

The Impact of Food Aid on Grain Prices in Ethiopia

Merlon Assefa Arega¹

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Abstract

Famine and food insecurity have long been prominent in Ethiopia, making the country one of the most food aid dependent in the world. Despite the several self-evident positive impacts of food aid, the possible disincentive effect of food aid on production induced by its depressing effect on food prices, have been one of the issues widely explored in the literature. Building on the existing literature, this study tries to examine the impact of food aid on the retail prices of *Teff*, wheat, maize, and sorghum using a panel monthly, *Woreda* or market level datasets for the period of July 2001 to December 2005 from Ethiopia. Regression for each of the four type of crops considered are estimated separately, using the Arellano-Bond two-steps Generalized Method of Moments (GMM) estimation method. The result shows that there is a negative correlation between per capita grain food aid distributed before six months period and the retail prices of *Teff*, wheat and maize, supporting the disincentive argument. However, the magnitude of the effect is rather small, particularly if compared to the impact of rainfall. The quantity of rainfall before four and six months period has a statistically significant depressing impact on the retail prices in all the crop cases. Therefore, concerted efforts are urgently required to increase local grain production to stabilize retail prices. Though the study implies that the disincentive effect of food aid is marginal, it indicates the possibility. Thus, food aid emergency programs should be designed with better targeting and timing of food aid deliveries to avoid the detrimental effects on the local markets.

JEL classification: Q11; Q18; C32

Keywords: food aid, grain retail prices, rainfall, Arellano-Bond two-steps GMM, Ethiopia

¹ Norwegian University of Life Science-UMB-Norway, E-mail meron.arega@umb.no / MerlonAssefa@uneca.org

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1. Introduction

The international community has been showing its commitment to the Millennium Development Goals (MDGs), of which the first is to halve hunger by 2015. However, despite several developmental efforts and the recorded significant economic growth over the past recent years, poverty and food insecurity have remained the major challenges faced by the developing world. Even though the global hunger slightly declined in 2010 (925 million undernourished people) from its worst record in 2009 (1.2 billion people), it is still *unacceptably* high, being worse than the pre-existing unpleasant situation even before the food and economic crisis of the past few years (FAO, 2010). It is also reported that about 20 percent of the world's undernourished people live in countries with protracted crisis (FAO, 2010).

Despite these predicaments, most of the countries do not have the capacity to import and fill their production gaps. Food aid therefore, in the past several years appeared to be an obvious mechanism to respond to food crises from chronic food insecurity due to poverty to humanitarian emergencies because of disasters. Globally, about 5.5 million MT of food aid was delivered to countries in the world in the year 2009, of which Sub-Saharan Africa constitutes the largest proportion, 64% (See Figure 1). The categories of food aid deliveries have changed over time showing a rapid increase in emergency food aid, and the decline of program food aid as can be seen in Figure 2.

Ethiopia is not exception in this regard; it is rather one of the most food aid dependent countries in the world. The country is known for recurrent droughts and famines, while food insecurity is also unremittingly high. Famine in Ethiopia has its long history that goes back as early as the sixteenth century when the country experienced more than ten major famines between 1540 and 1742 (Sen, 1981). Even recently, the 1972-74, 1985, 1999-2000, and 2002-2003 famines are amongst the major ones which resulted in high levels of mortality in various areas of the country. It has become apparent that food aid is a typical response to transitory food insecurity in Ethiopia and an institutionalized response to chronic food insecurity as well. As shown on Figure 3, including the times when the weather and market conditions are normally good, a significant number of people are in need of food aid. The maximum reaches as much as 10 million people in 2003/04, while the average is over 6 million people per annum in the last 20 years. This has

resulted in distribution of a significant amount of food aid in the country as shown in Figure 4; the average being 500,000 metric tons of food aid per annum to meet food needs over the past 20 years. Thus, food aid has long contributed to food supplies in the country. It is further shown on Figure 5 that the proportion of food aid to major cereal production is 6 percent and ranges between 5 to 18 percent in the past two decades (See Figure 5).

However, the role of food aid in economic development has been debatable. Many practitioners, donor and policymakers question the overall performance and effectiveness of various food aid programs. Several have argued that food aid can be counterproductive to longer-term sustainable reductions in hunger and poverty (Bizuneh, et al, 1988; Barrett, 2006). Their major concern is partly attributed to the several requirements that are abided with many food aid programs which are mainly to promote the donors' self interest; but mainly because as many other policy interventions the impacts of food aid programmes may not always be as expected (Barrett, 2006). The critics argue that food aid may result in some negative consequences which mostly termed as disincentive effects that allow dependency syndrome of economic agents. Dependency in this context has the notion that any interventions of food aid provision which are aimed to meet the current needs may result in reducing the capacity of recipients to meet their own needs in the future (Barrett, 2006). The disincentive argument is, therefore, the increase in food supplies due to food aid would depresses prices received by farmers/traders, which in turn decreases food production (Isenman and Singer, 1977, Bizuneh, et al, 1988, Barrett, 2006; Awokuse, 2006).

One may also question why food aid would bring about the increase in the supply of food in the local markets in the first place, as long as food aid is meant to fill production gaps. This is mainly due to problems associated with timing and targeting of food aid deliveries. Barrett (2006) argued that even the best designed and managed food aid programs suffer errors of exclusion of intended recipients and errors of inclusion of the unintended beneficiaries, in addition to commonly observed improper timing of the food aid delivery is common. For the case of Ethiopia for instance, Clay et al (1999) found no significant association between households who are food insecure and food aid recipients, and also Jayne et al (2001) found large differences in food aid allocations across regions that cannot be explained by observable

regional characteristics such as per capita income and rainfall. This puts the disincentive argument more vivid for more empirical investigation.

The effect of food aid on grain prices is also of a major concern, not only because of its implied disincentive effect on production, but also food prices on their own are very significant for the livelihoods, especially of the poor. It is widely argued that price of food is a major determinant of the real income of the poor; where for countries like Ethiopia, most of the poor (even in rural areas) are net buyers of their staples.

Ethiopia, being one of the highest food aid recipients, gives us an ample chance to study the impact of food aid. Most of the studies in the past are either macro or household levels, and if ever at market level (Tschirley, et al, (1996); Getaw and Shively (2010)). These studies tended to use annual food aid data to study the impact on monthly food prices, or most of them are limited to studying only a few selected markets. This paper tries to build on the existing literature on the impact of food aid on prices by examining the relationship between emergency grain food aid allocation and retail prices of major cereals, *Teff*, wheat, maize and sorghum in Ethiopia, using monthly, *Woreda* or market level panel data from July 2001 to December 2005. The major contribution of this study is thus mainly due to the kind of dataset used in the study. The food aid datasets is monthly thus corresponds to the monthly retail price data level that captures the rapid co-movements of demand and supply shocks and prices, and also we consider *Woreda* level distribution within the whole country, thus, it is more comprehensive.

The remainder of the paper proceeds as follows. The next section explores the conceptual and empirical issues underlying the impacts of food aid. Section 3 then describes the methodology and the data used in this study. Results along with discussions are presented in Section 4. The paper closes with policy implications.

2. Impacts of Food Aid: Conceptual and Empirical Review

Theoretically, food aid can create positive or negative dependency. This section explores the various mechanisms through which food aid can impact on the agricultural economies.

On the positive side, the most obvious is that food aid transfers income in terms of food or cash, which saves lives and prevents farmers and traders from suffering losses of their physical capital, and possibly improves human capital through nutritional gains and health, thus increases productivity and assures growth of both supply and demand for the market (Barrett, 2006; Isenman and Singer, 1977; Donovan C., et al, 2006). However, the role of food aid is not limited to feeding the hungry. Food aid provides insurance since it allows people to make expectations of the food assistance against adverse shocks before any crisis, which in turn allows to undertake longer-term, more productive, but somewhat riskier investments than they would otherwise have done (Barrett, 2006; Donovan C., et al, 2006). Food aid can have an important contribution to market developments by fostering competitive efficient channels through which food can flow from producers to final consumers and also it can be used by governments to build up food stocks that may be used to stabilize the food market (Isenman and Singer, 1977; Awokuse, 2006; Bizuneh, et al, 1988). It further finances specific government development projects in agriculture and rural development, and through which some of this projects may help develop job skills of the beneficiaries. At macro level, food aid saves foreign exchange that could have otherwise been used to import food to fill the production gaps, and thus supports balance of payments for recipient countries (Barrett, 2006; Isenman and Singer, 1977; Awokuse, 2006).

Despite all these benefits, food aid may also have some *unintended* effects. First, food aid may crowd out the already existing formal and informal insurances, and also may create a moral hazard problem since people who expect assistance may turn to take increased risks that could be more than what the existing insurance could pay off without the food aid assistance in the future (Barrett, 2006).

An important long standing argument is that food aid may result in decrease in the household level production. This may happen through two mechanisms. The first direct channel is food aid may cause a household labor disincentive, because it inadvertently discourages people from working due to the income effect of transfers that increase the welfare of the recipients. This may reduce labor supply simply since people tend to prefer more leisure to less (Barrett, 2006). A rather indirect and most popular channel is that food aid may drive food prices down because monetization of food aid increases the supply in the local market. Monetization of food aid in this context is that food aid recipients may decrease their demand for the same commodities they received as a food aid or their substitutes, or they may tend to sell such commodities to buy other necessities or complements. Thus, the decrease in the prices in turn impacts negatively on the production and welfare levels of households. The extent of the impact of food aid on prices in response to an increase in local market supply depends on several factors, such as the amount of the supply increase; own or cross price, and income elasticity of demand for the product; and market integration (Donovan C., et al, 2006). On the other hand, the welfare impacts of the decrease on food prices depend on whether the households are net buyers or net sellers of the commodity and its substitutes. Thus, lower prices have a negative consequence for the net seller of the commodity, which can in the long-term create a disincentive to invest in agricultural production activities.

There have been many empirical studies examining the price and production disincentive effects of food aid since Schultz's (1960) who analyzed the negative impact of food aid on recipients' production. But the results are mixed in which there are empirical studies which found evidence in support of the disincentive hypothesis, while others found little or no evidences. Lavy (1990); Barrett et al (1999); Lowder (2004); Abdulai, et al (2006) have found no significant evidence to support the notion of disincentive effects of food aid on the economies of the recipients. However, these studies have mainly been at macro or household level. So far, there are two major studies on food aid and food prices analyzed at market level. Tschirley, et al, (1996) studied the case of Mozambique, and most recently, Getaw and Shively (2010) studied the impact of food aid on food prices in Ethiopia for three markets and three commodities for years 1994-2006. They found that food aid shipments of the previous years have negative effects on all producer and consumer markets. However, mostly related to availability of data, their study has

some shortcoming that further studies could address. One is that they considered food aid shipments by World Food Program (WFP) to approximate food aid distribution to the local markets. However, this may overlook the possible timing gap between food aid shipment and food aid distribution. A second related problem of this study could be that the level of observation for food aid is annually, while prices were observed monthly. This study explores the impact of food aid on food prices along the same line as Getaw and Shively (2010); however, trying to address some of the mentioned research gaps that are mainly due to lack of supporting data.

3. Method and Data

We are interested in estimating the parameters of the model in Equation (1) for four major cereal crop types in the country (*Teff*, Maize, Wheat, and Sorghum) separately.

$$RP_{it} = \beta_1 RP_{it-p} + \beta_2 FA_{it} + \beta_3 RF_{it} + \beta_4 WL_{it} + \beta_5 POP_{it} + \mu_i + v_{it} \quad (1)$$

for *Woreda* $i = \{1, \dots, N\}$ in period $t = \{1, \dots, T\}$ and $p \in \mathbb{N}$

RP is retail prices; *FA* is per capita emergency food aid allocation (only grain); and *RF* is rainfall; *WL* is Daily wages for laborers; *POP* is population, and μ_i is fixed effects; and v_{it} is the error term. All variables are at monthly *Woreda* or market level, except annual population dataset.

This study uses a panel (monthly *Woreda* or market level) dataset from July 2001 to December 2005. The sample period is selected based on the availability of food aid allocation/distribution dataset, thus the recent years are not considered since it was found that the dataset after December 2005 is inconsistent and are under revision. The analysis will be extended in the near future upon the availability of the data. The selected *Woreda*'s are from all regions in the country (except Addis Ababa) for which it was possible to match the grain retail prices data with the food aid allocation datasets.

The data used in this paper is compiled from different sources. The data source for the grain food aid allocation/distribution is Disaster Risk Management and Food Security Sector (DRMFSS). The rainfall data of various stations distributed throughout the country are taken from National Metrology Agency (NMA). Retail prices, Daily wage for laborers and the Population datasets are from Central Statistics Authority (CSA).

The food allocation variable FA is our major variable of interest to show the net effect of food aid on the considered prices, which can be positive or negative. Furthermore, for rain-fed crops such as the ones considered in this study, the amount of rainfall during the production period is important influencing the output of the crops, which in turn affects marketing incentives, and activities of the economic agents in the local markets (Kindie, 2005). Therefore, the RF variable is included to capture the production shocks on price from the supply side. The other major factors determining the effect of prices is how the demand for the commodity changes as people's income and population changes. Thus, in order to control for the demand side effects on price, WL and POP , which capture changes in income for wage labor and population pressure respectively, are entered in our model.

Equation (1) represents a dynamic panel model, which specifies the dependent variable, RP_{it} to be on part a function of its values in previous periods, RP_{it-p} . OLS estimation with a lagged dependent variable and serial correlated error (since we know RP_{it-p} is correlated with the unobserved individual effect, μ_i by construction) lead to inconsistent parameter estimates of Equation (1). If we further consider estimating the equation using fixed effects method by removing μ_i using first differencing and estimating the model on Equation (2) below.

$$\Delta RP_{it} = \beta_1 \Delta RP_{it-p} + \beta_2 \Delta FA_{it} + \beta_3 \Delta RF_{it} + \beta_4 \Delta WL_{it} + \Delta v_{it} \quad (2)$$

Where, Δ is first difference such that $\Delta x_{it} = x_{it} - x_{it-1}$, where x is any of the variables.

However, OLS estimation of the first-differenced data produces inconsistent parameter estimates because the regressor, ΔRP_{it-p} is correlated with the error, Δv_{it} by construction; even if v_{it} is not

correlated. But it has become possible to get consistent estimates of the parameters using Arellano-Bond estimators, after Arellano and Bond (1991) who proposed the method. This is an Instrumental Variable (IV) estimation of the parameters in the first difference model (Equation 2), using appropriate lags of regressors as instruments and applying two-steps Generalized Method of Moments (GMM). In this study, we adopt this method because of its appropriateness to model the kind of relationship we are interested in. Besides, in order to check for the validity of the instruments, Sargan/Hansen test of overidentification restrictions, and test for serial correlation are made. And a better estimate of the standard errors proposed by Windmeijer (2005) is also used in all the regressions.

4. Results and Discussions

Descriptive statistics of all the variables considered in the model is presented in Table 1. For the period considered, retail price of *Teff* has the highest mean value of 2.17 *birr* per kg, followed by Wheat 1.78 *birr* per kg respectively. The per capita grain food aid ranges between 0 to 18 kg per month, with an average of about 13 kg. Average monthly rainfall is about 84 mm, with the maximum score of 568 mm over the places considered. Average population size of the *Woreda* is found to be 133,050 for the time under consideration.

To empirically assess the impacts of food aid on local prices, four regressions representing four grain types for selected *Woredas* in the country were estimated separately using the two-steps GMM estimation method. Table 2 depicts the regression results along with the specification tests.

The model includes the one and two months lag prices to control for any effects that past prices have on the current prices. We also included the current food aid and its lags in three, six and twelve months; the lags are aimed to capture any delays in delivery of food aid due to administrative reasons, and also some possible storage effects. Monthly rainfall is in its three, four and six month lags; with the lags reflecting the gap between planting and harvesting.

Population is entered in its level form, while wage for laborers is in its level and one month lag to see the change in income effects.

The results from the tests of the specification are given in Table 2. The validity of the instruments is verified using the Sargan test of overidentification restrictions in which, null hypothesis that the population moment conditions are correct is not rejected at 5% significance level. The second test for zero autocorrelation in the first differenced errors of order 1 and 2 (AR(1) and AR(2)) show that at order 2, the errors are serially uncorrelated because the p-values are greater than 5% significance levels. Thus as desired, there is no serial correlation in the original error, v_{it} .

Considering our variable of interest, per capita grain food aid allocation, in all the four regressions, the estimated coefficients are sensitive to the lag length in direction, magnitude and significance. All the coefficients of this variable are small in magnitude, and are statistically significant only for the current levels in all the cases, and six months lag period for the cases of *Teff*, wheat and maize. The current per capita food aid distribution to the *Woredas* considered has a statistically significant positive correlation with the prices of all the crop types considered. Tadesse and Shively (2010) also found the same positive effect for the current level of food aid shipment. The possible justification as they have argued is that during poor harvest, food prices and food aid delivery simultaneously increase; but then after the distribution of food aid, price tend to fall. It was also further found that food aid distributed before six months has a downward depressing effect on current prices of *Teff*, maize and wheat with 5 to 10 percent statistical significance levels. This goes with the disincentive effect of prices hypothesis though the magnitude of the effect is modest showing only about 0.01 percent decline in prices per kg per month. However, the other lag lengths of the food aid variable are found to be statistically insignificant to build any relationship.

Comparing across crop types, we would expect the effect of food aid on the retail price of wheat to be stronger as it is very close substitute to the grain type that usually comes as food aid, which is normally wheat. However, the result indicates that the retail prices for *Teff*, maize and wheat are correlated with food aid allocation in similar patterns, except for sorghum.

The four and six months lagged period rainfall quantity have statistically significant negative correlations with retail prices of all the crops considered. With a rain fed system of agriculture, production shocks mainly may come from unpredictable rainfall, and thus the result is quite expected. But most importantly, the magnitude and the statistical significance of these variables are stronger than any of the estimates of the food aid variables in the regression, implying that quantity of rainfall has a stronger negative correlation with retail prices than food aid.

On the demand side, population pressure has an upward pressure on retail prices since it increases demand for the same crops, and it is statically significant for the cases where we have prices of *Teff*, wheat and maize as a dependent variable. On the other hand, wage for labourers do not have any statistically significant effect of the retail prices of the crops considered. One and two months lagged grain retail prices have positive correlation with current retail prices.

5. Conclusion and Implications

This study is an attempt to build on past studies on the impacts of food aid on retail prices. The study uses a more disaggregated dataset than most of the past studies, panel monthly *Woreda* or market level emergency food aid allocation in Ethiopia. Thus, it mainly overcomes the data problem associated concerns that pre-existed when trying to analyze food aid impact. In particular, it explores the impact of emergency grain food aid allocation on the retail prices of wheat, *Teff*, maize and sorghum using a panel dynamic model.

The regression results imply that there is a negative correlation between monthly per capita food aid distributed before six months and retail grain prices considered; effect is not statistically significant for other lag lengths. Albeit, the effect is very marginal with a small magnitude of the coefficient. Instead the amount of rainfall before four and six months seems to have more significant depressing effect on retail prices.

Given the modest effect of emergency food aid that was found in this study, we should be careful on the implications. Overall, study is at least an indicative of the possible negative impact of food aid distribution on retail prices of the major locally produced grains. Emergency food aid

programs to serve as what they intended to, need to take steps to improve their targeting and timing of food aid deliveries. This is in particular important given the crucial role food prices play in determining production and thus farmers' labour incentives.

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Table 1. Descriptive Statistics for Major Variables

Variables	Observations	Mean	Standard Deviation	Minimum	Maximum
Retail Price for <i>Teff</i>	4386	2.17	0.51	0.62	6.07
Retail Price for Wheat per KG	4323	1.78	0.51	0.41	8.96
Retail Price for Maize per KG	4458	1.20	0.46	0.20	7.95
Retail Price for Sorghum per KG	3273	1,47	0,53	0,27	3,64
Food Aid Per Capita	4565	13.11	27.77	0	18.70
Annual Rainfall	4565	83.96	90.78	0.00	568.00
Population	4565	133,050	87,360	5,157	507,268
Daily Wage for Laborer	4403	7.47	2.23	1.17	63.33

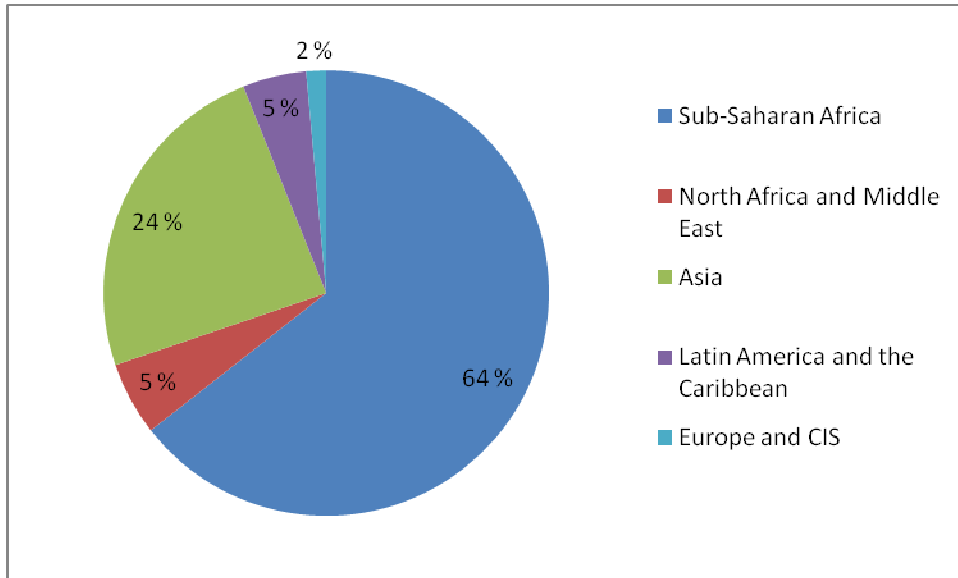
Source: Author's calculations

Table 2. Two-Steps GMM regression Results for Food Aid Effects on Food Prices

VARIABLES	(1)	(2)	(3)	(4)
	Retail Price Teff	Retail Price Wheat	Retail Price Maize	Retail Price Sorghum
Per Capita food aid	0.0109** (2.502)	0.0107** (2.388)	0.0140*** (4.542)	0.00868** (2.028)
Per Capita food aid, 3 months lag	-0.00206 (-0.639)	-0.00181 (-0.417)	-0.000728 (-0.284)	-0.00241 (-0.666)
Per Capita food aid, 6 months lag	-0.00693** (-2.011)	-0.00731*** (-2.958)	-0.00472* (-1.656)	-0.00317 (-0.921)
Per Capita food aid, 12 months lag	0.00382 (1.398)	0.00512 (1.414)	-0.00126 (-0.389)	0.00141 (0.446)
Quantity of Rainfall, 3 months lag	0.0573 (0.654)	0.0897 (0.891)	0.0128 (0.133)	0.104 (0.917)
Quantity of Rainfall, 4 months lag	-0.170* (-1.771)	-0.245* (-1.667)	-0.425*** (-5.985)	-0.162 (-1.365)
Quantity of Rainfall, 6 months lag	-0.300*** (-3.755)	-0.288*** (-3.043)	-0.366*** (-4.347)	-0.426*** (-4.591)
Population	0.00996* (1.958)	0.0141** (2.372)	0.0180*** (4.035)	0.0101 (0.993)
Wage for laborers, 3 months lag	5.907 (0.445)	3.529 (0.421)	1.023 (0.0761)	-10.85 (-0.437)
Wage for laborer,	4.725 (0.494)	4.655 (0.642)	-1.629 (-0.126)	2.235 (0.307)
Retail Price of Teff, 1 month lag	0.507*** (3.052)			
Retail Price of Teff, 2 months lag	0.163** (2.195)			
Retail Price of Wheat, 1 month lag		0.441*** (3.761)		
Retail Price of Wheat, 2 months lag		0.160* (1.765)		
Retail Price of Maize, 1 month lag			0.437*** (6.802)	
Retail Price of Maize, 2 months lag			0.147*** (4.249)	
Retail Price of Sorghum, 1 month lag				0.552*** (4.794)
Retail Price of Sorghum, 2 months lag				0.196** (2.307)
Sergan Test	0,5281	0,6031	0,4786	0,8951
AR(1)	0,018	0,231	0,002	0,004
AR(2)	0,7132	0,7416	0,5914	0,7607
Observations	2991	2843	2976	2000
Number of <i>woredas</i>	81	81	82	73

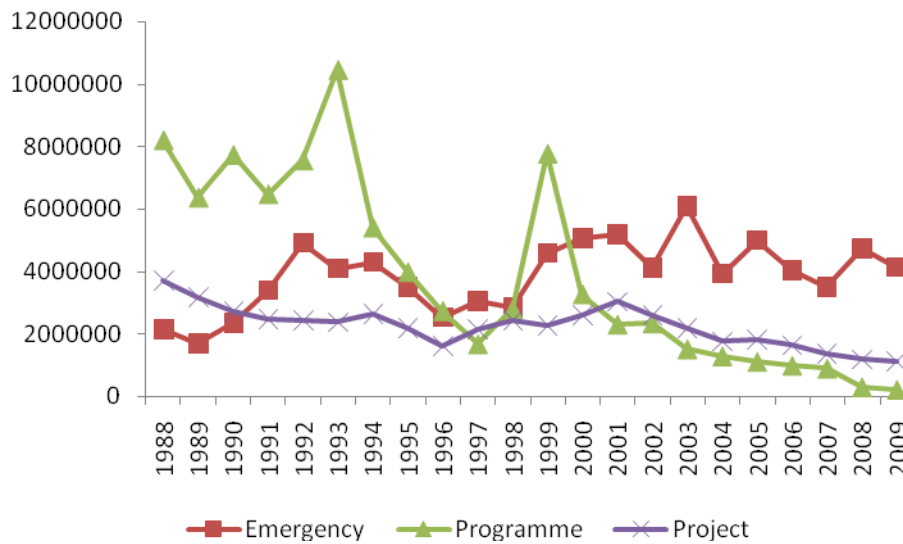
z-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1

Figure 1. Global Food Aid Deliveries by regions, 2009



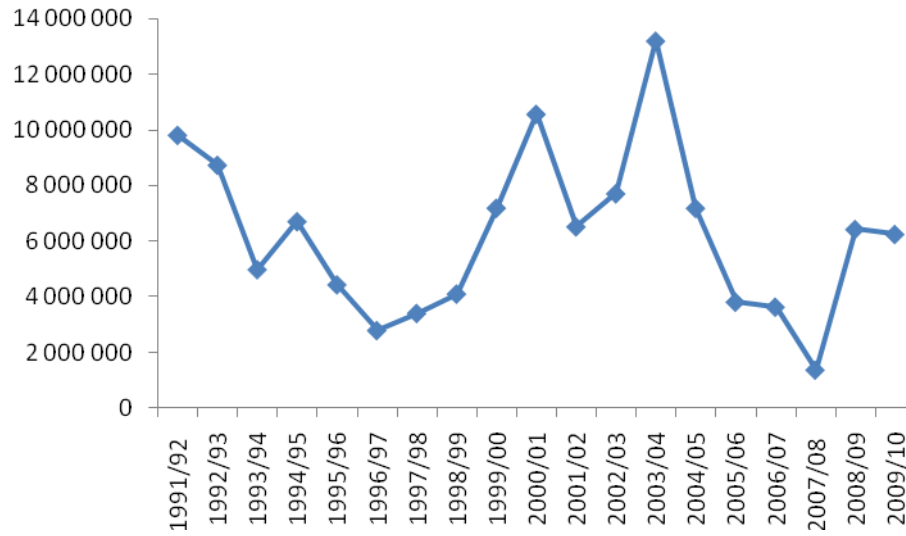
Source: Own compilation from World Food Program’s Food Aid Information System (WFP-FAIS)

Figure 2. Trends of Global Food Aid Deliveries for Emergency, Programme and Project, in MT, 1988-2009



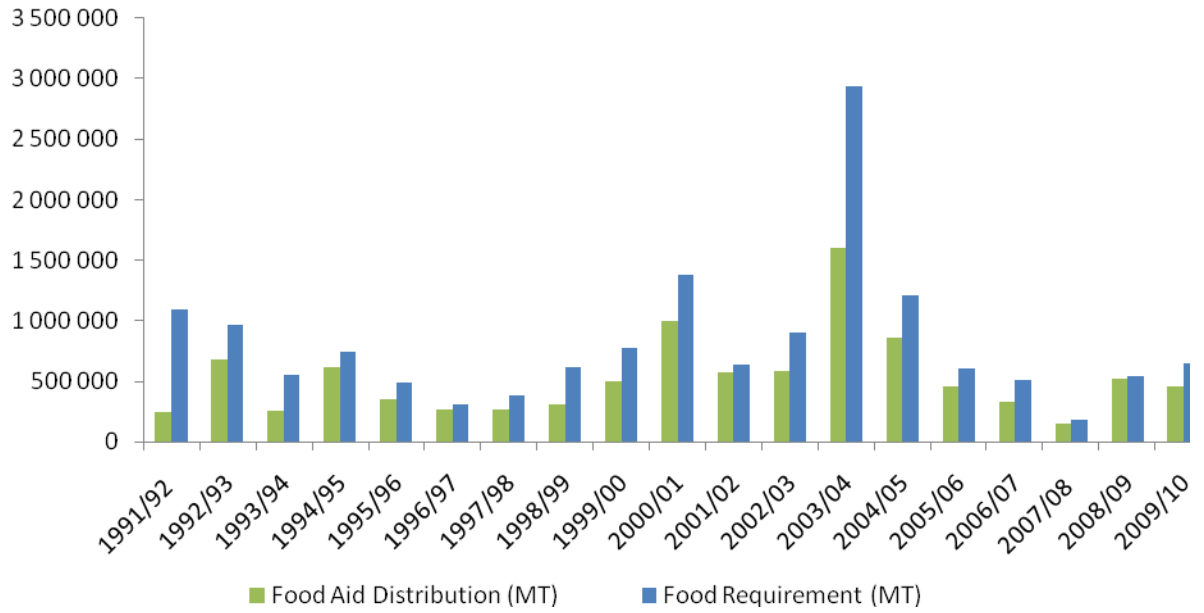
Source: Own compilation from World Food Program’s Food Aid Information System (WFP-FAIS)

Figure 3. Population in need of food aid, Ethiopia, in MT, 1991/92-2009/10



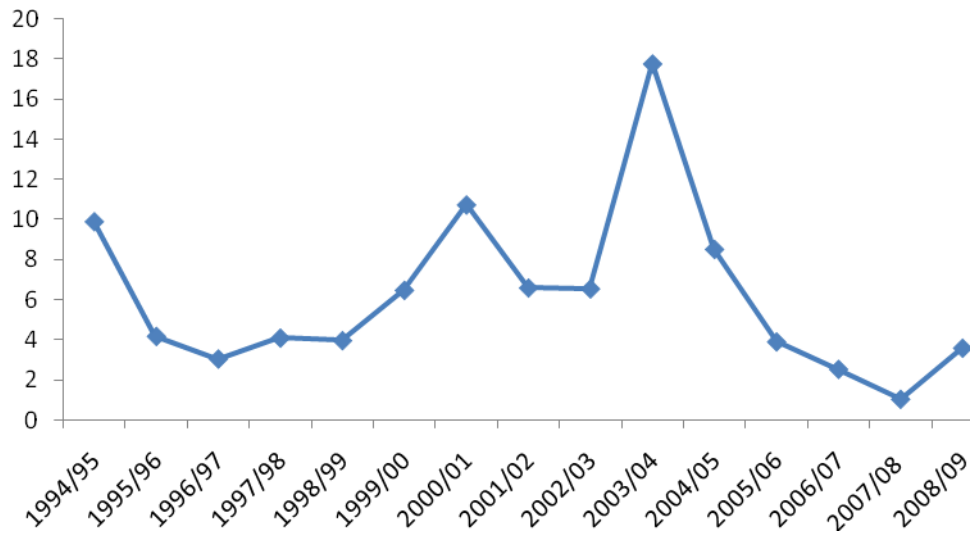
Source: DRMFS

Figure 4. Food Aid distribution and Food Requirement, Ethiopia, in MT, 1991-2009



Source: Own compilation from various CSA publication for Production data, and DRMSS for the Food Aid and Food Requirement datasets

Figure 5. Food aid as percentage of food production in Ethiopia, 1994 to 2009



Source: DRMSS