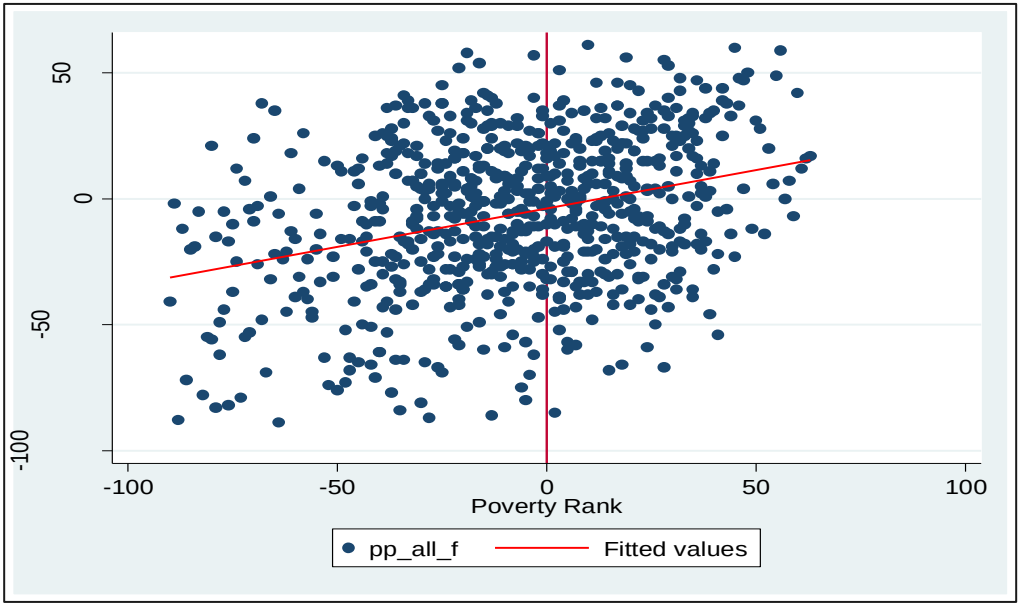


Table B4: Characteristics of Recipients and Non recipients of Public Works Benefits in RD Sample

Variable	Non-participants				Participants			
	Mean	St. dev.	Min	Max	Mean	St. dev.	Min	Max
PW Criteria based Rank	2.54	9.56	-17	17	-3.94	9.32	-17	17
Land Area owned in 1999 (in hectares)	0.91	0.70	0.00	4.00	0.96	0.77	0.00	4.00
Livestock Units owned in 1999	2.19	1.80	0.00	7.85	2.34	2.13	0.00	14.5
Age of Household Head in 2002	49.8	14.2	24.0	90.0	49.8	15.6	20.0	92.0
Household size in 2002	5.63	2.79	1.00	17.00	5.74	2.75	1.00	17.00
Proportion of HH members <10 & >64 yrs. old	0.32	0.24	0.00	1.00	0.33	0.21	0.00	1.00
Head's Marital Status (Married=1, else 0)	0.65	0.48	0.00	1.00	0.60	0.49	0.00	1.00
Household Head is female yes=1; no=0	0.33	0.47	0.00	1.00	0.37	0.48	0.00	1.00
Household Head is a farmer yes=1; no=0	0.70	0.46	0.00	1.00	0.67	0.47	0.00	1.00
Highest grade completed by HH head	2.20	2.69	1.00	16.00	2.60	3.02	1.00	14.00
Husb/wife seriously ill(1999-02) yes=1,no=0	0.16	0.37	0.00	1.00	0.20	0.40	0.00	1.00
Received Free Food Aid in 1999 yes=1; no=0	0.32	0.47	0.00	1.00	0.33	0.47	0.00	1.00
Received non FFD transfers 1999 yes=1; no=0	0.17	0.38	0.00	1.00	0.18	0.39	0.00	1.00
Growth in real food cons. per capita	0.05	1.10	-2.73	3.02	0.06	0.99	-3.00	2.77
Growth in real non-food cons. per capita	0.20	1.46	-4.85	4.08	0.36	1.24	-3.19	4.44
Growth in real overall consumption per capita	0.09	1.01	-2.76	2.91	0.12	0.89	-1.96	2.64
Change in Livestock units	0.30	2.39	-3.65	16.95	-0.11	1.87	-4.20	5.10
Sold Livestock yes=1; no=0	0.41	0.49	0.00	1.00	0.53	0.50	0.00	1.00
Allocation fairness 1=fair; 2=okay; 3=unfair	2.18	0.81	1.00	3.00	2.23	0.81	1.00	3.00
Observations	145				146			

Source: Own calculations from ERHS.

Table B5: Poverty Ranking and the Probability of Receiving Benefits - Probit

Variable	All Villages		Excluding Outliers	
	FFD	PW	FFD	PW
Eligible to Receive Free Food Aid	-0.390 (0.365)		-0.565 (0.383)	
Eligible to Receive Public Works		-0.187 (0.300)		-0.168 (0.311)
Poverty Rank	-0.026 (0.016)	-0.005 (0.016)	-0.032* (0.017)	-0.006 (0.016)
Land Owned in Hectares, 1999	-0.118* (0.070)	0.276 (0.198)	-0.141 (0.089)	0.229 (0.219)
Livestock Units, 1999	-0.026 (0.052)	-0.085** (0.033)	-0.018 (0.056)	-0.108*** (0.030)
Log of HH Head's Age, 2002	0.747** (0.365)	-0.919*** (0.286)	0.949*** (0.357)	-0.820*** (0.279)
Log of Household Size in 2002	-0.390*** (0.148)	0.163 (0.230)	-0.265** (0.124)	0.186 (0.235)
Proportion of HH members <10 & >64	-1.011** (0.477)	0.228 (0.385)	-1.192** (0.466)	0.268 (0.393)
HH Head is Married; Yes=1, No=0	0.109 (0.240)	0.415 (0.308)	0.293 (0.184)	0.486 (0.315)
HH Head is Female; Yes=1, No=0	-0.386 (0.463)	-0.527 (0.592)	-0.081 (0.379)	-0.450 (0.616)
HH Head is Farmer; Yes=1, No=0	-0.327 (0.314)	-0.429 (0.487)	-0.170 (0.266)	-0.334 (0.491)
Highest grade Completed by HH Head	0.095*** (0.036)	0.003 (0.042)	0.123*** (0.031)	0.004 (0.043)
Husband/wife had serious illness, 1999-2002	-0.196 (0.162)	-0.178 (0.279)	-0.179 (0.169)	-0.187 (0.281)
Household Received Free Food Aid, 1999	-0.798** (0.327)	-0.269 (0.240)	-1.091*** (0.306)	-0.349 (0.261)
Household Participated in Public Works, 1999	0.418 (0.284)	-0.153 (0.270)	0.340 (0.297)	-0.164 (0.277)
Household is a member of an Iddir (an informal insurance arrangement), 1999	0.471 (0.380)	-0.204 (0.270)	0.420 (0.355)	-0.186 (0.281)
Household Received other transfers remittances, 1999	1.162*** (0.402)	0.314 (0.359)	1.438*** (0.448)	0.319 (0.380)
Constant	-1.751 (1.752)	3.870*** (1.458)	-2.921* (1.544)	3.372** (1.429)
Observations	280	280	255	257
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. FFD equation in columns 3 excludes Doma, a village with free food aid participation rate of less than 15 percent while the PW equation in column 4 excludes Korodegaga, a village whose public works participation rate exceeds 90 percent.

Table B6: Criteria based Ranking and the Probability of Receiving Benefits - Probit

Variable	All Villages		Excluding Outliers	
	FFD	PW	FFD	PW
Eligible to Receive Free Food Aid	0.389** (0.184)		0.253* (0.138)	
Free Food Aid Criteria based Rank	-0.027** (0.013)		-0.029** (0.013)	
Eligible to Receive Public Works		0.431** (0.178)		0.351** (0.163)
Public Works Criteria based Rank		-0.034*** (0.008)		-0.037*** (0.008)
Proportion of HH members <10 & >64	0.276 (0.219)	0.222 (0.274)	0.235 (0.250)	0.149 (0.274)
HH Head is Married; Yes=1, No=0	0.067 (0.086)	-0.145 (0.134)	0.112 (0.074)	-0.106 (0.151)
HH Head is Female; Yes=1, No=0	-0.044 (0.120)	0.421*** (0.151)	-0.021 (0.119)	0.398** (0.194)
HH Head is Farmer; Yes=1, No=0	0.158 (0.142)	0.146 (0.121)	0.191 (0.148)	0.102 (0.134)
Highest grade Completed by HH Head	-0.022 (0.022)	0.017 (0.016)	-0.011 (0.025)	0.024 (0.016)
Husband/wife had serious illness, 1999-	-0.211 (0.141)	0.426*** (0.158)	-0.253* (0.150)	0.468*** (0.168)
Household Received Free Food Aid,	0.047 (0.275)	0.127 (0.342)	-0.101 (0.295)	-0.054 (0.348)
Household Participated in Public Works,	-0.213 (0.146)	-0.077 (0.180)	-0.199 (0.141)	-0.084 (0.173)
Household is a member of an Iddir (an informal insurance arrangement), 1999	-0.294 (0.201)	0.044 (0.241)	-0.322* (0.186)	0.036 (0.269)
Household Received other transfers remittances, 1999	0.195 (0.238)	-0.007 (0.222)	0.337 (0.250)	0.106 (0.244)
Constant	-0.462** (0.205)	-0.532** (0.223)	-0.444** (0.222)	-0.426** (0.201)
Observations	302	298	276	279
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. FFD equation in columns 3 excludes Doma, a village with free food aid participation rate of less than 15 percent while the PW equation in column 4 excludes Korodegaga, a village whose public works participation rate exceeds 90 percent.

Table B7: FFD Criteria based Ranking and the Probability of Receiving FFD Benefits
- All Villages

Variable	Linear	Linear with interaction term	Cubic	Cubic with interaction term
Eligible to Receive Free Food Aid	0.153* (0.069)	0.147* (0.071)	0.265*** (0.065)	0.260** (0.088)
Free Food Aid Criteria based Rank	-0.010* (0.005)	-0.014 (0.010)		
Free Food Aid Criteria based Rank (Cubic)			-0.000 (0.000)	-0.000 (0.000)
Free Food Aid Criteria based Rank		0.007 (0.020)		-0.001 (0.017)
Proportion of HH members <10 & >64	0.107 (0.079)	0.098 (0.066)	0.110 (0.082)	0.111 (0.073)
HH Head is Married; Yes=1, No=0	0.024 (0.031)	0.027 (0.032)	0.025 (0.030)	0.024 (0.033)
HH Head is Female; Yes=1, No=0	-0.012 (0.043)	-0.010 (0.040)	-0.014 (0.043)	-0.014 (0.043)
HH Head is Farmer; Yes=1, No=0	0.058 (0.048)	0.060 (0.046)	0.051 (0.047)	0.051 (0.047)
Highest grade Completed by HH Head	-0.007 (0.008)	-0.007 (0.007)	-0.006 (0.007)	-0.006 (0.007)
Husband/wife had serious illness, 1999-	-0.081 (0.054)	-0.082 (0.052)	-0.084 (0.056)	-0.084 (0.054)
Household Received Free Food Aid, 1999	0.022 (0.098)	0.021 (0.098)	0.033 (0.097)	0.032 (0.097)
Household Participated in Public Works, 1999	-0.080 (0.055)	-0.074 (0.062)	-0.092 (0.058)	-0.092 (0.058)
Household is a member of an Iddir (an informal insurance arrangement), 1999	-0.101 (0.071)	-0.098 (0.067)	-0.103 (0.072)	-0.104 (0.071)
Household Received other transfers remittances, 1999	0.065 (0.086)	0.063 (0.087)	0.060 (0.086)	0.061 (0.086)
Constant	0.329*** (0.072)	0.359*** (0.097)	0.278*** (0.079)	0.276** (0.084)
R-squared	0.081	0.079	0.076	0.073
Observations	302	302	302	302
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions.

Table B8: PW Criteria based Ranking and the Probability of Receiving PW Benefits - All Villages

Variable	Linear	Linear with interaction term	Cubic	Cubic with interaction term
Eligible to Receive Public Works Benefits	0.171** (0.066)	0.181** (0.072)	0.282*** (0.063)	0.240*** (0.056)
Public Works Criteria based Rank	-0.011*** (0.002)	-0.007 (0.005)		
Public Works Criteria based Rank (Interaction term)		-0.007 (0.008)		-0.011 (0.007)
Public Works Criteria based Rank (Cubic term)			-0.000** (0.000)	-0.000 (0.000)
Proportion of HH members <10 & >64 yrs.	0.065 (0.098)	0.064 (0.098)	0.065 (0.101)	0.063 (0.099)
HH Head is Married; Yes=1, No=0	-0.046 (0.047)	-0.048 (0.049)	-0.041 (0.043)	-0.047 (0.049)
HH Head is Female; Yes=1, No=0	0.135** (0.053)	0.137** (0.051)	0.135** (0.051)	0.138** (0.050)
HH Head is Farmer; Yes=1, No=0	0.041 (0.042)	0.039 (0.041)	0.037 (0.043)	0.036 (0.040)
Highest grade Completed by HH Head	0.006 (0.006)	0.006 (0.006)	0.007 (0.006)	0.007 (0.006)
Husband/wife had serious illness, 1999-2002	0.146** (0.052)	0.146** (0.054)	0.142** (0.051)	0.144** (0.055)
Household Received Free Food Aid, 1999	0.031 (0.125)	0.039 (0.120)	0.026 (0.127)	0.041 (0.119)
Household Participated in Public Works, 1999	-0.030 (0.062)	-0.029 (0.062)	-0.027 (0.063)	-0.027 (0.063)
Household is a member of an Iddir (an informal insurance arrangement), 1999	0.007 (0.082)	0.010 (0.080)	0.003 (0.082)	0.010 (0.079)
Household Received other transfers remittances, 1999	0.013 (0.085)	0.008 (0.080)	0.010 (0.089)	0.004 (0.082)
Constant	0.315*** (0.074)	0.279*** (0.073)	0.256*** (0.068)	0.231*** (0.058)
R-squared	0.108	0.106	0.103	0.104
Observations	298	298	298	298
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p< .05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions.

Table B9: FFD Criteria based Ranking and the Probability of Receiving Benefits – Excluding Outliers

Variable	Linear	Linear with interaction term	Cubic	Cubic with interaction
Eligible to Receive Free Food Aid	0.101* (0.051)	0.095 (0.052)	0.218*** (0.054)	0.205** (0.081)
Free Food Aid Criteria based Rank	-0.010* (0.005)	-0.013 (0.011)		
Free Food Aid Criteria based Rank (Interaction term)		0.005 (0.021)		-0.003 (0.018)
Free Food Aid Criteria based Rank (Cubic term)			-0.000 (0.000)	-0.000 (0.000)
Proportion of HH members <10 & >64	0.090 (0.091)	0.080 (0.075)	0.093 (0.094)	0.098 (0.082)
HH Head is Married; Yes=1, No=0	0.040 (0.027)	0.042 (0.028)	0.042 (0.026)	0.041 (0.029)
HH Head is Female; Yes=1, No=0	-0.005 (0.044)	-0.005 (0.042)	-0.003 (0.044)	-0.003 (0.046)
HH Head is Farmer; Yes=1, No=0	0.069 (0.051)	0.069 (0.051)	0.064 (0.050)	0.064 (0.052)
Highest grade Completed by HH Head	-0.003 (0.009)	-0.003 (0.008)	-0.003 (0.009)	-0.003 (0.008)
Husband/wife had serious illness, 1999-	-0.097 (0.058)	-0.097 (0.057)	-0.096 (0.061)	-0.096 (0.061)
Household Received Free Food Aid,	-0.029 (0.100)	-0.030 (0.101)	-0.020 (0.100)	-0.022 (0.099)
Household Participated in Public Works, 1999	-0.076 (0.053)	-0.072 (0.060)	-0.089 (0.056)	-0.089 (0.055)
Household is a member of an Iddir (an informal insurance arrangement), 1999	-0.113 (0.067)	-0.111 (0.064)	-0.115 (0.069)	-0.116 (0.068)
Household Received other transfers remittances, 1999	0.116 (0.083)	0.116 (0.084)	0.113 (0.083)	0.114 (0.082)
Constant	0.338*** (0.081)	0.362** (0.117)	0.281** (0.087)	0.274** (0.094)
R-squared	0.060	0.057	0.054	0.050
Observations	276	276	276	276
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. All regressions equations exclude Doma, a village with free food aid participation rate of less than 15 percent

Table B10: PW Criteria based Ranking and the Probability of Receiving Benefits – Excluding Outliers

Variable	Linear	Linear with interaction	Cubic	Cubic with interaction term
Eligible to Receive Public Works	0.143* (0.063)	0.151* (0.067)	0.260*** (0.060)	0.217*** (0.050)
Public Works Criteria based Rank	-0.013*** (0.002)	-0.008 (0.005)		
Public Works Criteria based Rank		-0.008 (0.009)		-0.011 (0.008)
Public Works Criteria based Rank			-0.000*** (0.000)	-0.000 (0.000)
Proportion of HH members <10 &	0.040 (0.098)	0.038 (0.097)	0.039 (0.100)	0.037 (0.097)
HH Head is Married; Yes=1, No=0	-0.032 (0.053)	-0.034 (0.055)	-0.026 (0.048)	-0.031 (0.054)
HH Head is Female; Yes=1, No=0	0.126 (0.067)	0.132* (0.067)	0.126* (0.065)	0.134* (0.064)
HH Head is Farmer; Yes=1, No=0	0.025 (0.047)	0.026 (0.045)	0.019 (0.047)	0.024 (0.044)
Highest grade Completed by HH	0.009 (0.006)	0.009 (0.007)	0.010 (0.006)	0.009 (0.007)
Husband/wife had serious illness,	0.159** (0.055)	0.159** (0.057)	0.154** (0.054)	0.157** (0.058)
Household Received Free Food Aid,	-0.031 (0.126)	-0.021 (0.120)	-0.042 (0.127)	-0.023 (0.120)
Household Participated in Public	-0.030 (0.059)	-0.029 (0.059)	-0.028 (0.060)	-0.027 (0.060)
Household is a member of an Iddir	0.002 (0.089)	0.008 (0.089)	-0.003 (0.089)	0.008 (0.088)
Household Received other transfers	0.053 (0.093)	0.045 (0.088)	0.056 (0.095)	0.045 (0.089)
Constant	0.349*** (0.069)	0.306*** (0.078)	0.289*** (0.062)	0.259*** (0.058)
R-squared	0.105	0.103	0.102	0.102
Observations	279	279	279	279
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. All regressions exclude Korodegaga, a village whose public works participation rate exceeds 90 percent.

Table B11: Effect of Free Food Aid Benefits on Household Consumption and Assets – All Villages

Variable	Growth in Real Per Capita Consumption			Asset Sales		Change in Livestock Units
	Food	Non-Food	Overall	Livestock	Non-Livestock	
Received Free Food aid Benefits	2.233* (1.370)	0.905 (1.726)	1.977* (1.137)	0.022 (0.388)	0.087 (0.174)	-0.910 (3.761)
Free Food Aid Criteria based Rank	0.023 (0.021)	0.021 (0.029)	0.023 (0.016)	-0.001 (0.007)	-0.002 (0.002)	-0.011 (0.061)
Proportion of HH members <10 & >64 yrs.	0.094 (0.321)	0.316 (0.312)	0.028 (0.330)	0.176 (0.118)	0.161 (0.109)	0.835 (0.658)
HH Head is Married; Yes=1, No=0	-0.175 (0.177)	0.119 (0.141)	-0.148 (0.162)	0.108 (0.070)	-0.096 (0.067)	0.304* (0.178)
HH Head is Female; Yes=1, No=0	-0.472* (0.283)	-0.032 (0.300)	-0.432 (0.273)	-0.205*** (0.073)	-0.103 (0.066)	-0.201 (0.312)
HH Head is Farmer; Yes=1, No=0	-0.457* (0.238)	-0.044 (0.257)	-0.449** (0.208)	-0.084 (0.083)	0.007 (0.053)	-0.241 (0.199)
Highest grade Completed by HH Head	-0.026* (0.014)	-0.036* (0.022)	-0.027** (0.012)	-0.017 (0.011)	-0.005 (0.003)	0.035 (0.057)
Husband/wife had serious illness, 1999-2002	0.229* (0.128)	0.086 (0.262)	0.196* (0.103)	0.043 (0.098)	-0.012 (0.026)	-0.333 (0.366)
Household Received Free Food Aid, 1999	-0.630* (0.373)	-0.376** (0.158)	-0.452 (0.375)	0.025 (0.076)	-0.010 (0.058)	-0.451 (0.465)
Household Participated in Public Works, 1999	-0.024 (0.132)	-0.405 (0.256)	-0.148 (0.110)	-0.038 (0.056)	0.075 (0.061)	0.186 (0.303)
Household is a member of an Iddir (an informal insurance arrangement), 1999	-0.075 (0.369)	0.061 (0.386)	0.026 (0.308)	0.037 (0.085)	0.011 (0.086)	-0.787 (0.596)
Household Received other transfers remittances, 1999	0.219 (0.360)	0.306 (0.211)	0.025 (0.353)	-0.039 (0.119)	-0.018 (0.083)	0.212 (0.638)
Constant	-0.274 (0.660)	-0.330 (0.886)	-0.114 (0.577)	0.739*** (0.228)	0.012 (0.090)	0.250 (1.847)
R-squared	0.054	0.048	0.061	0.152	0.111	0.052
Observations	300	300	301	301	301	299
Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the free food aid criteria based ranking as instrument for program participation.

Table B12: Effect of Free Food Aid Benefits on Household Consumption and Assets – Excluding Outliers

Variable	Growth in Real Per Capita Consumption			Asset Sales		Change in Livestock Units
	Food	Non-Food	Overall	Livestock	Non-Livestock	
Received Free Food Aid Benefits	3.851* (2.276)	0.374 (2.889)	3.063 (2.030)	0.175 (0.751)	0.061 (0.371)	0.248 (6.438)
Free Food Aid Criteria based Rank	0.042 (0.034)	0.013 (0.041)	0.035 (0.028)	0.002 (0.012)	-0.002 (0.005)	0.007 (0.093)
Proportion of HH members <10 & >64 yrs.	0.145 (0.472)	0.398 (0.376)	0.099 (0.458)	0.082 (0.108)	0.091 (0.093)	0.856 (0.930)
HH Head is Married; Yes=1, No=0	-0.211 (0.185)	0.172 (0.154)	-0.159 (0.155)	0.084 (0.075)	-0.117 (0.072)	0.306 (0.264)
HH Head is Female; Yes=1, No=0	-0.409 (0.335)	-0.062 (0.309)	-0.381 (0.314)	-0.198** (0.082)	-0.096 (0.070)	-0.122 (0.401)
HH Head is Farmer; Yes=1, No=0	-0.581 (0.371)	-0.086 (0.270)	-0.545* (0.296)	-0.084 (0.105)	0.009 (0.064)	-0.222 (0.200)
Highest grade Completed by HH Head	-0.031 (0.025)	-0.023 (0.018)	-0.028 (0.020)	-0.013 (0.011)	-0.004 (0.004)	0.014 (0.059)
Husband/wife had serious illness, 1999-2002	0.368 (0.241)	-0.058 (0.377)	0.243 (0.246)	0.112 (0.133)	-0.027 (0.039)	-0.171 (0.663)
Household Received Free Food Aid, 1999	-0.425 (0.570)	-0.345 (0.239)	-0.243 (0.514)	0.059 (0.087)	0.022 (0.052)	-0.573 (0.730)
Household Participated in Public Works, 1999	0.096 (0.148)	-0.450 (0.320)	-0.075 (0.164)	-0.030 (0.071)	0.070 (0.064)	0.280 (0.442)
Household is a member of an Iddir (an informal insurance arrangement), 1999	0.155 (0.586)	0.001 (0.551)	0.194 (0.463)	0.050 (0.121)	0.009 (0.096)	-0.671 (1.012)
Household Received other transfers remittances, 1999	-0.059 (0.562)	0.275 (0.404)	-0.239 (0.464)	-0.076 (0.166)	-0.019 (0.108)	0.319 (1.151)
Constant	-1.025 (0.806)	-0.094 (1.331)	-0.636 (0.818)	0.698** (0.348)	0.045 (0.150)	-0.358 (2.906)
R-squared	0.064	0.090	0.081	0.020	0.043	0.018
Observations	274	274	275	275	275	273
Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the free food aid criteria based ranking as instrument for program participation.

Table B13: Effect of Free Food Aid Benefits on household consumption and Assets – Cubic Specification

Variable	Growth in Real Per Capita Consumption			Asset Sales		Change in Livestock Units
	Food	Non-Food	Overall	Livestock	Non-Livestock	
Received Free Food Aid Benefits	1.438** (0.703)	-0.013 (0.658)	1.171* (0.628)	0.013 (0.154)	0.061 (0.069)	-0.726 (1.377)
Free Food Aid Criteria based Rank (Cubic term)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)
Proportion of HH members <10 & >64	0.147 (0.307)	0.392 (0.297)	0.088 (0.304)	0.180 (0.110)	0.171 (0.109)	0.839* (0.492)
HH Head is Married; Yes=1, No=0	-0.159 (0.167)	0.133 (0.124)	-0.130 (0.150)	0.108 (0.071)	-0.096 (0.068)	0.297 (0.188)
HH Head is Female; Yes=1, No=0	-0.469* (0.264)	-0.042 (0.301)	-0.429* (0.254)	-0.207*** (0.074)	-0.108 (0.068)	-0.212 (0.247)
HH Head is Farmer; Yes=1, No=0	-0.403** (0.167)	0.017 (0.252)	-0.394*** (0.146)	-0.084 (0.083)	0.007 (0.045)	-0.257 (0.208)
Highest grade Completed by HH Head	-0.033*** (0.009)	-0.044** (0.022)	-0.034*** (0.008)	-0.017 (0.011)	-0.005 (0.004)	0.037 (0.044)
Husband/wife had serious illness, 1999-2002	0.161 (0.113)	0.014 (0.206)	0.128 (0.083)	0.043 (0.085)	-0.011 (0.030)	-0.311 (0.244)
Household Received Free Food Aid, 1999	-0.621** (0.316)	-0.373*** (0.138)	-0.452 (0.313)	0.026 (0.077)	-0.008 (0.057)	-0.446 (0.475)
Household Participated in Public Works, 1999	-0.070 (0.136)	-0.464* (0.261)	-0.190* (0.097)	-0.040 (0.052)	0.068 (0.057)	0.182 (0.233)
Household is a member of an Iddir (an informal insurance arrangement), 1999	-0.164 (0.260)	-0.058 (0.219)	-0.066 (0.214)	0.036 (0.066)	0.010 (0.078)	-0.763** (0.357)
Household Received other transfers remittances, 1999	0.271 (0.273)	0.377** (0.162)	0.088 (0.274)	-0.039 (0.114)	-0.018 (0.079)	0.194 (0.500)
Constant	0.045 (0.521)	0.046 (0.609)	0.203 (0.476)	0.744*** (0.164)	0.026 (0.090)	0.186 (0.866)
R-squared	0.107	0.110	0.092	0.095	0.071	0.037
Observations	300	300	301	301	301	299
Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p< .05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the free food aid criteria based ranking as instrument for program participation.

Table B14: Effect of Public Works Employment on Household Consumption and Assets – All Villages

Variable	Growth in Real Per Capita Consumption			Asset Sales		Change in Livestock Units
	Food	Non-food	Overall	Livestock	Non-Livestock	
Received Public Works Benefits	0.696 (1.340)	-2.155* (1.230)	0.245 (1.051)	0.737 (0.754)	-0.105 (0.451)	4.030 (2.941)
Public Works Criteria based Rank	0.010 (0.024)	-0.035 (0.022)	0.003 (0.020)	0.007 (0.013)	-0.005 (0.008)	0.092 (0.059)
Proportion of HH members <10 & >64	-0.333 (0.352)	0.084 (0.462)	-0.223 (0.323)	0.005 (0.150)	0.055 (0.085)	0.806 (0.743)
HH Head is Married; Yes=1, No=0	-0.062 (0.073)	-0.092 (0.151)	-0.077 (0.077)	0.152** (0.077)	-0.073** (0.037)	0.431 (0.400)
HH Head is Female; Yes=1, No=0	-0.484* (0.260)	0.063 (0.293)	-0.452* (0.244)	-0.181 (0.145)	0.056 (0.075)	-0.642 (0.523)
HH Head is Farmer; Yes=1, No=0	-0.169 (0.158)	0.238 (0.235)	-0.158 (0.169)	0.043 (0.121)	0.128*** (0.032)	-0.420 (0.334)
Highest grade Completed by HH Head	-0.000 (0.026)	-0.017 (0.016)	-0.004 (0.020)	-0.009 (0.011)	0.005 (0.006)	0.012 (0.049)
Husband/wife had serious illness, 1999-2002	-0.050 (0.214)	-0.188 (0.311)	-0.109 (0.179)	-0.124 (0.085)	-0.065 (0.073)	-0.938 (0.686)
Household Received Free Food Aid, 1999	-0.003 (0.243)	0.094 (0.418)	0.030 (0.192)	-0.064 (0.110)	0.082 (0.057)	-0.962 (0.804)
Household Participated in Public Works, 1999	0.159 (0.112)	-0.127 (0.157)	0.142 (0.123)	0.050 (0.051)	0.030 (0.047)	0.373 (0.295)
Household is a member of an Iddir (an informal insurance arrangement), 1999	-0.521*** (0.133)	-0.256 (0.291)	-0.368** (0.153)	-0.059 (0.075)	-0.091* (0.051)	-0.820** (0.357)
Household Received other transfers remittances, 1999	0.043 (0.201)	0.089 (0.411)	0.025 (0.175)	0.092 (0.104)	-0.068 (0.074)	0.576 (0.631)
Constant	-0.127 (0.520)	1.312** (0.667)	0.168 (0.410)	0.093 (0.370)	-0.038 (0.168)	-1.885 (1.210)
R-squared	0.070	0.075	0.093	0.061	0.104	0.115
Observations	298	298	298	297	295	292
Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the public works criteria based ranking as instrument for program participation.

Table B15: Effect of Public Works Employment on Household Consumption and Assets – Excluding Outliers

Variable	Growth in Real Per Capita Consumption			Asset Sales		Change in Livestock Units
	Food	Non-Food	Overall	Livestock	Non-Livestock	
Received Public Works Benefits	0.766 (1.628)	-2.803* (1.438)	0.168 (1.300)	0.792 (0.979)	-0.126 (0.583)	3.829 (3.269)
Public Works Criteria based Rank	0.011 (0.030)	-0.047* (0.026)	0.002 (0.025)	0.008 (0.017)	-0.005 (0.011)	0.092 (0.065)
Proportion of HH members <10 & >64 yrs.	-0.182 (0.352)	0.166 (0.478)	-0.079 (0.313)	0.025 (0.150)	0.069 (0.085)	1.110 (0.679)
HH Head is Married; Yes=1, No=0	-0.070 (0.071)	-0.113 (0.173)	-0.080 (0.082)	0.168** (0.080)	-0.081** (0.040)	0.490 (0.418)
HH Head is Female; Yes=1, No=0	-0.527* (0.294)	-0.089 (0.262)	-0.519** (0.264)	-0.187 (0.177)	0.067 (0.094)	-0.665 (0.572)
HH Head is Farmer; Yes=1, No=0	-0.140 (0.163)	0.126 (0.182)	-0.166 (0.170)	0.037 (0.142)	0.149** (0.030)	-0.568** (0.285)
Highest grade Completed by HH Head	-0.010 (0.031)	0.000 (0.017)	-0.010 (0.025)	0.000 (0.010)	0.005 (0.008)	-0.009 (0.058)
Husband/wife had serious illness, 1999-2002	-0.094 (0.254)	-0.047 (0.354)	-0.123 (0.219)	-0.119 (0.109)	-0.067 (0.098)	-0.950 (0.783)
Household Received Free Food Aid, 1999	0.217 (0.134)	0.101 (0.550)	0.214** (0.091)	-0.038 (0.141)	0.099 (0.083)	-0.372 (0.463)
Household Participated in Public Works, 1999	0.167 (0.120)	-0.146 (0.140)	0.144 (0.128)	0.049 (0.051)	0.031 (0.049)	0.386 (0.278)
Household is a member of an Iddir (an informal insurance arrangement), 1999	-0.489*** (0.136)	-0.235 (0.335)	-0.326** (0.153)	-0.050 (0.092)	-0.092* (0.055)	-0.787** (0.345)
Household Received other transfers remittances, 1999	-0.143 (0.144)	0.144 (0.522)	-0.135 (0.116)	0.113 (0.110)	-0.083 (0.088)	-0.038 (0.331)
Constant	-0.216 (0.659)	1.751** (0.693)	0.192 (0.522)	0.026 (0.486)	-0.050 (0.227)	-1.824 (1.374)
R-squared	0.066	0.79	0.087	0.071	0.067	0.092
Observations	279	279	279	278	276	273
Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p< .05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the public works criteria based ranking as instrument for program participation.

Table B16: Effect of Public Works Employment on Household Consumption and Assets – Cubic Specification

Variable	Growth in Real Per Capita Consumption			Asset Sales		Change in Livestock Units
	Food	Non-Food	Overall	Livestock	Non-Livestock	
Received Public Works Benefits	0.090 (0.593)	-1.274** (0.531)	-0.134 (0.460)	0.428 (0.309)	-0.018 (0.166)	1.065 (1.050)
Public Works Criteria based Rank (Cubic)	-0.000 (0.000)	-0.000** (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)
Proportion of HH members <10 & >64	-0.291 (0.333)	0.029 (0.389)	-0.196 (0.300)	0.024 (0.142)	0.048 (0.066)	0.874 (0.571)
HH Head is Married; Yes=1, No=0	-0.092 (0.075)	-0.039 (0.121)	-0.094 (0.076)	0.137* (0.074)	-0.067 (0.043)	0.237 (0.246)
HH Head is Female; Yes=1, No=0	-0.396** (0.167)	-0.046 (0.294)	-0.395** (0.178)	-0.137 (0.109)	0.046 (0.039)	-0.153 (0.282)
HH Head is Farmer; Yes=1, No=0	-0.134 (0.142)	0.207 (0.248)	-0.133 (0.160)	0.060 (0.115)	0.127*** (0.027)	-0.199 (0.228)
Highest grade Completed by HH Head	0.003 (0.022)	-0.021 (0.014)	-0.002 (0.018)	-0.007 (0.012)	0.004 (0.005)	0.034 (0.032)
Husband/wife had serious illness, 1999-2002	0.044 (0.197)	-0.320 (0.221)	-0.049 (0.154)	-0.078 (0.077)	-0.077** (0.030)	-0.486 (0.354)
Household Received Free Food Aid, 1999	0.013 (0.193)	0.048 (0.361)	0.037 (0.169)	-0.054 (0.081)	0.076 (0.067)	-0.825* (0.488)
Household Participated in Public Works, 1999	0.141 (0.112)	-0.095 (0.195)	0.131 (0.121)	0.040 (0.046)	0.034 (0.044)	0.268* (0.137)
Household is a member of an Iddir (an informal insurance arrangement),	-0.522*** (0.119)	-0.281 (0.260)	-0.372*** (0.141)	-0.053 (0.051)	-0.096** (0.046)	-0.753*** (0.207)
Household Received other transfers remittances, 1999	0.067 (0.182)	0.092 (0.351)	0.045 (0.166)	0.099 (0.097)	-0.065 (0.073)	0.590 (0.510)
Constant	0.105 (0.295)	0.938** (0.462)	0.308 (0.291)	0.215 (0.217)	-0.077 (0.071)	-0.735 (0.530)
R-squared	0.101	0.068	0.075	0.040	0.080	0.020
Observations	298	298	298	297	295	292
Window	+/-17	+/-17	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the public works criteria based ranking as instrument for program participation.

Table B17: Effect of Free Food Aid Benefits on Household Views of Allocation Fairness and Trust in Government

Variable	Trust in			Fairness of Allocation of benefits
	Government	Government Officials	Village Officials	
Received Free Food Aid Benefits	0.738* (0.423)	0.826** (0.392)	-0.338 (0.751)	0.076 (0.921)
Free Food Aid Criteria based Rank	0.012 (0.009)	0.015* (0.009)	-0.008 (0.012)	-0.005 (0.016)
Proportion of HH members <10 & >64 yrs.	-0.068 (0.147)	-0.145 (0.109)	-0.058 (0.147)	0.477** (0.231)
HH Head is Married; Yes=1,	0.080 (0.080)	0.062 (0.064)	0.017 (0.082)	-0.071 (0.060)
HH Head is Female; Yes=1, No=0	0.270*** (0.079)	0.250*** (0.073)	0.068 (0.058)	-0.284 (0.196)
HH Head is Farmer; Yes=1, No=0	0.137** (0.066)	0.168** (0.071)	0.118* (0.067)	-0.399** (0.194)
Highest grade Completed by HH Head	0.005 (0.014)	0.004 (0.014)	0.010 (0.010)	-0.032 (0.028)
Husband/wife had serious illness, 1999-2002	0.145 (0.118)	0.187 (0.127)	0.006 (0.077)	-0.166 (0.120)
Household Received Free Food Aid, 1999	0.119 (0.120)	0.180 (0.128)	0.178** (0.079)	-0.147*** (0.052)
Household Participated in Public Works, 1999	0.070 (0.090)	0.105 (0.087)	-0.114 (0.085)	0.188** (0.083)
Household is a member of an Iddir (an informal insurance arrangement), 1999	0.055 (0.080)	0.015 (0.109)	-0.021 (0.132)	0.059 (0.187)
Household Received other transfers remittances, 1999	-0.370*** (0.091)	-0.374*** (0.105)	-0.160 (0.114)	0.020 (0.135)
Constant	0.003 (0.206)	-0.078 (0.147)	0.735* (0.380)	2.329*** (0.561)
R-squared	0.071	0.081	0.068	0.067
Observations	302	302	302	296
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p< .05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the free food aid criteria based ranking as instrument for program participation.

Table B18: Effect of Free Food Aid Benefits on Household Views of Allocation Fairness and Trust in Government - Cubic

Variable	Trust in			Fairness of Allocation of benefits
	Government	Government Officials	Village Officials	
Received Free Food Aid Benefits	0.362* (0.202)	0.262 (0.217)	-0.018 (0.269)	0.203 (0.331)
Free Food Aid Criteria based Rank (Cubic term)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Proportion of HH members <10 & >64 yrs.	-0.032 (0.105)	-0.095 (0.068)	-0.090 (0.147)	0.469** (0.232)
HH Head is Married; Yes=1,	0.091 (0.085)	0.076 (0.069)	0.009 (0.084)	-0.071 (0.059)
HH Head is Female; Yes=1, No=0	0.271*** (0.076)	0.250*** (0.075)	0.070 (0.052)	-0.283 (0.189)
HH Head is Female; Yes=1, No=0	0.168*** (0.057)	0.208*** (0.071)	0.096** (0.046)	-0.410** (0.180)
Highest grade Completed by HH Head	0.002 (0.012)	-0.001 (0.012)	0.013 (0.011)	-0.031 (0.023)
Husband/wife had serious illness, 1999-2002	0.109 (0.096)	0.141 (0.102)	0.031 (0.084)	-0.154* (0.085)
Household Received Free Food Aid, 1999	0.119 (0.098)	0.181* (0.095)	0.176** (0.069)	-0.163 (0.101)
Household Participated in Public Works, 1999	0.047 (0.074)	0.074 (0.078)	-0.094 (0.072)	0.192*** (0.061)
Household is a member of an Iddir (an informal insurance arrangement), 1999	0.012 (0.046)	-0.041 (0.079)	0.011 (0.080)	0.063 (0.169)
Household Received other transfers remittances, 1999	-0.338*** (0.095)	-0.333*** (0.096)	-0.183** (0.093)	0.009 (0.124)
Constant	0.169 (0.131)	0.142 (0.110)	0.609*** (0.215)	2.278*** (0.365)
R-squared	0.071	0.027	0.011	0.022
Observations	302	302	302	296
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p< .05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the free food aid criteria based ranking as instrument for program participation.

Table B19: Effect of Public Works Employment on Household Views of Allocation Fairness and Trust in Government

Variable	Trust in			Fairness of Allocation of benefits
	Government	Government Officials	Village Officials	
Received Public Works benefits	1.491** (0.738)	0.994 (0.743)	1.203** (0.595)	0.271 (1.078)
Public Works Criteria based Rank	0.029** (0.012)	0.018 (0.013)	0.020* (0.012)	0.002 (0.020)
Proportion of HH members <10 & >64 yrs.	0.022 (0.132)	0.021 (0.125)	-0.139 (0.115)	0.044 (0.181)
HH Head is Married; Yes=1, No=0	0.090 (0.081)	0.058 (0.064)	0.067 (0.106)	0.115 (0.147)
HH Head is Female; Yes=1, No=0	-0.209 (0.136)	-0.099 (0.161)	-0.256** (0.114)	-0.321*** (0.106)
HH Head is Farmer; Yes=1, No=0	-0.117 (0.126)	-0.020 (0.143)	-0.226** (0.103)	-0.148 (0.108)
Highest grade Completed by HH Head	-0.009 (0.012)	-0.009 (0.011)	0.005 (0.014)	-0.024 (0.024)
Husband/wife had serious illness, 1999-2002	-0.246*** (0.089)	-0.119 (0.104)	-0.211** (0.107)	-0.307** (0.125)
Household Received Free Food Aid, 1999	-0.057 (0.179)	-0.004 (0.117)	-0.022 (0.158)	-0.008 (0.090)
Household Participated in Public Works, 1999	-0.132 (0.090)	-0.126 (0.090)	-0.124** (0.059)	0.133* (0.070)
Household is a member of an Iddir (an informal insurance arrangement), 1999	0.157** (0.068)	0.128* (0.066)	0.064 (0.095)	0.222 (0.140)
Household Received other transfers remittances, 1999	-0.180** (0.087)	-0.211*** (0.071)	-0.068 (0.108)	-0.029 (0.129)
Constant	0.159 (0.290)	0.257 (0.273)	0.359 (0.263)	2.279*** (0.611)
R-squared	0.065	0.048	0.059	0.043
Observations	298	298	298	292
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p< .05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the public works criteria based ranking as instrument for program participation.

Table B20: Effect of Public Works Employment on Household Views of Allocation Fairness and Trust in Government - Cubic

Variable	Trust in			Fairness of Allocation of benefits
	Government	Government Officials	Village Officials	
Received Public Works Benefits	0.447* (0.258)	0.317 (0.220)	0.451*** (0.166)	0.129 (0.497)
Public Works Criteria based Rank (Cubic term)	0.000* (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Proportion of HH members <10 & >64 yrs.	0.091 (0.074)	0.066 (0.094)	-0.089 (0.098)	0.055 (0.184)
HH Head is Married; Yes=1, No=0	0.034 (0.051)	0.022 (0.055)	0.027 (0.087)	0.105 (0.119)
HH Head is Female; Yes=1, No=0	-0.068 (0.088)	-0.007 (0.104)	-0.154* (0.080)	-0.304*** (0.116)
HH Head is Farmer; Yes=1, No=0	-0.068 (0.098)	0.013 (0.119)	-0.190** (0.078)	-0.140 (0.106)
Highest grade Completed by HH Head	-0.003 (0.010)	-0.005 (0.010)	0.008 (0.012)	-0.024 (0.024)
Husband/wife had serious illness, 1999-2002	-0.087 (0.062)	-0.015 (0.073)	-0.096 (0.063)	-0.284*** (0.092)
Household Received Free Food Aid, 1999	-0.017 (0.106)	0.021 (0.069)	0.006 (0.113)	-0.002 (0.095)
Household Participated in Public Works, 1999	-0.166** (0.074)	-0.148* (0.079)	-0.149* (0.079)	0.130** (0.063)
Household is a member of an Iddir (an informal insurance arrangement), 1999	0.170*** (0.024)	0.135*** (0.038)	0.073 (0.068)	0.223* (0.135)
Household Received other transfers remittances, 1999	-0.160** (0.071)	-0.197*** (0.054)	-0.052 (0.091)	-0.024 (0.127)
Constant	0.580*** (0.162)	0.528*** (0.152)	0.660*** (0.150)	2.337*** (0.359)
R-squared	0.045	0.070	0.068	0.016
Observations	298	298	298	292
Window	+/-17	+/-17	+/-17	+/-17

Notes: * p<.10, ** p<.05, *** p<.01. Clustered standard errors are shown in parenthesis. Estimates for village dummies are not shown in this result. The RD sample contains households with ranks between 17 points of the relevant village and program cut-off points. All pre-intervention household characteristics used in generating the criteria based ranking are excluded from the regressions. Treatments effects are estimated using the eligibility indicator implied by the free food aid criteria based ranking as instrument for program participation.