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The Determinants of Food Security in Rural Ethiopia

An empirical analysis of the effect of food aid on households

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Abstract

Ethiopia is the second largest recipient of food aid in the world, with food provided to households via free aid and food-for-work from government and NGO programs. This study examines the determinants of food security in rural Ethiopian households, focusing particularly on food aid using unique panel from the Centre for the Study of African Economies. The data, covering 15 rural villages and 1477 households, were collected in four waves in 1994, 1995, 1997, and 1999. The analysis is cross sectional within each survey round with a rich set of controls for household and production characteristics. A fixed effects model using village variation as an instrument is used to estimate the effect of both short term, and long term, food aid on food security at the household level. Key findings are that while the amount of food aid received in the last year does not have significant effects on food security, participation in food for work might. Long term food aid can have a positive or no effect dependent on commodity type. Also, the persistence of aid, as measured by how many years the household has received aid, has a significant negative effect on food security. It may be the case that the longer a household has received aid the less likely it is to reinvest in its factors of production. An analysis of food aid targeting shows that the major determinant of allocation is measures of weight for height, but the majority of the variance in distribution is accounted for by national level targeting to village.

These data have been made available by the Economics Department, Addis Ababa University, the Centre for the Study of African Economies, University of Oxford and the International Food Policy Research Institute. Funding for data collection was provided by the Economic and Social Research Council (ESRC), the Swedish International Development Agency (SIDA) and the United States Agency for International Development (USAID); the preparation of the public release version of these data was supported, in part, by the World Bank. AAU, CSAE, IFPRI, ESRC, SIDA, USAID and the World Bank are not responsible for any errors in these data or for their use or interpretation.

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1. Introduction

Worldwide, a child dies every 5 seconds from hunger related causes (Barret, 2006). The international community has responded to the obvious nutrient deficit in developing areas with large quantities of food aid shipments. Millions of tons of food are given to developing nations every year and Ethiopia is the second largest recipient of food aid in the world. Ethiopia is a chronically food insecure area that suffers from continuous droughts and other highly variable harsh weather conditions that have prevented the country from becoming agriculturally self-sustainable (Quisumbing, 2003). The World Bank estimated that 51% of Ethiopian children under 5 were suffering from malnourishment and growth stunting in 2005. From 1984 to 1998 food aid to Ethiopia has totaled almost 10 million metric tons (Jayne et al. 2002). Because of the mass allocation of resources to this area much research has been done in an effort to assess the effectiveness of food aid policy. This study examines the determinants of food security for Ethiopian households, focusing on the effect food aid has on vulnerability to hunger.

It is thought that food aid is superior to cash aid because it is not as easily absorbed by corrupt officials, meets the immediate needs of starving people, and supports development. Critics of food aid argue that providing commodity goods depresses prices and creates disincentive effects for local food production ultimately hurting the recipient economy. Cochrane (1959) first proposed that the US could promote development in poor countries by distributing agriculture commodities, which generated the Food for Peace program. Schultz (1960) responded to Cochrane by warning that sending food to poor economies would have negative effects on producers in those countries by depressing prices and production. Food aid in this view only exacerbates the developing world's dependence on richer nations and further cripples their markets. This relationship between food aid, production, and prices has been the focus of the majority of research on food aid.

The availability of relatively comprehensive data for Ethiopian markets and its extreme reliance on foreign assistance has resulted in a large literature on food aid in Ethiopia and Sub-Saharan Africa. Berrett et al. (2007) examined household level data in rural Ethiopia and found that, after controlling for endogeneity, food aid has no disincentive effects. The authors also estimated vector autoregression methods using market-level data and drew the same conclusion. Abdulai et al. (2005) performed a similar study on the household level in Ethiopia and found no evidence of production depression from food aid. Kirwan and McMillan (2007) examined wheat markets specifically, because they are incredibly saturated with aid. Their conclusion was that while food aid is unreliable and driven by donor interests as opposed to recipient need, there are no direct disincentive effects. Mabuza's (2009) study of the maize industry in Swaziland found slightly positive production effects from food aid in that industry. These studies seem to indicate that there are no negative market effects, but they do not explore effects in other facets of recipient wellbeing.

In contrast, Gelan's (2006) analysis of Ethiopian data provided evidence in favor of cash aid as opposed to food aid. His work found disincentives on local food production from increases in food aid. Tadesse et al. (2009) supports this finding in his work which examines the effect of food aid on pricing. This study found that food aid shipments accounting for over 10% of the commodity market have disruptive effects. Food aid shipments reduce prices in both producer and consumer markets for internationally traded commodities when this is the case. While this may be beneficial in one aspect by allowing for greater consumption due to lower prices as Levinsohn (2007) suggests, it may also create the production disincentive Shultz feared. This reduction in local production would reduce the food stock available in future periods negatively affecting future consumption.

Another significant topic in food aid research is the effectiveness of the targeting of food assistance, specifically whether the most poor are receiving the most aid. Studies are generally in

agreement that food aid in Ethiopia is poorly targeted and is allocated disproportionately to the relatively more wealthy households. Jayne et al. (2001) blames poor targeting on government corruption leading to a greater allocation of aid to favored regions regardless of need. Jayne et al (2002) offers an alternative theory of aid inertia. That is, once the food aid has been established in a certain area it continues to go there because the distribution infrastructure is already in place. Gebremedhin (2001) examined the targeting of food for work projects and drew similar conclusions that project placement is based primarily on project feasibility as opposed to need. Clay et al. (1999) also found poor targeting of food distribution and examined the relationship between food aid and food security. This study used weight-for-height z-scores to estimate food security. He found no significant relationship between the two and blames this on the lack of effective targeting.

Gilligan et al (2007) used a difference-in-differences matching estimator on household data from Ethiopia to estimate the effect of emergency food aid on household consumption and found distinctly different results from Clay et al. (1999). This study found an increase in food consumption as well as an increase in consumption insecurity as a result of emergency food aid. In contrast, Ninno et al. (2007), using household data from India, Bangladesh, Ethiopia, and Zambia, find that food aid increases food security. Both of these studies measure food security by estimating and averaging food consumption over a long time horizon. Dercon et al. (2003) examines the effectiveness of food aid and informal risk sharing in smoothing the consumption curve. It was found that while food aid is poorly targeted it still improves consumption outcomes.

The current literature has produced mixed results. Awokuse (2006) criticized the lack of rigorous empirical analysis in food aid research. There is an obvious hole in the literature in respect to examining the effects of food aid on the household's non-production outcomes. Also, the majority of research that explores food security uses indicators such as BMI, weight-for-height

scores, or long term consumption as the measure of security. This paper will seek to fill a gap in the research by using a uniquely comprehensive panel data set for rural Ethiopian households, measuring the household's food security as a function of self-reported short term consumption as opposed to agriculture production or health indicators, and examining both short term and long term aid effects.

2. Data

The purpose of the study is to understand how the reception of food aid affects a household's vulnerability to hunger. The data used in this study are longitudinal household data provided by the Centre for the Study of African Economies. The data contain a sample of 1477 households from 15 villages in rural Ethiopia collected in four waves: 1994, 1995, 1997 and 1999. The villages included in the survey were chosen to provide a realistic representation of diversity in agro-ecological zones. Within each of the villages random sampling was used to choose respondents stratified by female and non-female headed households to reflect the demographic trend away from male lead households. Sample sizes in each village were purposed to attain a self-weighting sample in terms of type of farming system. This data set is unique due to the comprehensive information gathered on household characteristics. Table 2.1 provides descriptive statistics of characteristics used as controls to account for differences in households.

Table 2.1 Household characteristics 1994 (n= 1475)

Variable	Mean	Std. Dev.	Min	Max
Household Characteristics				
Number in HH	6	3.05	1	23
Number of males	2.94	1.85	0	13
Number of females	3.05	1.83	0	13
Number of children	2.9	2.09	0	14
Adult age	36.81	11.22	17	100
Female HH head	0.22	0.415	0	1
HH mean weight for height	0.26	0.05	0.068	0.883
# bedrooms in house	1.33	0.69	0	9
Production Characteristics				
Plot size	71.99	313.03	0	4644
Off-farm income (Birr)	25.86	126.39	0	2200
HH cereal stores (kg)	7.16	15.34	0	313
Has taken loan in last 5 years	0.473	0.505	0	1
Value of assets (Birr)	202.02	437.85	0	6000
Year last invested in assets	80.45	5.25	30	99
# of production assets	6.87	5.27	0	40
Cost of prod. inputs (Birr)	27.83	67.79	0	700
Quantity of last harvest (kg)	52.89	169.96	0	3000
Harvest revenue (Birr)	822.33	14037.47	0	500960
Food expenditure in last week	39.03	114.97	0	4072.85
Livestock owned	6.57	9.31	0	91
Livestock revenue (Birr)	52.51	162.99	0	2150

Ethiopia is an ideal context to study the effects of food aid because of its long dependence on foreign aid. Government and NGO food aid programs deliver food, mostly in the form of cereals, to households via free food and food-for-work (FFW). Annually, cereal food aid alone has typically totaled between 2,000 and 6,000 metric tons from 1986-1995 (Dercon et al. 2003). The Ethiopian government has placed priority on FFW programs, but both continue to be an important source of nutrition for Ethiopians (Jayne et al. 2002).

3. Methodology

Conceptually a household can acquire income from three sources: agriculture production, paid labor, and FFW programs (Quisumbing, 2003). The household budget constraint can be derived from these activities as a function of the time spent on each. If the household receives free food aid it is treated as unearned income.

$$p_a Q_a(A, t_a) + w t_w + w_{ffw} t_{ffw} + N = p X_p$$

$p_a Q_a$ is the value of the households agriculture production as a function of the households assets of production A and time spent on production t_a. Income from paid labor is $w t_w$ with w the wage rate and t_w time spent earning wages. Income from food for work is measured by $w_{ffw} t_{ffw}$ where w_{ffw} is the in kind wages offered for time t_{ffw} spent working. N is the unearned income from free aid and other transfers. Consumption is measured by $p X_p$ with X goods purchased at price p.

Building off of this model, the effects of food aid on consumption can be identified by regressing consumption on each of these inputs. Because of the nature of the sample, the majority of households are subsistence farmers eligible for free aid, implying that all income is spent on needs. Needs are generally defined as physiological or biological requirements for maintaining life. This paper uses a self-reported measure of food consumption to indicate the availability of food under the assumption that eating less is not a choice based on preference, and households are consuming as much food as their budget constraint allows. Households that have excess income and do not fall under this assumption are not eligible for food aid. Non eligible households (N =0) are used as controls in this model.

Using a self-reported consumption measure allows for commodity prices to be ignored as the household already took them into account when actualizing its budget into consumption. The household factored prices in when making purchasing choices, so prices are inherently included in the measure of the household's capacity to obtain food. This study employs OLS regression analysis to estimate the effect of food aid on household consumption according to this budget constraint.

The primary regression will capture the effect of short term food aid by examining the effect of aid distributed in the last year on the household's current access to food in each of the survey rounds. By using the amount of food aid the household has received in the last year as the independent variable, the specific effect this input in the last period has on food security at time *t* is shown.

The measure of household food security is how many meals per day the family consumed in the last week. The relatively high variation in meals-eaten-per-day, shown in table 3.1, indicates that it is susceptible to changes in the availability of food for a given household. This volatility makes meals-per-day a good measure of food security at the time of the survey. The short time horizon of a week sets this measure apart from the long term health indicators or consumption aggregates used in other studies that are more constant and cannot reflect current conditions as accurately.

This will be used as the dependent variable in the regression. Because meals-eaten-per-day is not an indicator used by food aid programs to determine distribution, some issues of endogeneity are avoided. Distribution is typically determined by rainfall, weight for height scores, income, or other measures of poverty. Using a dependent variable that is short term and not used for aid allocation decisions prevents correlation with the independent variable.

Table 3.1 Summary statistics of meals eaten per day

Meals-eaten-per-day by HH 1994

	Freq.	Percent
1	50	3.39
2	629	42.62
3	789	53.46
4	8	0.54
Total	1,476	100

Meals-eaten-per-day by HH 1995

	Freq.	Percent
0	1	.7
1	62	4.2
2	486	32.92
3	927	62.8
4	8	0.54
Total	1476	100

Meals-eaten-per-day by HH 1997

	Freq.	Percent
1	74	5.01
2	458	31.02
3	938	63.55
4	6	0.4
Total	1476	100

Meals-eaten-per-day by HH 1999

	Freq.	Percent
1	64	4.33
2	490	33.19
3	915	61.99
4	7	0.47
Total	1476	100

The independent variable of interest will be amount of food aid received in the last year, measured in kilograms and delineated by free aid and participation in FFW.

Table 3.2 Households receiving food aid by year

Percentage of Households Receiving Food Aid				
	1994	1995	1997	1999
Free Food	24.11	15.04	22.92	35.23
Food for Work	8.6	3.87	11.89	25.38

Key controls include land and livestock owned, sex and age of household members, assets, education, family size (number of dependents), other sources of un-earned income, on and off-farm income, negative shocks to crops and livestock, access to credit, and harvest quantity. Village fixed effects are used to account for unobservable characteristics, such as cultural variation, and inherent differences, such as climate, between villages.

Controls are household characteristics that either directly affect security, like income, or capture a factor of production that play a role in the household's vulnerability to hunger. Controlling for time varying variables that have an impact on the household's production such as rainfall creates a much more realistic model for estimating changes in food security. Accounting for shocks prevents uncharacteristic circumstances from skewing the results. The inclusion of basic household characteristics such as number of children and house size prevents left out variable error due to inherent differences between households.

The primary regression specification is:

$$S_{it} = a + \beta_{FA} FA_{it-1} + \beta_{FFW} FFW_{it-1} + X_{it}\beta + \varepsilon_i$$

Where S is the measure of food security, FA is the amount of free food aid received measured in 100 kilogram units, FFW is the amount of food acquired via food for work programs (100 kilogram units), and X is the vector of controls described above. β_{FA} and β_{FFW} will test the hypothesis that food aid has a negative effect on food security. By using current household conditions as controls and the amount of aid received in the past year, food aid is effectively lagged by one period.

A second regression addresses the concern raised by existing literature that food aid has displacement effects of domestic production and decreases the available stock of food in further rounds. As food aid increases the local supply, by price depression or other mechanisms, the domestic production has, in some cases, been shown to decrease. This theory has been evaluated in the previously mentioned studies by looking at market indicators of price and supply. This study will examine a different facet of the issue using the same meals-per-day variable to provide a practical look at the household's current access to food and a measure of food security. By using consumption outcomes instead of market indicators as the dependent variable, this model can estimate the effects of food aid on households' capability to obtain food, as opposed to aggregated amounts of food on the market.

The data for the 1994 survey round provide greater detail of the type and amount of food aid received by the household in the last 30 years by recall than do later rounds; therefore this analysis will use only values from that year. If domestic production is indeed being substituted by aid, donated commodities that are produced in the receiving area would have a negative effect on food security in later rounds due to decreased supply. Wheat and maize are the primary crops of the

sampled areas and also the majority of food aid allowing for this hypothesis to be tested with the following regression.

$$S_{it} = a + \beta_{FA}FA_{it-1} + \beta_{WFA}WeatFA_i + \beta_{MFA}MaizeFA_i + \beta_{VFA}VegFA_i +$$

$$\beta_{CFA}CoffeeFA_i + \beta_{OFA}OtherFA_i + \beta_{FFW}FFW_i + \beta_{Y}FAyears_i + X_i\beta + \varepsilon_i$$

The amount of food aid a household has received over the last 30 years is aggregated and specified by type of commodity(wheat, maize, vegetables, coffee, and other goods such as cooking oil) with β_{WFA}, β_{MFA}, β_{VFA}, β_{CFA}, and β_{OFA} estimating the effect of each food type on food security (S) respectively. FFW is the amount of food ever received via food for work programs in the last 20 years with β_{FFW} estimating the effects thereof. $FAyears$ is the number of years the household has received food aid with the parameter β_{Y} showing the effect of length of food aid dependence. $X\beta$ is the vector of controls for household characteristics and village fixed effects.

Table 3.3 Number of years household has received aid

Years HH received Food Aid		
	Freq.	Percent
0	725	49.09
1	184	12.46
2	134	9.07
3	116	7.85
4	68	4.6
5	112	7.58
6	13	0.88
7	17	1.15
8	11	0.74
9	10	0.68
10	16	1.08
11	7	0.47
12	9	0.61
13	11	0.74
14	12	0.81
15	4	0.27
16	4	0.27
17	5	0.34
18	5	0.34
19	3	0.2
20	1	0.07
21	5	0.34
22	4	0.27
30	1	0.07
Total	1,477	100

A third regression examining the targeting of food aid will be run with food aid received being the dependent variable and the household characteristics as the independent variables with village fixed effects as controls.

$$FA_{it} = \beta_i income_{it} + \beta_a assets_{it} + \beta_{wh} weight/height_{it} + X_{it}\beta + \varepsilon_i$$

This regression will reveal what types of households are actually receiving food aid and if the most needy are being reached. Running the model with and without village fixed effects will allow for different levels of targeting to be assessed.

4. Results

Regressing food aid received in the last year on meals-eaten-per-day for the household produces the results shown in Table 4.2 when controlling for household and production characteristics within the Village Fixed Effects model. According to the conceptual model, changes in income, defined as the value of agriculture production $p_a Q_a$, wage labor wt_n, food for work $w_{ffw} t_{ffw}$, and unearned income N, will result in changes in consumption. In this regression, income and production assets should have a positive relationship with consumption. The measures of agriculture production and income used as independent variables should therefore have positive coefficients. Because the values of food for work and food aid are aggregated over the last year and lagged a period behind the control variables this expectation does not apply to these measures.

There are no glaring discrepancies between expectations and the signs on outputs. Harvest quantity has a significant positive coefficient meaning that, the more a household harvests, the more they eat. This is consistent with a priori expectations. However, some variables such as harvest revenue and off-farm income that would be expected to have a positive impact on consumption do not have significant coefficients in most rounds. In the case of off-farm income this could be due to low variation between households as few generate substantial income outside of farming. The insignificance of harvest revenue could point to a weakness in the model as there is not an obvious explanation for this result.

Household characteristics such as mean adult age also conform to general expectations. The negative coefficient on mean adult age follows expectations as it is reasonable to assume that as adults age they become less productive and contribute less to income but consume the same amount, making the household more nutritionally insecure. Adverse weather shocks have negative

coefficients but are only significant within one round. This could be due to a higher number of households experiencing too much rain in this round compared to the others as is summarized in table 4.1.

Table 4.1 Proportion of households experiencing negative weather shocks

"Too much rain"			
1994	1995	1997	1999
8.20%	16.50%	7.19%	9.10%

With no extreme contradictions to expected coefficient values and R-squared values greater than .3 in each round it is reasonable to draw conclusions from the model's results. Coefficients without significance must be interpreted as equal to zero.

Table 4.2 Effects of Short Term Food Aid

Meals-per-day	1994	1995	1997	1999
Food aid received in last year (100kg)	0.000553	-0.00619	-0.00715	0.000832
	(0.00151)	(0.00878)	(0.00662)	(0.00291)
Food for work (100kg)	-0.00108	-0.0361*	-0.0902*	-0.00116
	(0.00434)	(0.0213)	(0.0524)	(0.00102)
Off-farm income (Birr)	0.000114	0.000923	0.00342*	0.000493
	(0.000107)	(0.000531)	(0.00204)	(0.00451)
# Bedrooms in house	0.0132	0.0233	.0692*	0.0467
	(0.0216)	(0.0394)	(0.0281)	(0.0275)
Taken a loan	0.0218	0.0559	0.00585	0.00830
	(0.0269)	(0.0274)	(0.0294)	(0.0317)
Member of EQUB	0.105***	0.021	0.00118	0.0226
	(0.0351)	(0.0404)	(0.0294)	(0.0537)
Plot size (10 hectars)	-0.00224	0.00258**	0.00102	0.00167
	(0.00436)	(0.00490)	(0.00361)	(0.00158)
HH has access to grazing land	0.129***	0.0236*	0.098	0.101*
	(0.0348)	(0.0299)	(0.0678)	(.06450)
Cost of production imputs (Birr)	-0.000135	-0.00021	-0.00826	-0.00548
	(0.000176)	(0.00034)	(0.00186)	(0.00363)
Harvest quantity (100kg)	0.0166**	.0191**	0.0112***	0.0213**
	(0.0675)	(0.00371)	(0.00424)	(0.00496)
Harvest revenue (10 Birr)	0.000479	0.00525	0.00626	0.00329
	(0.00328)	(0.00927)	(0.00118)	(0.00202)
Too much rain	-0.0672	-0.0602*	-0.0558	-0.0301
	(0.0635)	(0.0333)	(0.0130)	(0.0371)
Too little rain	-0.0251	-0.0347	-0.0352	-0.0115
	(0.0551)	(0.0345)	(0.0324)	(0.0669)
Value of livestock (10 Birr)	0.00357*	0.0382	0.0598*	0.00441*
	(0.00197)	(0.02970)	(0.03180)	(0.00239)
Livestock revenue (10 Birr)	0.000120	0.000334	0.000687*	0.000552
	(0.000103)	(0.000215)	(0.000173)	(0.00038)
# males in HH	0.183*	0.102*	0.165*	0.0402*
	(0.101)	(0.119)	(0.171)	(0.100)
# females in HH	0.173*	0.194*	0.183*	0.0190*
	(0.0991)	(0.0998)	(0.0870)	(0.0104)
# children in HH	0.00387	0.00445	0.00389	-0.00236
	(0.0115)	(0.0225)	(0.0199)	(0.0253)
Mean adult age	-0.00307***	-0.00416**	-0.00311***	-0.00974*
	(0.00113)	(0.00212)	(0.00144)	(0.00146)
ALP	-0.0164	-0.00191	-0.00201	0.00603
	(0.0110)	(0.00371)	(0.00247)	(0.0034)
# in Household	-0.0147	-0.0197	-0.0352	-0.0223
	(0.0972)	(0.0988)	(0.0525)	(0.0701)
Value of assets (10 Birr)	0.00245	0.0428	0.00356	0.00366
	(0.00274)	(0.0276)	(0.00690)	(0.00301)

HH head female	-0.0589*	-0.0621*	-0.0522*	-0.0579*
	(0.0353)	(0.0304)	(0.0298)	(0.0401)
Atsbi	-0.470***	-0.484***	-0.609***	-0.453***
	(0.0986)	(0.0702)	(0.0859)	(0.0929)
Sebhaassahsie	-0.591***	-0.513***	-0.790***	-0.577***
	(0.109)	(0.0788)	(0.0967)	(0.110)
Ankober	-0.0679	-0.0624	-0.145	-0.147
	(0.0958)	(0.0584)	(0.101)	(0.0996)
Basso	-0.00796	-0.0983*	-0.0447	-0.115
	(0.0954)	(0.0568)	(0.0960)	(0.0968)
Enemayi	-0.166	-0.282***	-0.295***	-0.438*
	(0.105)	(0.0673)	(0.0998)	-0.904
Bugena	-0.319***	-0.0328*	-0.348***	-0.494***
	(0.0841)	(0.0438)	(0.0869)	(0.0807)
Adaa	0.439***	0.101*	0.349***	0.407***
	(0.0846)	(0.0545)	(0.0826)	(0.0924)
Kersa	0.390***	0.0814*	0.237***	0.128**
	(0.0880)	(0.0671)	(0.0916)	(0.111)
Dodota	-0.259***	-0.158***	-0.284***	0.322***
	(0.0908)	(0.0419)	(0.0914)	(0.0887)
Shashemene	0.235***	0.302*	0.171*	0.403***
	(0.0851)	(0.0356)	(0.0910)	(0.0994)
Cheha	0.133*	0.155**	0.216**	0.284***
	(0.0963)	(0.0725)	(0.0954)	(0.0956)
Kedida	0.148*	0.807***	0.861*	0.705*
	(0.0978)	(0.0906)	(0.0973)	(0.0899)
Bule	0.499***	0.256***	0.385***	0.336**
	(0.0814)	(0.0417)	(0.0809)	(0.0607)
Boloso	-0.0685	-0.0340	-0.0667	-0.0449
	(0.0953)	(0.0515)	(0.0968)	(0.0881)
Observations	1,475	1,475	1,240	1,240
R-squared	0.347	0.316	0.367	0.343

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The coefficients on free food aid are statistically insignificant in each of the survey rounds. This indicates that short term food aid has no effect on food security and meals-eaten-per-day is instead determined by the vector of controls. In both 1994 and 1997, FFW has a significant negative coefficient at the $p < .01$ level. The structure of the FFW program requires participants to work on public projects and often requires them to be away from home for extended periods of time. A household that has received 100 kg from FFW programs in the last year has eaten .0361 less meals per day in 1997 and .0902 less meals per day in 1999. This could be a result of the allocation of labor to public programs instead of on the household's own production. A reduction of labor in the past cultivating fields or tending livestock could cause the household to be less productive in the present. Since this survey was administered just after the Meher harvest if a household had allocated it's time to FFW in months leading up to the harvest it could have had negative implications for harvest results currently affecting the household.

The second regression, using the extensive data from the 1994 survey, produces the results found in table 4.4. The nature of the OLS regression allows for the coefficients to be interpreted as marginal effects, that is, the coefficients represent the change in the value of the dependent variable for a one unit change in the related control variable. Because the first regression showed generally consistent relationships through rounds, this model can be viewed as characteristic of sample behavior in general and not confined to the sample year.

In the results, household access to grazing land, value of livestock, and harvest quantities continue to have significant positive effects on food security. This is predicted by the positive relationship between the value of the household's agricultural production and consumption. Harvest revenue has an insignificant coefficient once again contradicting expectations. It is possible that

households eligible for food aid do not generate revenue from their harvest and keep output for consumption. Table 4.3 shows summary statistics of harvest revenue.

Table 4.3 1994 Harvest revenue

1994 Harvest revenue (Birr)	Freq.	Percent
0	755	51.15
>0 - 50	123	8.34
>50-100	240	16.27
>100-400	273	18.49
>400	85	5.75
Total	1476	100

Over 50% of households report having no harvest revenues. This lack of variation could account for the lack of significance.

Demographic characteristics of number of males and females have significant positive coefficients. This fits into the conceptual model in that for each additional adult the household's supply of labor increases allowing for increased income. Likewise, mean adult age has a negative affect which follows the assumption that as age increases productivity decreases cause labor supply to decline. EQUB membership (discussed further in regards to targeting), a savings and loan association that insulates households from risk, has a significant positive coefficient indicating that the mechanisms of the organization are decreasing member household's vulnerability to hunger. Once again the control coefficients generally follow expectations and the R-squares are sufficiently high to treat the model as meaningful.

Table 4.4 Effects of Long Term Food Aid

1994 Meals-per-day	Total FA	FA by commodity	Total FA	FA by commodity
Food aid received in last year (100kg)	0.00121	0.00216	0.00111	0.00204
	(0.00165)	(0.00182)	(0.00165)	(0.00185)
Total food aid received (100kg)	-0.0256		-0.00934	
	(0.0341)		-0.0348	
Wheat food aid (100kg)		-0.00684		-0.00530
		(0.00396)		(0.00402)
Maize food aid (100kg)		-0.0282		-0.0231
		-0.0163		(0.0165)
Vegetable food aid (100kg)		0.0740**		0.0973***
		-0.034		(0.0320)
Coffee food aid (100kg)		0.00102*		0.00110**
		(0.00554)		(0.00544)
Other food aid (100kg)		0.0025		0.00395
		(0.00221)		(0.00241)
Years received food aid			-0.0119**	-0.0146**
			(0.00586)	(0.00612)
Food for work (100kg)	-0.000454	-0.000827	-0.000183	0.000104
	(0.00424)	(0.00418)	(0.00423)	(0.00418)
Off-farm income (Birr)	0.000112	0.000106	0.000120	0.000114
	(0.000108)	(0.000111)	(0.000107)	(0.000110)
# bedrooms in house	0.0108	0.00912	0.0101	0.00839
	(0.0213)	(0.0212)	(0.0213)	(0.0211)
Value of production assets	0.00247	0.00225	0.00244	0.00214
	(0.00276)	(0.00276)	(0.00277)	(0.00276)
Taken a loan in last 5 years	0.0244	0.0232	0.0262	0.0250
	(0.0269)	(0.0269)	(0.0268)	(0.0268)
Member of EQUB	0.102***	0.0981***	0.101***	0.0981***
	(0.0351)	(0.0351)	(0.0350)	(0.0349)
Plot size (10 hectars)	-0.00227	-0.00254	-0.00248	-0.00273
	(0.00442)	(0.00441)	(0.00442)	(0.00441)
HH has access to grazing land	0.133***	0.135***	0.136***	0.138***
	(0.0351)	(0.0352)	(0.0351)	(0.0351)
Cost of production imputs (Birr)	-0.000111	-0.000104	-0.000114	-0.000105
	(0.000178)	(0.000178)	(0.000178)	(0.000178)
Quantity harvested (100kg)	0.0173**	0.0167**	0.0179***	0.0175**
	(0.00684)	(0.00686)	(0.00679)	(0.00681)
Harvest revenue (100 Birr)	-0.0000235	-0.0000281	-0.0000237	-0.0000296
	(0.0000418)	(0.0000461)	(0.0000424)	(0.0000484)
Too much rain	-0.0689	-0.0665	-0.0687	-0.0665
	(0.0638)	(0.0634)	(0.0636)	(0.0633)
Too little rain	-0.0224	-0.0207	-0.0224	-0.0218
	(0.0552)	(0.0552)	(0.0550)	(0.0548)
Value of livestock (10 Birr)	0.0374*	0.0374*	0.0372*	0.0370*

	(0.0196)	(0.0196)	(0.0196)	(0.0196)
Livestock revenue (10 Birr)	0.00125	0.00124	0.00124	0.00123
	(0.00103)	(0.00103)	(0.00102)	(0.00102)
# of males in HH	0.189*	0.192*	0.187*	0.192*
	(0.102)	(0.102)	(0.101)	(0.101)
# of females in HH	0.174*	0.177*	0.173*	0.177*
	(0.0995)	(0.0994)	(0.0990)	(0.0989)
# of children in HH	0.00357	0.00259	0.00361	0.00286
	(0.0116)	(0.0113)	(0.0115)	(0.0113)
Mean adult age (adult >17)	-0.00322***	-0.00345***	-0.00293**	-0.00314***
	(0.00113)	(0.00114)	(0.00114)	(0.00115)
ALP	-0.0158	-0.0153	-0.0155	-0.0150
	(0.0111)	(0.0110)	(0.0111)	(0.0110)
# of HH members	-0.149*	-0.153*	-0.148*	-0.152*
	(0.0975)	(0.0973)	(0.0970)	(0.0969)
Atsbi	-0.474***	-0.424***	-0.462***	-0.390***
	(0.103)	(0.108)	(0.103)	(0.109)
Sebhaassahsie	-0.611***	-0.624***	-0.584***	-0.578***
	(0.107)	(0.112)	(0.108)	(0.114)
Ankober	-0.0713	-0.0571	-0.0553	-0.0263
	(0.0954)	(0.0974)	(0.0956)	(0.0982)
Basso	-0.0217	-0.00583	-0.0421	-0.0176
	(0.0943)	(0.0975)	(0.0947)	(0.0968)
Enemayi	-0.173*	-0.158	-0.193*	-0.169
	(0.105)	(0.107)	(0.105)	(0.107)
Bugena	-0.331***	-0.339***	-0.229**	-0.213**
	(0.0831)	(0.0821)	(0.0980)	(0.0992)
Adaa	0.427***	0.442***	0.406***	0.430***
	(0.0836)	(0.0869)	(0.0839)	(0.0862)
Kersa	0.373***	0.384***	0.363***	0.386***
	(0.0875)	(0.0909)	(0.0872)	(0.0901)
Dodota	-0.285***	-0.281***	-0.280***	-0.262***
	(0.0896)	(0.0927)	(0.0893)	(0.0927)
Shashemene	0.223***	0.238***	0.203**	0.226***
	(0.0845)	(0.0877)	(0.0848)	(0.0869)
Cheha	0.125	0.156	0.116	0.155
	(0.0962)	(0.0991)	(0.0958)	(0.0981)
Kedida	0.143	0.164	0.125	0.154
	(0.0981)	(0.100)	(0.0981)	(0.0996)
Bule	0.501***	0.516***	0.481***	0.505***
	(0.0815)	(0.0848)	(0.0818)	(0.0840)
Boloso	-0.0813	-0.0616	-0.0891	-0.0591
	(0.0948)	(0.0969)	(0.0944)	(0.0961)
Observations	1,475	1,475	1,475	1,475
R-squared	0.345	0.349	0.347	0.351

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The model was run first with an aggregated variable of total food aid received in the last 30 years and food aid in the last year to parallel the first regression. Both the coefficients are insignificant meaning that this model estimates the effect of these food aid categories on food security as 0. However, adding in commodity specification to the long term food aid variable results in positive coefficients on vegetable and coffee aid. The coefficients on total, wheat, and maize food aid are negative as was suspected by the literature that finds displacement effects. However, the coefficients are insignificant so wheat and maize food aid can be interpreted as having no effect on food security.

Vegetable and coffee food aid both have significant positive coefficients. OLS allows us to interpret these as marginal effects on meals-per-day. Vegetable food aid has the largest effect with every 100 kg increase causing a .0104 increase in meals the household eats per day. Because vegetables are not a cash crop in this area, that is households producing vegetables are doing so mainly for their own consumption as opposed to for sale, it is reasonable to infer that food aid in this form would not have disincentive effects. An increase in the supply of vegetables is unlikely to have any effects other than on the recipient household at that time. Also, as vegetables have a higher nutritional value than cereals, it is possible that they have a positive impact on household health and productivity is increased. Similarly, households are unlikely to treat coffee as substitutes for their own production. These foods would likely supplement their consumption, but have little to do with production decisions.

Table 4.5 shows the total amounts of each commodity distributed by village and the per household amount of each food type.

Table 4.5 Distribution of long term food aid by commodity

Commodity amounts (kg) by village					
(amount per receiving household in parentheses)					
	Wheat FA	Maize FA	Veg FA	Coffee FA	Other FA
Atsbi	123292.5	0	0	4143	1015
	(1503.56)	-	-	(50.52)	(12.37)
Sebhaassahsie	20646	2	371	11315.5	1288.5
	(327.71)	(0.031)	(5.88)	(179.61)	(20.45)
Ankober	2949	143	178	495	892
	(40.39)	(1.95)	(2.43)	(6.78)	(12.22)
Basso	0	0	0	0	0
	-	-	-	-	-
Enemyai	65	0	0	0	0
	(16.25)	-	-	-	-
Bugena	10968.65	710.5	3082.75	5533.35	7907
	(74.61)	(4.83)	(20.97)	(37.64)	(53.79)
Adaa	0	0	0	0	0
	-	-	-	-	-
Kersa	2343	0	80.5	107	415
	(37.79)	-	(1.29)	(1.72)	(6.69)
Dodota	12409	25	142.75	0	500
	(114.89)	(0.23)	(1.32)	-	(4.62)
Shashemene	106	62.5	2	0	1.33
	(13.25)	(7.81)	(0.25)	-	(0.16)
Cheha	72.5	438.5	58.66	752	107.33
	(1.42)	(8.59)	(1.15)	(14.74)	(2.10)
Kedida	768.5	235.5	0	0	42
	(32.02)	(9.81)	-	-	(1.75)
Bule	0	0	0	0	0
	-	-	-	-	-
Boloso	1722	321	2	94.5	131
	(25.32)	(4.72)	(0.029)	(1.38)	(1.92)
Gardula	2002	455	1124.5	58	4536
	(32.81)	(7.46)	(18.43)	(0.95)	(74.36)

Wheat aid clearly composes the majority of aid distributed however it does not have a significant effect on food security in this model while vegetable and coffee food aid do. In the case of coffee food aid it is possible that recipient households are supplementing their income as opposed to consumption by selling or trading it. The amount of coffee being allocated to recipient

households is relatively large with values as high as 179 kg per household in Sebhaassahsie. This is especially true for a good that does not provide caloric value and is used in small amounts. This raises suspicion as to the ends of coffee food aid. If it is being sold and generating income, that income could be invested on the household's capabilities making it more productive in the future.

The distribution of vegetable food aid is not as telling. It seems likely that the positive effect of this commodity arises from qualities inherent to the good. The nutritional content of vegetables gives them reasonably different health effects than consumption of wheat and maize. These inherent differences in nutrition could be responsible for the positive coefficient and significance.

The new variable years received food aid is introduced in the last two columns of table 4.4. These regressions are purposed to show the effect of length of food aid participation on food security. This specification is run with both the aggregated long term food aid variable, and specified by crop. The model produces results consistent with the first two regressions for short term, long term, wheat, maize, vegetable, coffee, and other food aid, as well as the controls. This gives validity to the results for years received. In both specifications years received food aid has a significant negative coefficient.

The most economically significant result in the model is this coefficient on years received. For every additional year the household has received food aid, regardless of type or amount, meals-eaten-per-day decreases by .0142. For a household who has received food aid for 20 years this means a decrease of .278 meals per day. This is an 11% decrease from the mean of 2.5 meals per day. This coefficient points to a new issue that is unaddressed by the current literature. The length of time the household has received food aid having negative effects on food security brings the issue into a different realm. This result is not likely a result of production displacement as the amount of

food aid received is being controlled for. As opposed to a market effect, the length of dependence may have behavioral effects on the household's decision making process.

If a household receives food aid for an extended amount of time it is likely that the household begins to take this income into its budget constraint as a guaranteed source of consumption. Food aid may function as an expected safety net for households who have received it for a long time. This could lead to a different allocation of resources than would occur without the expectation of help. In this case of persistent food aid, aid agencies are acting as a form of predicted insurance taking on some of the risk of the household. It is possible that this leads to moral hazard on behalf of the household where the urgency to maximize production is lessened. A household that does not expect to receive food aid in the next year may take greater lengths to increase its security for that year.

This hypothesis suggests that E(*N*) in the budget constraint is somehow substituting other inputs for the same expected consumption. Time could be the substituted good. The household chooses how much time it spends on each activity (agriculture, wage labor, food for work) including leisure with the time constraint as follows:

$$T = t_a + t_w + t_{ffw} + L$$

If moral hazard is causing a reallocation of time from productive to leisure based activities on the assurance of food aid in the next period, agriculture productivity could be compromised. This would decrease the resources available to the household and the household would be less nutritionally secure. The household's moral hazard is acting less responsible in ensuring its food security because food aid programs are insulating it to risk. To test this hypothesis, how many years

the household has received food aid is regressed against days worked on farm in the last month as the dependent variable with the same vector of household controls.

$$\beta_d Days_i = \beta_y FAyears_i + X_i\beta + \varepsilon_i$$

This regression produced insignificant results that can be interpreted as number of years a household has received food aid has no effect on the amount of time they spend working their land. However, this survey was administered in the months after the largest harvest of the year and it is possible that the last month of work was not typical or representative of how much work is done in harvest or planting times.

Table 4.6 Time spent working on farm

Days worked on farm in last month		
	Freq.	Percent
0	767	52
1-5	128	9
6-10	288	20
11-15	125	8
16-20	83	6
21-25	51	3
26+	34	2
Total	1,476	100

Table 4.6 shows that over 50% of households have reported 0 days worked in the last month. The overriding factor affecting days worked in this sample appears to be the time of survey administration being after the harvest making all other factors irrelevant. This prevents any meaningful tests on this variable.

Therefore, rest of the income equation must be explored for other possible sources of a decrease in productivity. Because the wage rate w and w_{ffw} are exogenous to the household's budget constraint, the household's decisions do not affect these inputs. The value of agriculture output is determined by P_aQ_a, P_a is exogenous and Q_a is a function of A and t_a. Time has already been examined leaving A, agricultural assets, as the remaining factor the household controls. Land ownership is allocated by the government and thus can also be treated as exogenous. Assets of production are left for the household to control.

If the household has a decreased dependence on their own productive capability due to the expectation of food aid in future rounds, it is possible that they redirect their current resources to areas other than investing in that production capacity. In this way, persistent food aid may discourage the household from improving its factors of production. The data do not allow for regression analysis but simple cross tabs of years received food aid and how recently the household invested in their own factors of production are very telling. By looking at the households that have received food aid for a certain time period and how many of those households have invested in their production assets in subsequent years it can be seen if there is a difference in behavior.

Table 4.7 Years received food aid and HH investment in factors of production

HH received FA at least:		Household has invested in assets of prod. in last:		
		10 years		
15 years		No	Yes	
	No	1,068	365	1,433
		74%	26%	100%
	Yes	31	13	44
		70%	30%	100%
		1,099	378	1,477
		5 years		
10 years		No	Yes	
	No	1,323	55	1,378
		96%	4%	100%
	Yes	90	9	99
		91%	9%	100%
		1,413	64	1,477
		4 years		
5 years		No	Yes	
	No	1,177	38	1,215
		96%	4%	100%
	Yes	239	23	262
		91%	9%	100%
		1,416	61	1,477
		3 years		
4 years		No	Yes	
	No	1,114	33	1,147
		97%	3%	100%
	Yes	304	26	330
		92%	8%	100%
		1,418	59	1,477
		2 years		
3 years		No	Yes	
	No	999	32	1,031
		96%	4%	100%
	Yes	420	26	446
		94%	6%	100%
		1,419	58	1,477

2 years	1 years		
	No	Yes	
No	869	28	897
	96%	4%	100%
Yes	550	26	576
	95%	5%	100%
	1,419	54	1,473

Table 4.7 reveals that no fewer households that have received food aid in years prior, invested in their factors of production in the subsequent years. That is, households who have received food aid are not less likely to have taken action to improve their production assets. Granted, this analysis is limited due to lack of controls, but does not provide evidence for the presence of moral hazard with persistent aid.

Households may still be treating aid agencies as a form of informal, in-kind insurance against hunger risk but this exercise indicates that a decrease in investment is not the mechanism in play. However, running a t-test on asset investment year by a food aid dummy produces a significant difference of -.575 at the $p < .05$ level. This result means that the difference in the means of investment year for those who have received food aid and those who have not are significantly different. The difference can be interpreted as the mean household that has received food aid has invested in its assets .575 years earlier than the mean household never receiving food aid. This suggests that, generally, households who have received food aid have older, or less improved assets of production. Once again, this analysis is limited from a lack of controls but, it provides some evidence of differences in investment behavior between these subgroups. This data set does not provide the information necessary to test this hypothesis further in a meaningful way so further research in this field is necessary.

For a household's expectation of a certain amount of food aid E(*N*) to have negative effects on food security, there must be some time when that expectation is not met and the household has an income deficit. Variation in food aid targeting must be present for this to occur or the household's expectation would always be met and food security would not be compromised. Table 4.8 shows that the variation of food aid by village is relatively high.

Table 4.8 Variation in food aid distribution

Households receiving food aid by village				
	1994	1995	1997	1999
Atsbi	79%	5%	79%	33%
Sebhaassahsie	35%	2%	12%	24%
Ankober	0%	3%	65%	44%
Basso	0%	0%	6%	31%
Enemyai	0%	5%	11%	0%
Bugena	96%	69%	7%	89%
Adaa	0%	1%	61%	0%
Kersa	0%	5%	4%	6%
Dodota	98%	28%	64%	28%
Shashemene	0%	9%	22%	0%
Cheha	0%	30%	7%	3%
Kedida	0%	10%	33%	0%
Bule	0%	0%	5%	0%
Boloso	9%	1%	2%	0%
Gardula	1%	9%	17%	8%

The proportion of households receiving aid is not constant from year to year meaning that households receiving food aid one year may receive none in the next. This could be due to the households having enough income to not need aid, or from changes in program targeting.

Targeting of food aid is vital for the program to be effective. The goal is to reach the most food insecure households. Most research has shown that targeting to villages is highly political and follows inertia as opposed to need (Jayne et al. 2002). Targeting occurs on two levels, nationally from government or NGO programs to selected villages, and locally within village. There is also a third level of allocation that is self-selection of the household itself choosing to participate.

The following regression employs OLS with food aid as the independent variable to identify what types of households are receiving aid. Results both with and without village fixed effects are shown to assess different levels of targeting. The first model without fixed effects estimates what the

determinants of aid are on the whole nationally. The inclusion of village fixed effects shows the determinants of aid allocation within village. Food aid allocation to households is distributed by village governments from the stocks given to them from a national source. Therefore, the first level of targeting is from NGO or Ethiopian government to village then the second level from village officials to household. FFW is largely targeted via self-selection as if an individual could generate more income from the private sector instead of program participation he would not self-select. Therefore, this study only examines free aid targeting. Results are shown in table 4.9.

Table 4.9 Village level targeting of food aid

1994 Food aid (10kg)		
VARIABLES		Village Fixed Effects
Female HH head	1.661***	-0.124
	(0.571)	(0.517)
Weight for height	-20.54***	-8.288**
	(5.694)	(4.120)
Value of assets	-0.0605***	0.00315
	(0.0223)	(0.0167)
# bedrooms in house	0.503	0.357
	(0.298)	(0.236)
Kg of cereals stored by HH	-0.0179*	0.00118
	(0.00975)	(0.00428)
HH taken loan in last 5 years	-0.135	0.235
	(0.403)	(0.367)
Member of EQUB	-2.106***	-0.303**
	(0.302)	(0.148)
Plot size	-0.00108***	-0.000111
	(0.000272)	(8.97e-05)
HH has access to grazing land	0.218	0.115
	(0.393)	(0.375)
Cost of production imputs	0.0152***	0.00225
	(0.00361)	(0.00263)
Harvest Quantity	-0.00198**	0.000509
	(0.000911)	(0.000476)
Harvest Revenue	-4.00e-06	1.19e-06
	(3.00e-06)	(1.13e-06)
Too much rain	-2.840***	-0.0313
	(0.351)	(0.0909)
Too little rain	-3.286***	-0.0111
	(0.358)	(0.0940)
Livestock owned	0.0317	-0.00654
	(0.0169)	(0.0127)
Livestock revenue	0.000113	0.00285
	(0.00151)	(0.00123)
# males in HH	1.294	1.853
	(1.639)	(1.472)
# females in HH	1.224	2.021
	(1.532)	(1.386)
# children in HH	0.0630	0.0423
	(0.143)	(0.113)
Mean adult age (>17)	-0.0143	-0.00493
	(0.0162)	(0.0148)
ALP	0.445	0.0433
	(0.102)	(0.0544)
# in HH	-2.247	-2.026
	(1.582)	(1.430)

Atsbi		15.71***
		(2.223)
Sebhaassahsie		6.068***
		(2.170)
Ankober		0.167
		(0.186)
Basso		-0.102
		(0.327)
Enemayi		0.305
		(0.197)
Bugena		2.914***
		(0.343)
Adaa		-0.0286
		(0.391)
Kersa		-0.371
		(0.434)
Dodota		11.33***
		(0.641)
Shashemene		0.104
		(0.215)
Cheha		-0.00479
		(0.265)
Kedida		-0.463**
		(0.227)
Bule		0.320
		(0.339)
Boloso		0.116
		(0.317)
Observations	1,475	1,475
R-squared	0.096	0.378

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Most results are consistent with expectations when considering the politics of aid programs. In the model without fixed effects female headed households are shown to receive extra aid with a significant coefficient of 1.661. This means that households identical in every other way being controlled for will receive more aid if headed by a female. Targeting aid towards women has been a finding in various studies including Jayne et al. (2002) using data from Ethiopia in this time period. Women development has become an institutionalized goal by many aid programs under the theory that women handle income more responsibly and is included in the UN's Millennium Development Goals (Clay et al. 1999).

Other significant variables in the first model relate to the household's general wealth. How much land is allocated to the household, cereal stores, harvest quantity, and value of assets all have negative coefficients so as these measures of wealth increase, food aid received decreases. This would point to effective targeting to more poor households. However the measures of adverse rainfall have coefficients that do not follow expectations. Negative coefficients on both too much and too little rain suggest that households that undergo negative weather shocks receive less aid. These variables are all time-varying. Due to the costs of targeting it is possible that aid is unresponsive to factors that change frequently. Quisumbing (2003) found food aid and food for work programs to be highly determined by weight for height scores and insensitive to shocks to both crops and livestock.

Weight for height has a significant coefficient of -20.54 without fixed effects and -8.288 in the second model. Weight for height scores are an accessible measure of malnutrition and cited as a targeting mechanism by aid agencies (Jayne et al. 2001). This variable is one of only two that retain its significance in the fixed effects model. The loss of significance of other variables and the decrease in magnitude on the significant coefficients indicate that the main source for the variation in the

distribution of food aid is targeting to village. The first model has a very low R-squared value which increases to .378 with fixed effects affirming this conclusion. The probable explanation for this is that aid agencies save costs by targeting low income villages and within villages, aid goes to those with low weight for height.

The second variable that maintains its significance is EQUB membership. The variable has a negative coefficient of .303 meaning that member households receive 3.03 kg less aid than non-members. This is not a large amount of food but the significance does point out subgroup of households that are receiving less food aid by a classification they chose to be in. EQUB is a savings and loan association that requires periodic deposits from the household and allows for withdraws and loans at little to no interest rate. This organization insulates households to risk and provides a resource to turn to other than aid. It is likely that households who are members make withdraws to account for deficits in their budget constraint as opposed to participation in food aid. EQUB membership had a significant positive coefficient in 1994 in both regressions indicating that membership also has positive effects on food security.

5. Conclusions

Food aid has been, and will undoubtedly continue to be, an important policy option for addressing hunger in Ethiopia and other developing nations. While it's hard to argue against giving starving children bread, it is vital to consider long term consequences of food aid policies in order to maximize welfare and promote development in recipient nations. This research adds to the literature devoted to exploring the effects of food aid on beneficiaries by looking at effects on household consumption as opposed to production, and examining a unique dependent variable as a measure of food security in a village fixed effects model.

The analysis reveals that short term food aid has no effect on the measure of food security in all four survey years. Food for work participation however, decreased food security for two of the tested rounds. This program requires aid recipients to work on public projects in exchange for the in-kind wage. It is possible that reallocating labor from the household's own production to FFW can compromise its productivity in further rounds. FFW participation is not significant in the long term model so this paper produced no further evidence for this effect. Further research is warranted as to the effects of FFW on household production particularly at different times of the growing season. This data set does not provide information necessary to test this hypothesis.

The model examining long term food aid produced evidence of vegetable and coffee food aid having positive effects on food security while other types of commodities have no significant effect. Descriptive statistics suggest that households may be supplementing their income as opposed to/ as well as consumption with coffee aid. Vegetables' inherent nutritional benefits could increase the health and productivity of the house more than cereal aid increasing the household's capability to provide for itself.

The key finding is the negative relationship between food security and number of years received food aid. The more years a household has been receiving food aid , the less food secure it is. It is possible that households are developing moral hazard from expected food aid values and variation in targeting sometimes causes households to not receive their expected value. A household that expects to receive food aid may be experiencing moral hazard and not be as motivated to maximize its production as a household that does not expect help. The mechanisms of this hypothesized behavior were explored via information on days worked on household farm and investment in production assets. The limitations of the data set prevent conclusive evidence but descriptive statistics and tests present trends both against and supporting the hypothesis. Once again,

further work is necessitated to test the result years received aid decreases food security and to discover the means by which this occurs.

This analysis of food aid targeting is general but reveals the major mechanisms at work in distribution decisions. On the household level, weight-for-height scores are the main source of variation in aid within this model. This finding is in line with other research on targeting which describes weight-for-height as a measure of household nutrition that is easier to obtain than other health indicators. The lower costs of gathering this information and objective nature of z-scores make it widely used for targeting needy households. However, the addition of fixed effects reduces the magnitude of weight-for-height's coefficient and removes significance from other household characteristics. This change reveals that the large majority in variation of food aid distribution is in fact based on village level targeting, not household level. Generally poorer villages receive aid while relatively more wealthy villages may receive none, despite the possible presence of the neediest households in the wealthier village. Targeting at the village level reduces costs, but may have drawbacks for poor households in non-poor areas.

There is evidence of both positive and negative effects of food aid on household food security in this study. As further research is done and more facets of the issue are brought to light, hopefully food aid programs can become more effective in achieving their goal of reducing hunger, and saving lives. Help is needed in poor areas, but the consequences of that help must be considered in order to truly increase recipient welfare.

6. References

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