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# DOES FOOD AID HAVE DISINCENTIVE EFFECTS ON LOCAL PRODUCTION? A GENERAL EQUILIBRIUM PERSPECTIVE ON FOOD AID IN ETHIOPIA

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***Abstract:*** This paper examined impacts of food aid on domestic food production employing a computable general equilibrium modelling technique and using data from Ethiopia. The simulation experiments have shown that food aid has unambiguous disincentive effects on domestic food production. The removal of food aid caused a modest increase in food prices but this stimulated food production. Employment and income generation effects of the latter outweighed the adverse effect of the former. Consequently, the removal of food aid led to improvements in aggregate household welfare. Contrary to some concerns in the food aid literature that any reduction in food aid would hurt the poor, the simulation experiments suggested that actually poor rural household and urban wage earners are the ones who benefit most in absence of food aid but entrepreneurs are more likely to encounter a marginal welfare decline. We have distinguished between in-kind food aid and cash equivalent transfers in order to isolate the disincentives that in-kind transfers would make to domestic production from those that are related to household purchasing power problem. The expansionary effect of removing food aid becomes significantly larger when it is accompanied by cash equivalent payments because the latter would provide demand side stimulus to agriculture while the removal of in-kind transfers would stimulate supply side, with the supply and demand side effects reinforcing each other. Thus the multiplier effect of cash aid leads to improvements in welfare of households other than direct cash aid recipients (e.g. food producers and transport services) who would benefit from a higher demand for food in the domestic market. It follows that the apparent dichotomy between the two strands of the food aid literature, i.e., the "cash aid" versus "in-kind aid" debate and the controversy surrounding the disincentive hypothesis, virtually vanish as long as the multiplier effects of cash aid are taken into account in an economy-wide modelling framework. In our modelling framework, the only adverse effect would be a modest deterioration in the external current account, because the expansionary effects of food aid would cause imports to rise but exports to fall.

*Key words: food aid; in-kind transfers; cash equivalent payments; domestic agricultural production; disincentive hypothesis; general equilibrium; Ethiopia*

## Introduction

Ethiopia has been receiving a large share of food aid shipments to Sub-Saharan Africa during the last few decades. The volume of food aid flowing into the country was about 760 thousands tones per year during 1993 to 2003 (WFP, 2004). The usual method of providing food aid to famine stricken localities in Ethiopia has been importing food and then distributing it freely to the needy population. No doubt that this method of food aid delivery has saved millions of lives in regions where droughts have often escalated into catastrophic famines over the past few decades. However, it has become increasingly questionable whether direct transfers or in-kind food aid is the most effective way relief could be provided (Oxfam, 2005; OECD, 2005). Coate (1989) argued that if there are markets for food in the country a relief agency or a donor country could just as easily distribute money to the needy and let them purchase food in these markets.

There has been a raging debate about the right way to combat hunger, because of a growing awareness among the global community about the continuing and worsening conditions of poverty and hunger in developing countries. In its recent editorial entitled "boosting the effectiveness of food aid", *The Lancet* commented that "the central question being thrashed out among donors is: should food aid be sent as food or cash?" This commentary was a reaction to a significant event during that week regarding a proposal put forward by the Bush Administration to purchase about 25% of its food aid from abroad and make food aid more effective; cutting transport costs, which currently eats up about 40% of aid money. However, the proposal was rejected by the US congress in an attempt to protect the interest of US farmers and cargo ship firms who currently profit from the government-donated aid (*The Lancet*, 2005, p. 1412).

A cross country study by OECD published at the end of September 2005 demonstrated that "food aid in-kind carries substantial efficiency costs, conservatively estimated as at least 30 percent on average… In contrast, most local purchases or regionally sourced imports are relatively efficient ways of providing food aid. Thus, there is a scope for considerable efficiency gains by switching to less restricted

sourcing of food. The study therefore argues that, in most circumstances, financial aid (cash) is the preferable way to fund direct distribution of food…" (p.1). Non-governmental organisations that have first hand experience in emergency relief operations have made strong cases for cash payments instead of in-kind food aid. For instance, it was argued that "cash transfers are faster, more cost effective, and provide more culturally appropriate foods than most food distribution. US$92 million - nearly half of the WFP's tsunami-relief budget of US$210 million - has been allocated to pay for the logistics involved in transporting and storing the food" (Oxfam, 2005, p. 4). A number of studies documented that food aid is quite often converted to cash at a highly discounted rate by recipient households; this signals their preference for local food stuff or non-food items, and hence it follows that providing aid in less appropriate form results in recipient household welfare loss (Barrett and Barrett and Maxwell, 2005; WFP, 2004; Clay, 2003; Reed and Habicht, 1998).

However, there are conflicting views in academic research regarding the relative effectiveness of food aid and cash aid. Basu (1996) developed a theoretical model to examine how "a cash-for-work programme would typically enhance the demand for food, causes food prices to rise, and result in more food in the hands of those who have received the wage. This will mean that those who are left out of the programme (for example the old and the infirm) could be worse off" (p. 91). Basu's model has become a very influential piece of work, perhaps because of its apparently rigorous theoretical formulation, causing a staggeringly large proportion of the food aid literature to focus on "targeting food aid" (Barrett, 2003; Levinsohn and McMillan, 2004; Jayne et al. 2001; Clay et al, 1999).

On the other hand, there are a few theoretical and empirical models providing in-depth analytical insights into conditions under which cash aid could be a better way of delivering food aid if the objective is to improve aggregate welfare in a recipient country (Osakwe, 1998; Faminow, 1995; Coate, 1989; Sen, 1986). Osakwe (1998) developed a small open economy model to examine how alternative method of food aid disbursement affects labour employment, food security, and aggregate welfare, in recipient countries. In this model, private firms were assumed to pay efficiency wages to induce effort, and two forms of food aid delivery are considered: project food aid and non-project food aid. The analytical and simulation results of this model

have clearly indicated that, unless it is firmly tied to an infrastructural development project that is guaranteed to enhance productive capacity of agriculture, if in-kind food aid is freely distributed to households, "the model predicts that it creates labour disincentive effects in the food industry, increases the unemployment level and decreases food security" (p. iii).

As far as the authors are aware, Coate (1989) provides by far the most comprehensive theoretical framework, encapsulating key features such as inefficiencies related to transportation costs that have become a topical issue only during the recent months. According to this model, "the relative effectiveness of cash and direct food relief will depend critically on the behaviour of traders and on whether food will be exported, imported or neither exported nor imported" (p. 27). More generally, cash relief will be more likely to be optimal when food will be exported, the larger the degree of price responsiveness of excess supply of the un-needy population, and the larger the relief agency's transport costs and the smaller the money or wealth holdings of the needy population (ibid). Coate's ideas were stimulated by Sen (1986) which stated that during slump famines when household purchasing power (entitlements) decline but food is locally available through markets, cash aid which increases household purchasing power would be better than food aid because operational agency transportation of food aid is less efficient than transportation by traders.

Theoretical and empirical evidence about the relative effectiveness of food aid delivery as cash or in-kind payments have always been analysed using partial equilibrium models. However, the existence and importance of system-wide effects of food aid are widely acknowledged in the literature. Bhagwati (1985) provided an analytical framework tracing general equilibrium effects of food aid but this analysis does not distinguish between relative merits of cash and in-kind. Computable General Equilibrium (CGE) application on this subject have been very rare but a few existing ones have generally focused more on assessment of general food aid requirements (Wobst 2001; Fontana; 2001) or specific food aid targeting (Arndt and Tarp, 2001).

Gelan (2005) developed a general equilibrium model and used Ethiopian data to examine differential impacts of in-kind transfers and cash payments. This paper builds on the latter and examines the relative effectiveness of food aid and cash aid in

a single modelling framework. This study draws attention to the importance of appropriately valuing food aid in analysing the significance of cash aid. We undertake three alternative simulation scenarios. First we set the stage by examining system-wide impacts of abolishing food aid valued at total donor cost. Second, we assume that a donor country might be reluctant to pass the total amount of pledged food aid in monetary terms. Thus, the total pledge is reduced by the transport cost margin and the remaining amount is transferred to households, this gives the local purchase equivalent of the volume of cereals shipped to Ethiopia during the base year. Third, total pledged amount is assumed to be passed to households and hence households would be able to purchase from domestic markets.

The remainder of this paper is structured as follows. Section 2 discusses the role of food aid in the Ethiopian economy. Section 3 highlights key features of the CGE model developed for this study with a focus on the specification of food aid. Section 4 discusses the simulation results. Concluding remarks are made in a final section.

## The role of food aid in Ethiopia

For much of its recent history, Ethiopia has experienced recurrent droughts and agro-ecological imbalances, which caused extreme volatility in domestic food production. Periodic natural disasters have often been compounded by a range of socio-economic factors, most notably poor governance and civil wars. Given that Ethiopia is a predominantly subsistent agrarian economy, exogenous natural shocks such as lack of rain for just one season in a few localities have most often rapidly descended into catastrophic famine episodes. Such dramatic events have led to frequent appeals for emergency food aid and a continuous inflow of food aid from donor countries.

### *Size and composition of food aid donated to Ethiopia*

The volume of food aid donated to Ethiopia was about 760 thousand metric tons per year during the period 1993-2003 (see figure 1). The lowest amount of inflow during the decade occurred in 1996, Ethiopia's particularly good harvest year, when food aid inflow was only 156 thousand metric tons. The maximum inflow was during 2000, with just over 1.3 million metric tons of food aid. The World Food Programme (WFP, 2004) reported that "direct transfers" or shipments of in-kind food aid from

donor countries to Ethiopia accounted for the largest proportion, typically about 76% of the total volume of food aid whilst purchases from local markets by NGOs constituted about 23.3%. Triangular purchases or procurements from a third country represented the remaining proportion, just over one percent of the total food aid flow into Ethiopia. The 2004 WFP report indicated that food aid in Ethiopia used for emergency relief purposes represented 90% of the total while the remaining proportion was project food aid or donations for purposes other than famine such as public works including schools or hospitals.

[Insert figure 1 here]

Figure 1 illustrates that cereals accounted for a considerably large share (91%) in the total volume of food aid donated to Ethiopia between 1993 and 2003. Wheat accounted for the bulk of this amount (80%). Non-cereal food stuffs on average accounted for 8.7% of food aid during the period under discussion. The motivation behind analysing the commodity composition of food aid lies in our interest to examine the composition of food aid with that of food supply from domestic sources. By bringing together data from food balance tables in Food and Agricultural Organisation (FAO) statistical database, Gelan (2005) found considerable dissimilarities between the structures of food aid and food supply from domestic sources in Ethiopia. For instance, it was shown that although wheat constituted a substantially large proportion of food aid, it accounted for only a small proportion of total food consumption and production in Ethiopia, on average about 6% during 1993 to 2002. Moreover, the share of cereals in food aid is just over 90%, but an analysis of data from FAO food balance tables indicated that cereals constituted only 44% domestic food consumption in Ethiopia. The remaining proportion was non-cereals such as *enset* (a perennial crop commonly referred to as 'false banana' tree), root crops, and livestock products. At this juncture it is important to explain why it was so important to know the dissimilarities between the compositions of commodities supplied via food aid and those supplied from domestic sources. In this regard, there were two major areas of concerns in the food aid literature on Ethiopia.

Firstly, on the grounds that a substantially large proportion of food aid to Ethiopia has been cereals, analysts have usually measured the significance of food aid in terms of its ratio to total national cereal production; in fact, total "cereal production" has been

interchangeably used with "food production". For instance, Clay et al (2001, p.397) justifies such an approach claiming that "Conventional wisdom in Ethiopia is that grains constitute 80% of the average Ethiopian diet…", but the authors did not provide their source for such a statement which surely contradicts the facts we have presented in the preceding paragraph. In any event, their statement implied that the commodity composition of food aid in Ethiopia was similar to that of aggregate food consumption in the country. The outcome of such analysis has been underestimating domestic food supply, and exaggerating the significance of food aid in total food supply. Such claims have had far reaching consequences. Researchers, policy-makers, and donors have focussed very much on food production problems, paying insufficient attention to distributional bottlenecks that is likely to provide some explanation for Ethiopia's food security challenges.

Secondly, the conceptual problem regarding the relative roles of food aid and domestic food supply in Ethiopia have had serious repercussions on the way researchers have attempted to test the disincentive hypothesis using Ethiopian data. In other words, the contrasting features between the composition of food aid and domestic food supply has serious implications for explaining and understanding whether or not food aid has disincentive effects on the domestic food production. A brief discussion of the literature related to the disincentive hypothesis applied to Ethiopia is separately presented in the next section.

### *Does food aid harm Ethiopian farmers?*

A number of studies have recently examined the disincentive hypothesis using data from Ethiopian household surveys (Abdulahi, et al., 2005; Levinsohn and McMillan, 2005).[1] Levinsohn and McMillan (2005) employed a partial equilibrium analysis, concentrating on one commodity, wheat, and deriving its supply and demand functions. The following paragraph provides a good summary of the way they went about testing the disincentive hypothesis:

> … we find that the price of wheat would be $295 per metric tonne in the absence of food aid compared with an average observed price of $193 per metric tonne in 1999. We also find that the price increase would lead to an increase in producer surplus of around 125 million US dollars and a reduction in

[1] The discussion in this section heavily borrows from Gelan (2005)

> consumer surplus of around 159 million US dollars. Overall, the increase in the price of wheat leads to a net welfare loss of approximately 34 million US dollars. There were roughly 12 million households in Ethiopia in 1999 of which 4.3 million reported spending money on wheat and 0.8 million reported earning income from wheat. Therefore, *on average*, the loss in consumer surplus works out to roughly 37 US dollars per household per year for households that consume wheat and the gain in producer surplus works out to roughly 157 US dollars per household per year for households that sell wheat. In Ethiopia, where the poverty line is roughly 1057 Birr ($132), these effects are quite large…
>
> There are more buyers than sellers of wheat. This is important because it means that at all levels of living standards, more households will benefit from food aid (a reduction in wheat prices) than will be hurt (p.22).

Clearly, the authors' have limited their analysis to wheat simply because this commodity constitutes a lion's share of total food aid to Ethiopia. However, their conclusion seemed to be rather hasty. First, the price effect of removing food aid was estimated using arbitrarily chosen price elasticity parameters, which were obtained from the literature (Soledad Bos, 2002; Regmi et al, 2001). The price elasticity parameters they used were 0.45 for supply and -0.6 for demand. However, Soledad Bos (2002) and Regmi et al (2001) had actually estimated those parameters for supply of and demand for *cereals*, not supply of and demand for *wheat*. It follows that the elasticity parameters chosen were relatively low with both demand and supply functions being assumed to be inelastic. Relatively larger parameter values would have given a lower price increase if food aid was removed and hence lower welfare loss to consumers. If a composite price of cereals increases, then households would have limited choice and hence they may still purchase cereals; that is demand for cereals could be price inelastic in demand. However, if the price of wheat increases, say because of food aid being abolished, then Ethiopian households would have ample choice as they can shift their consumption to other cereals like teff.

In addition to the problem associated with own-price elasticity of demand discussed above, we argue that there is an oversight related to cross-price elasticity of demand. The authors asserted that only net-sellers of wheat would be hurt by the continued supply of food aid. However, it is reasonable to expect that households who get wheat for free via food aid would shift their consumption away from other cereals (teff, maize, and sorghum). Consequently, the adverse effect would be felt by producers of these substitute products with the extent of negative effects in each case

depending on the closeness of their substitutability for wheat. The latter is measured by cross price elasticity between wheat and other cereals.

Furthermore, in the conditions of mixed subsistence farming, food aid could have some impacts on farming activity of rural households. Gelan (2005) argued that even if households are net buyers of wheat, they also produce other food items, cereals or non-cereals. In fact, if a certain group of rural households are net-buyers of a particular cereal like wheat, then in all probability one can only assume that they must have produced and sold some other cereal (teff, maize or sorgham) or other agricultural products. Thus, if net-buyers of wheat are supplied with freely distributed wheat, this would have implications for their decision to engage in other farming activities, in terms of cutting back on producing for the market. Abdulahi, et al (2005) and Hoddinott (2003) used Ethiopian data to examine labour supply effects of food aid. The results were mixed, which were summarised as follows:

> All negative effects of food aid disappeared, with two *exceptions*. Food aid received a year ago reduced the likelihood of growing enset [a perennial crop, that constitutes a substantial proportion of Ethiopian household diet in Southern and South-western regions] but by a trivial amount. And while contemporaneous access to food aid reduced time spent on permanent and non-permanent crops, the magnitude of these effects was offset by the increased amount of labour on off-farm labour that food aid receipt induced (Hoddinott, 2003, p. 2). [emphasis and description in the bracket added]

Then the authors conclude that:

> In Ethiopia, while superficial examination suggests strong disincentive effects of food aid on labor supply and agricultural activities, these largely vanish under more careful statistical analysis (Hoddinott, 2003, p. 1).

It is important to note that whilst the disincentive hypothesis is mostly concerned with what happens to agricultural production and hence labour supply to agriculture, Hoddinott (2003) would consider accounting for any food aid related activities including off-farm employment activities such as food-for-work public projects to disprove the disincentive hypothesis. In my view, if food aid induces farming households to get increasingly engaged in off-farm activities, then this would support the disincentive hypothesis, certainly it does not disprove it. Moreover, given the importance of non-cereals in Ethiopia's food balance, the implication of a negative

impact of food aid on these farming activities deserve special attention, rather than considering it as an exception.

## The model

### *Overview*

Although computable general equilibrium models have gained popularity and are used widely for policy analysis in developing countries (Wobst, 2001; Dervis, 1982), they have rarely been applied to economy-wide impacts of food aid. Arndt and Tarp (2001, p.108) observe that "despite vastly increased capacity to conduct applied or computable general equilibrium (CGE) analysis in recent years, relatively little CGE analysis has been conducted on food aid issues". A few existing applications have mostly focussed on demand side analysis such as assessing food aid requirements (Wobst, 2000; Riaz, 1992; Sadoulet and de Janvery, 1992) and relative merits of different distribution schemes (Arndt and Tarp, 2001).

More specifically, CGE models evaluating whether or not food aid has depressing effects on domestic production have been very rare except for two recent applications to Ethiopia (Gelan, 2005; World Bank, 2005). However, CGE models are most suited to analysing economy-wide effects of exogenous shocks such as drought and famine related in-kind food aid that cause not only changes to consumption levels but also supply side disturbances. Given that supply conditions are not expected to remain passive, it proves useful to employ a modelling approach that fully captures impacts of in-kind food aid injections on resource allocation in sectors most directly affected as well as other sectors via indirect inter-sectoral linakge effects. Since CGE models are built upon the input-output basic data, they are capable of accommodating such inter-sectoral linkages in a theory-consistent manner, and dealing with the endogeneity of relative prices (and therefore competitiveness) and quantities as all markets equilibrate simultaneously.

Gelan (2005) provides a description of the model used for this study together with a review of related literature. Whilst the formulation of this model follows standard CGE applications (Hosoe and Hashimoto 2004; Wobst, 2001; Lofgren et al 2002;

Gelan, 2002), its novel aspect lies in modifying standard CGE applications to specifying food aid in the modelling the commodity markets. A diagrammatic exposition of the structure of the model is displayed in Appendix A1; with details of activity and commodity disaggregations; household types; and functional forms employed at different levels of aggregation. [2] Here we limit our discussion to a novel feature of this version of the model: valuation of food aid. We will illustrate this in the following section using a condensed social accounting matrix (SAM) for Ethiopia (2000) that provides a baseline database for this model.

### *The Social accounting matrix and valuation of food aid*

This study benefited from a social accounting matrix database recently constructed for Ethiopia with 2000 as the base year.[3] Taffese and Ferede (2004) provide detailed discussion about data sources, methods, and procedures employed in the construction of the SAM. We used a condensed version of this social accounting matrix, disregarding sectoral details and concentrating on elements of the accounting relationships that enable us to explain the importance of valuations of food aid (see Table 1 below).[4] It proved useful to begin with an overview the SAM and highlight key relationships between different institutional accounts for the base year.

**The SAM**

The condensed SAM has sixteen separate accounts. In each SAM account, entries in columns denote out-goings or payments and entries in the corresponding row represent in-coming or receipts. A particular cell in the matrix represents a payment by the account in the column heading and a receipt by the account in the row heading.

Column 1 represents cost of production which consists of intermediate inputs worth birr 20.7 billion (in row 2) and birr 68.2 billion value-added (in row 3). The model is implemented with four factors of production: family labour, compensation of employees, rent income, and producer surplus (see Appendix A1). The sum of

[2] The model was implemented using a GAMS (General Equilibrium Modelling Systems) programming language. The full set of model equations both in Algebraic and GAMS formats are available upon request.

[3] A collection of background papers for this macroeconomic modelling project as well as a detailed database, including the social accounting matrix are available on the World Bank website: http://siteresources.worldbank.org/INTETHIOPIA/Resources/PREM

sectoral value-added gives Ethiopia's GDP at factor cost during 2000. Row 1 has only one entry, commodity output supplied by the aggregate production function. Although it is a single entry in the condensed version of the SAM, the activity-commodity linkage, the make matrix has a dimension of 12 rows (number activities) by 8 columns (number of commodities) in the full SAM (see figure A1).

[Insert Table 1 here]

Total commodity supplied to the domestic economy is presented in column 2. This consists of commodity output from domestic activities at producer prices (in row 1) and aggregate imports at world prices (in row 9). The remaining entries in this column are commodity tax and trade margins. Aggregate commodity supply at market price (inclusive of tax and trade margins) is birr 116.2 billion (in row 16). Row 2 allocates total commodity supply to different destinations: intermediate demand, final demand, investment demand, transaction demand, and exports.

Column 3 distributes income generated in the process of production to households and business accounts (rows 2 and 3). Whilst factor income is the only account that pays to the business account, this amount is redistributed to households as producer surplus payments to households; business tax payment to the government or retained earnings as business savings.

Household income consists of labour income, business income (as transfers from the business account), government transfers, imputed in-kind food aid, and transfers from the rest of the world. Whilst the main item in household expenditure (column 4) is final consumption expenditure (row 2); other outgoings from this account include imputed transport cost on food aid, transfer payments to the ROW region, household savings, and income tax. The effect of food aid on household income and expenditure is discussed separately in the next section.

There are three sources of government revenue appearing in the row 6: direct income taxes (household income tax and business tax), indirect taxes on commodities (sales tax and export tax) and grants from abroad. While final consumption expenditure on

[4] Supplementary data related to elasticity parameters are discussed in Gelan (2005), Appendix I.

goods and services and transfers to households and the rest of the world represent major items of government expenditure, the balance between the sum of these items and total government revenue gives government deficit (row 11).

In the Ethiopian SAM, capital formation is categorised into private investment and public investment. The latter is financed from government surplus and food-for-work programmes (row 8 and column 8); that is financed by donor agencies from the rest of the world. Private investment is financed from domestic private savings and savings from the external account.

**Valuation of food aid**

Food aid enters the social accounting framework through the commodity balance account (row 2). In the original SAM (Taddesse and Ferede, 2004), food aid was not distinguished from commercial food imports but it was simply added to imports under the commodity category "food crops" (see appendix A1). An equivalent amount (birr 639 million) was recorded as a transfer payment to households via the food aid account (FAID or column 8). For our modelling purpose, this was not a satisfactory procedure and hence we had to make adjustments to this accounting framework. First, it is known that food aid has a significant transaction cost component, given that donor agencies purchase grains from donor countries and then incur substantial transaction costs in delivering it to Ethiopia.

A convenient economic accounting principle would require recording food aid, distinguishing it from commercial imports and isolating transport margins incurred in the process of delivery. Secondly, recording food aid in row 9 of Table 1 would imply that cereal imports are imperfectly competitive to domestic crops. We believe that in-kind food aid in the form of "cereals" is "perfectly competitive" to domestically produced food crops; hence they need to enter the commodity balance account as direct deduction from aggregate demand for commodities in domestic markets, rather than specifying it via Armington specification. This follows a conventional Keynesian macroeconomic modelling framework whereby imports are

treated as competitive.[5] There are a few CGE applications implemented treating some items of imports as being competitive to domestic outputs (Taylor, 1991; 1983).

Accordingly, the entries related to food aid in the current SAM are specified recognising the distinction between food aid as household transfer income as well as its competitive nature with domestic output in commodity market. First, the total amount of food aid was recorded as direct transfers to households. This amount is equal to the pledged value of food aid, birr 639 million. In the full SAM, this total amount was allocated to different groups of households with farming household, wage earners and entrepreneurs receiving 27%; 24%; and 50% of the in-kind food aid transfer. Second, we isolate food aid from commercial food imports, and then record them as separate entries in the SAM. We keep commercial food imports as imports from ROW region, a relatively small amount of birr 7 million, included to row 9 and column 2.

Food aid was then recorded as a "competitive import" by re-valuing it at local purchase equivalent and accounting for trade and transport margins that was paid to foreign transport agencies. Transportation cost on food aid was estimated by bringing together information from three sources. The first one is Oxfam (2005) that reported a specific case of food aid delivery from Canada to Ethiopia. According to this report the costs of purchasing a tone of wheat in Toronto and Adama (Nazaret), a city in central Ethiopia, were $248 and $253 respectively, a negligible difference. However, the Canadian donor agency spent $170 to transport a tone of wheat from Canada to Ethiopia. This gives a 40% transport margin that is the transport cost divided by the pledged amount food aid (the cost of purchasing wheat in donor country plus transport cost). The second source was recent cross country study by OECD (2005) that estimated that *on average* the rate of trade and transport margin on food aid was at least 30% of the actual value of food aid pledged to be donated to a recipient country. Given the second source, which was a summary of cross country study analysis, confirmed specific reference to the Ethiopian case, we use Oxam's report and

[5] This refers to the familiar E = C + I + G + X – M, where domestic expenditure (E) is determined by household expenditure (C ); investment expenditure (I), government expenditure (G) and exports (X) less imports (M).

employed a 40% trade and transport margin to adjust the valuation of food aid in the SAM.

Accordingly, 60% of total value of food aid (birr 382 million) entered the commodity balance account as a competitive import. This means that aggregate demand for marketable food products in the domestic market would have been larger by this amount if food aid was not supplied to households as in-kind transfers. It has to be noted that the local purchase equivalent of the in-kind transfer has already entered the household consumption expenditure and constitutes a part of the amount reported as birr 50 billion (column 4, row 2). Given that in-kind food aid doest not constitute a marketed product, its local cost equivalent has to be deducted from the commodity balance equation, recording it under the account labelled as "FAID" (column 9 and row 2). Also, recorded in column 9 was food aid as a transfer payment to households, at the pledged nominal amount, birr 639 million. However, it was appropriate to treat the difference between the total pledged food aid for that particular year and the local cost equivalent of purchasing the same volume of cereals (i.e., birr 639 million less birr 382 million), that is birr 257 million, as a transfer from the household account back to the external account, FAID (column 4, row 8).

### Simulation results

The simulation experiment is designed to distinguish between the effects of in-kind food aid and its cash equivalent. Accordingly, three separate simulation scenarios were conducted. Scenario I simulate the effect of abolishing in-kind food aid when this is implemented without any cash aid equivalent. This means that the exogenously introduced entries related to food aid in the SAM account are removed (entries in column 8 and row 8). In the remaining two scenarios, in-kind food aid is eliminated and replaced by cash equivalents with two separate assumptions related to valuation of food aid. The key point here is to note how much food would be domestically purchased if the pledged donation was directly passed to households in a recipient country rather than donor agencies purchasing grains from a developed country and then spending a good proportion of donations on trade margins. Scenario II assumes that donor countries agree to provide cash aid valued at local purchases of the quantity it planned to ship to the recipient country and retaining savings from the trade

margins. Thus, cash equivalent payments to households would be reduced by the sum of all shipment costs. Scenario III examines the effect of allocating the total amount of food aid budget pledged by a donor country to households without reducing the amount that would have incurred on shipments.

### *Commodity market effects*

Table 2 below provides commodity market effects of removing in-kind food aid in the Ethiopian economy. Column 1 displays base year values computed from the social accounting matrix. The base value 1.14 against food crops, for instance, represents farm gate price which is held at unity plus a 15% trade and transport margin. Similarly, the base value of 15,772 represents the total value (in millions of Ethiopian birr) of food crop produced during the base year.

The average price of food crops, the sector that encountered the policy shock, increase by 1.16%, 1.18%, and 1.20% respectively in scenario I, scenario II and scenario III. This indicates an inevitable rise in the price of food crops, a widely reported concern in the food aid literature that if in-kind food aid is removed then this would cause an increase in food prices and consequently result in welfare deterioration particularly for households who are net buyers of food (Barrett, 2001; Levinsohn and McMillan, 2004). However, our simulation results indicate that the increase in the prices of food does not necessarily cause a decline in aggregate welfare (see Table 2). Whilst the excess demand in the food grain market, due to cash aid, is likely to cause an increase in the price of food crops, the feedback effect of the food aid shock would cause equilibrium prices of other commodities to decline in scenarios II and III. There is a marked difference in the price effects between agricultural products and non-agricultural commodities, with negligible price effects on the latter but larger price effects on the former. Within agriculture, price increases happen only to the agricultural commodity that received the shock, the food crops, with other agricultural products experiencing adverse price effects. The rates of price changes reflect the share of the commodity in household consumption, which follows the linear expenditure system with minimum level of consumption for each commodity group (see eq. A1 in Appendix I).

[Insert Table 2 here]

If we shift our attention to commodity output effects of the exogenous shock, we observe that output of most commodity groups increase from the base period. This means that the removal of food aid would have expansionary effects on most agricultural and non-agricultural sectors under each scenario. Food crop output increases by 2.09% in scenario I, 3.27% in scenario II and 4.07% in scenario III. The other agricultural sectors would mostly experience expansion even under scenario I, even when no cash payment accompanies removing food aid from the system. When cash equivalent payments replace in-kind food aid, however, the rate of expansion becomes significantly larger. Commodity output of non-agricultural sectors encounter marginal declines under scenario I but the situation improves under scenarios II and III with most of these sectors experiencing positive changes.

### *Factor market effects*

Table 3 below summarises effects of removing food aid on Ethiopia's factor market. The first rows displays factor price effects. In this simulation experiment all factor prices and quantities were allowed to vary with equilibrium values of each variable being determined by interactions between demand and supply. However, the price of land does not vary due to lack of land market and the decision of land allocation is being governed by institutional factors, with local authorities allocating land to farmers largely depending on family needs and capacity to farm. Accordingly, quantities of land and labour are allowed to vary freely because of the existence of considerably high unemployment rate and existence of uncultivated land in Ethiopia. However, capital stock is not allowed to vary and this remains a limiting factor for the utilisation of other factors of production.

[Insert Table 3 here]

In these circumstances, a positive stimulus to the agricultural sector does not necessarily cause an upward pressure on factor prices. The simulation results show that factor prices remain more or less unchanged at the base period level. Whilst land rent remains unchanged (by assumption) the price of labour (imputed price of family labour as well as wage labour) declines but only very slightly while imputed capital

rental rate rises slightly from the base year. As we expect, the positive stimulus to the agricultural sector would have a ripple effect; causing the quantity of factors employed to rise for most factors and in all scenarios, except for a marginal decline in the capital stock in the non-agricultural sectors. While agricultural land use increases modestly under both scenarios, family labour and wage labour increase by relatively large percentage points under scenarios II and III.

The lower part of Table 3 presents the effects of the policy shock on aggregate value-added with further sectoral details. Total value added, which represents income measure of GDP, increases only slightly under scenario I, a 0.75% rise from the base period. The positive GDP effects become larger, when cash aid replaces in-kind food aid, with 1.58% and 2.13% increases under scenarios II and III. In all scenarios, the mixed farming sub-sector of agriculture experiences the largest expansion. Two main factors explain why mixed farming benefits most from the policy change when food aid is removed even with no cash equivalent payment to households. First, it has to be noted that mixed farming is the sector which produces most food crops, which is directly affected by food aid. With the removal of food aid, there would be excess demand in food markets, and hence prices of food crops increase from the base period level, as shown in Table 2. Consequently, this causes a positive stimulus to the mixed farming sector, causing its employment and value-added to expand. Second, in the base year database, the social accounting matrix, food crops constitute a relatively larger proportion in household consumption expenditure budget than any other commodity group. In the linear expenditure system (LES), a functional form with a minimum consumption parameter for each commodity group, this level is calibrated using the budget share parameter as key determining variable. Therefore, when the price of food crops increases but purchasing power of consumers is effectively reduced, then households would shift demand away from most other commodities to food crop which has a relatively large budget share given that its contribution to household subsistence consumption is relatively high.

### *Aggregate macroeconomic and welfare effects*

**Macroeconomic effects**

Table 4 illustrates the macroeconomic effects of the shocks. Scenario I shows that reducing or removing food aid from the system would have small negative effects on domestic expenditure. If food aid is eliminated without any cash payment, then Ethiopia's gross domestic expenditure (GDE) and all components of domestic absorption (except for government expenditure) would contract in scenario I but only by negligible percentage points. When cash aid replaces food aid, then GDE expands by 0.59% and 1.01% respectively in scenarios II and III. Whilst household expenditure and imports rise by relatively larger percentage points, exports decline in all scenarios. The rise in government expenditure in all scenarios is explained by the fact that most government consumption consists entirely of services, which are not directly related to food crops.

[Insert Table 4 here]

The simulation results in scenarios II and III reveal a crucial point that a removal of food aid from the system could have relatively large expansionary effect on the Ethiopian economy as long as in-kind food aid is replaced by cash equivalent aid. As it was shown earlier, the removal of food aid stimulates domestic production while transfer payments to households maintains purchasing power of households. These effects would reinforce each other and have a multiplier effect on the domestic economy. Consequently, real GDP increases marginally from the base period levels, except for exports that decline in this scenario as well. The main reason for this is that cash transfers to households would stimulate domestic demand and hence this would divert exports to domestic markets. Similarly, the removal of food aid would cause an increase in prices of agricultural products (Ethiopia's main exports) and hence demand for exports would fall. Apart from this adverse effect on the external sector via reduction of exports and increase of imports, the replacement of food aid by cash aid is expected to have an expansionary effect on the Ethiopian economy.

**Household welfare effects**

The consumer price index is the numeraire for this model. Thus, the aggregate effect of removing food aid on household or private consumption given in Table 4 below change by similar order of magnitude as the total welfare effect measured by equivalent variation (EV) in Figure 2 below. Aggregate welfare declines under scenario I but it improves under scenarios II and III. Additionally, Figure 2 reveals distributional effects across household groups. On the one hand, it is crucial to note that farm households experience welfare gains in all scenarios, with the positive effects getting larger with the amount of cash aid. The reason is that food aid competes with domestic agricultural output and hence its removal would stimulate the agricultural sector under all scenarios (see sectoral details in Table 2 and Table 3 above).

Scenario I shows that removing in-kind food aid would have a clear distributional effect. Farming households would gain but wage earners and entrepreneurs would encounter welfare loss, with no significant change in aggregate welfare. Scenario II shows that farming households and wage earners would experience improvements in their welfare; entrepreneurs encounter welfare declines but by smaller percentage points compared to scenario I; and consequently aggregate welfare rises from the base period level. Scenario III indicates that if all pledged cash donations are directly passed to households then this would cause welfare improvements to most household groups. In this scenario, wage earners and farming households would gain most with their welfare rising from the base period respectively by 3% and 2.3%. Similarly, unlike in scenarios I and II, entrepreneur households experience a welfare gain, with a rise from the base year by 1.8%. Consequently, aggregate welfare improves by 2.4%.

[Insert figure 2 here]

Contrary to concerns in the food aid literature (eg. Basu, 1996; Levinsohn and McMillan, 2004), the simulation experiments indicate that it is entrepreneurs, not farming households, who benefit more from the existence of food aid in the system mostly through labour market effects. Accordingly, entrepreneurs would not only experience the largest welfare declines under scenario I and II (by 3.8% and 0.4% respectively), but also experience a relatively smaller welfare gain in scenario III.

Wage earners experience welfare deterioration only under scenario I (-0.8%) but their welfare improves in scenarios II and III by 1.4% and 3% respectively. Welfare loss or gain for the household group in all scenarios is related to positive or negative income effects resulting from employment expansion or contraction (see Table 3 above) dominating the negative or positive price effect caused by increases in prices of agricultural products (see Table 2 above).

## Summary and conclusion

The effectiveness of food aid has attracted the attention of policy-makers in donor and recipient countries and NGOs during recent years. In order to provide insights into complex socio-economic factors surrounding this subject, food aid has become a heavily researched topic. However, most studies have focussed on one aspect or another in explaining effectiveness of food aid, paying less attention to feed-back mechanisms through which effects of food aid, which is an the exogenous injection, on a particular sector could be transmitted to other sectors of the economy.

Given that Ethiopia has been receiving a relatively large quantity of food aid during the last few decades, it has become the most frequently used case study for a relatively large number of research projects. Food aid donations to Ethiopia arrive typically as in-kind aid; cereals, largely wheat, which was then distributed to needy people affected by periodic droughts and famine in different localities. Undoubtedly, such in-kind aid have saved millions of lives over the years, but it has become increasingly questionable whether or not in-kind food aid is the best way emergency relief could be delivered to poor Ethiopian households affected by drought and famine.

At broader level, the food aid literature concerned with effectiveness of food aid could be classified into two strands: the cash versus in-kind aid debate and the disincentive hypothesis. This study has attempted to fill the gap in the food aid literature by bringing together the two strands of research in a single conceptual framework, employing an economy-wide modelling approach.

The cash versus in-kind aid debate has examined the effectiveness of aid delivery specifically focussing on consequences of alternative mechanisms on welfare of

beneficiary households or direct food aid recipient households. Proponents of cash relief emphasised inefficiencies associated with in-kind aid delivery, most particularly logistic costs that eat up nearly half of the pledged amount of money. Cash relief is then justified on the ground that efficiency gains and hence welfare improvements for recipient households who would be able to purchase greater quantity of food from domestic markets for the same amount of donations initially pledged by donor countries. This argument is then firmly anchored on positive outcomes of cash aid in terms of household welfare gains due to higher level of consumption by households who directly receive the donation.

This study takes the argument a step further, drawing attention to indirect benefits that occurs because of the multiplier effects of cash aid. A higher level of domestic household expenditure associated with efficiency gains because of a change from in-kind aid to cash aid explains only a fraction of the overall gains. Surely, the initial injection would have ripple effects throughout the economy, causing welfare improvements not only to households who are direct beneficiaries but also to other households whose livelihood depends on producing and selling food in domestic markets, households who provide transport services, and so on. If we take into account all rounds of direct and indirect feedback effects in all sectors of the economy, then the economy-wide efficiency gains from the policy change becomes much larger than calculations confined to the narrow range of welfare gains of direct beneficiaries.

Theoretical and empirical models in the food aid literature have often warned of possible upward pressure on food prices in a recipient country if in-kind food aid is replaced by a cash payment. However, such concerns are largely based on partial equilibrium analysis where no feedback mechanism exists and hence either estimated rise in prices are highly exaggerated or welfare losses by recipient households are never compared to welfare losses incurred due to inefficiencies of in-kind food aid delivery.

For instance, Levinsohn and McMillan employed a partial equilibrium analysis, comparing the impacts of removing food aid (wheat) on equilibrium quantity and price of wheat in Ethiopia. It was estimated that equilibrium price would increase by

about 53%, indicating that such large increase would have substantial adverse effects on the welfare of poor households who rely on food aid. However, employing a multi-commodity and multi-sectoral general equilibrium modelling framework and accounting for multiplier effects, we have shown that food prices rise by no more than 1.2%. The adverse effect of the increase in food price was outweighed by the positive stimulus effects of cash aid on agriculture and the ripple effect of this throughout the economy.

Furthermore, Levinsohn and McMillan have argued that food aid benefits poor households than rich ones but we have argued that actually the opposite is likely to be the case. The simulation experiments have indicated that the rural households are likely to benefit much more than any other household group. Also, net-buyers" of food, such as urban and rural wage earners, do not necessarily get hurt as a result of abolishing food aid, because the expansionary effect of removing food aid in terms of generating employment and income outweighs any adverse effect that comes from food price increases. In our simulation experiments urban entrepreneurs are the only group who encounter a minor decline in welfare mainly because an increase in agricultural prices would squeeze profit margins as cost of raw materials increase.

Critically, the cash versus in-kind food aid debate and the controversy surrounding the disincentive hypothesis are usually discussed as if they are separate issues. However, this study has shown that actually the dichotomy between the two strands in the food aid literature effectively disappears if inter-sectoral linkages and spill-over effects are taken into account in an economy-wide modelling framework. Similarly, studies that focus on the disincentive impacts of in-kind food aid on domestic producers in a recipient country have rarely employed a system-wide framework to account for welfare losses that may occur if in-kind food aid is abolished. In fact, one comes across worrying ideas put forward to explain the disincentive effects of in-kind food aid being used as arguments against food aid in general, ignoring the crucial distinction between cash aid and in-kind food aid. This study has illustrated the importance of such distinctions. To this effect, the simulation experiments were designed to clearly show welfare losses that are likely to occur if food aid is abolished without any cash payments and the economic stimulus that takes place if in-kind food aid removed and then replaced by cash payments (see figure 2).

There are two central methodological elements that have influenced the simulation results reported in this study. The first one is an economy-wide modelling approach that unified different strands, explicitly showing implications of alternative aid delivery mechanisms for production and consumption of food and other commodities in the Ethiopian economy. The second one, and most novel aspect to this study, is the appropriate valuation method that was built into the base year database, the social accounting matrix. The key point is that we have employed an appropriate economic accounting principle, a suitable food aid valuation method that explicitly distinguished between the pledged aid money (food aid at donor cost); local purchase equivalent; and isolated the logistic cost and hence we were able to trace economy-wide impacts of alternative food aid delivery.

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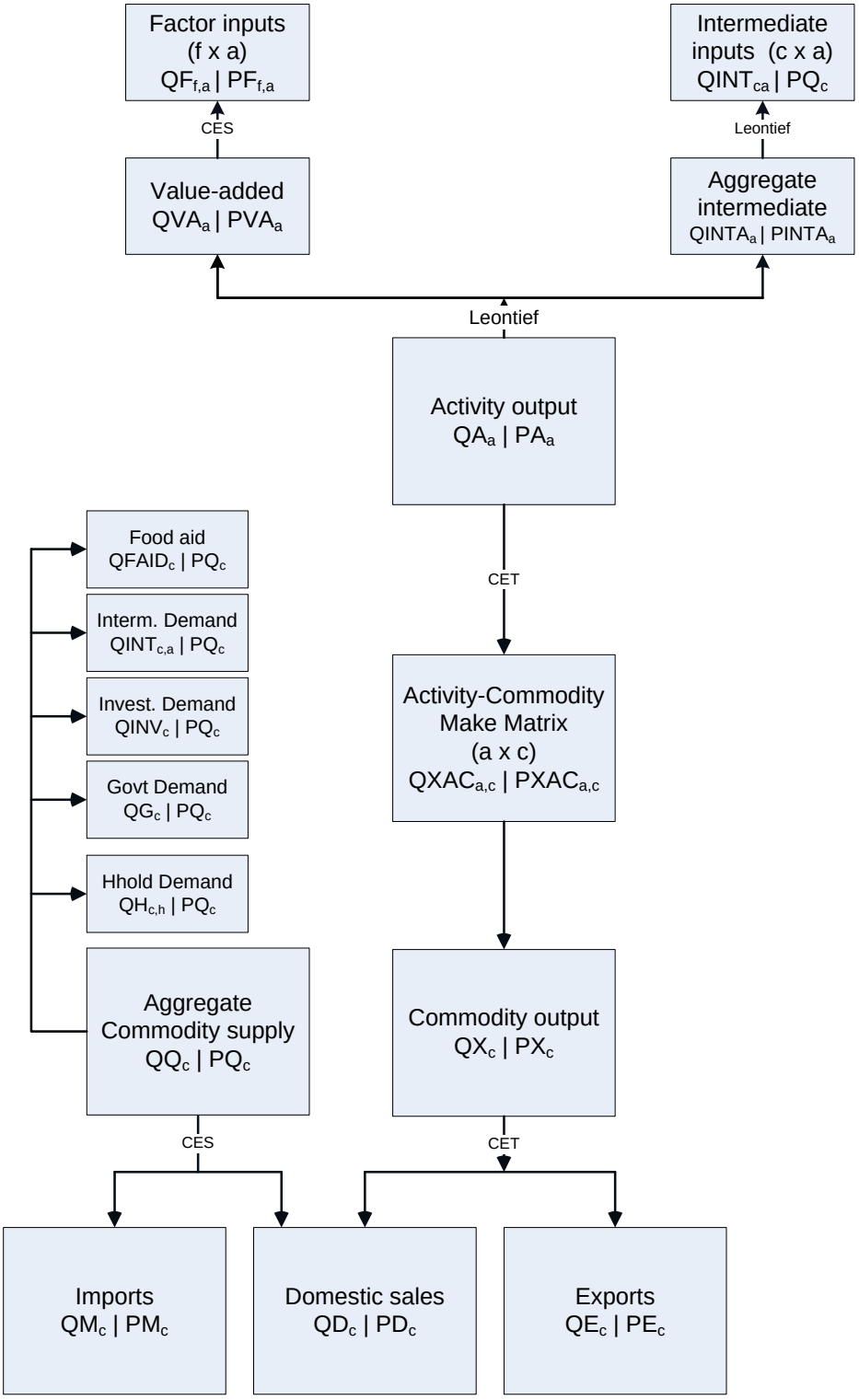
Figure A1 Structure of production and flows of commodities



# Description of model structure

Subscripts

| | | | |
|---|---|---|---|
| a | Activities (12) | 1 | Peasant farming - Highland mixed |
| | | 2 | Peasant farming - Lowland mixed |
| | | 3 | Peasant livestock production - Pastoralists |
| | | 4 | Handicraft and small-scale manu./processing |
| | | 5 | Large/medium Agro- manufacturing - public |
| | | 6 | Large/medium Agro-manufacturing - private |
| | | 7 | Large/medium Other manufacturing – public |
| | | 8 | Large/medium Other manufacturing - private |
| | | 9 | Other industry n.e.c. -public |
| | | 10 | Other industry n.e.c. -private |
| | | 11 | Service - public |
| | | 12 | Services - private |
| c | Commodities (8) | 1 | Food crops |
| | | 2 | Traditional agricultural exportables |
| | | 3 | Non-traditional agricultural exportables |
| | | 4 | Other agricultural products |
| | | 5 | Agro-industrial products |
| | | 6 | Other industrial products |
| | | 7 | Public goods services |
| | | 8 | Other services |
| f | Factors (4) | 1 | Family labour |
| | | 2 | Wage labour |
| | | 3 | Capital |
| | | 4 | Land |
| h | Households (3) | 1 | Farm households |
| | | 2 | Wage earners |
| | | 3 | Entrepreneurs |

Figures and Tables

Figures

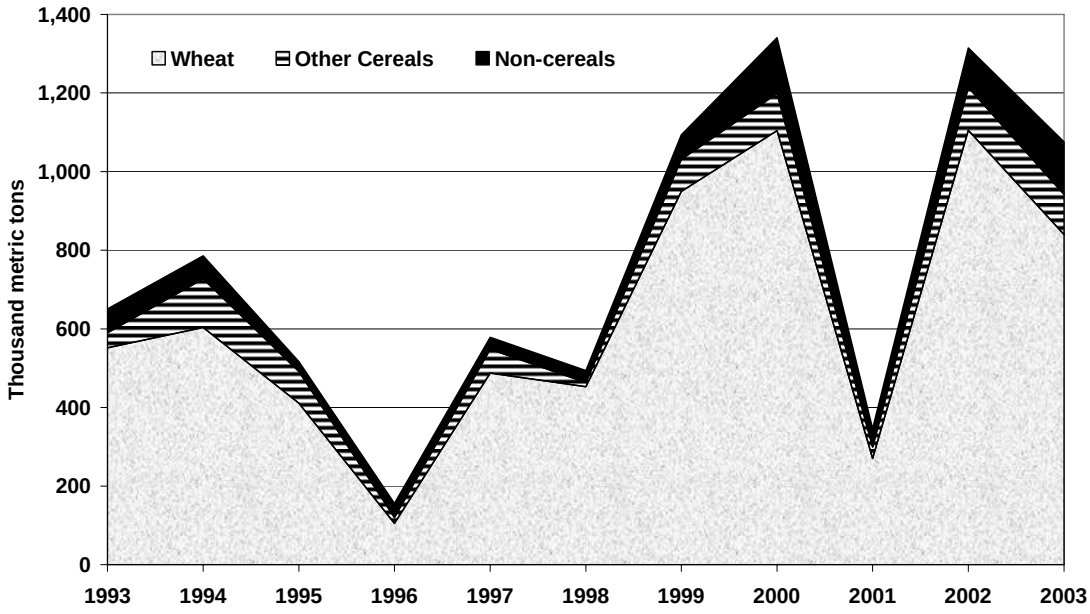


Tables

Table 1. A condensed social accounting matrix for Ethiopia (millions Eth birr, balanced)

| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 14 | 16 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **ACT** | **COM** | **FCT** | **HHD** | **FRM** | **GVT** | **FFW** | **FAID** | **ROW** | **PRV** | **PBV** | **YTX** | **ETX** | **ITX** | **TMG** | **TOT** |
| **Activities** | **ACT** | | 88,843 | | | | | | | | | | | | | | 88,843 |
| **Commodities** | **COM** | 20,685 | | | **50,033** | | 7,203 | | **-382** | 8,018 | 19,185 | 3,200 | | | | 8,300 | 116,243 |
| **Factors** | **FCT** | 68,158 | | | | | | | | | | | | | | | 68,158 |
| **Households** | **HHD** | | | 32,771 | | 20,964 | 393 | | **639** | 3,117 | | | | | | | 57,885 |
| **Firms** | **FRM** | | | 35,387 | | | | | | | | | | | | | 35,387 |
| **Government** | **GVT** | | | | | | | | | 1,715 | | | 5,556 | 169 | 3,601 | | 11,040 |
| **Food-for-work** | **FFW** | | | | | | | | | 305 | | | | | | | 305 |
| **Foodaid** | **FAID** | | | | **257** | | | | | | | | | | | | **257** |
| **Rest of the world** | **ROW** | | *15,330* | | 95 | | 548 | | | | | | | | | | 15,973 |
| **Private invest.** | **PRV** | | | | 5,140 | 11,227 | | | | 2,818 | | | | | | | 19,185 |
| **Public invest.** | **PBV** | | | | | | 2,895 | 305 | | | | | | | | | 3,200 |
| **Income tax** | **YTX** | | | | 2,360 | 3,196 | | | | | | | | | | | 5,556 |
| **Export tax** | **ETX** | | 169 | | | | | | | | | | | | | | 169 |
| **Indirect tax** | **ITX** | | 3,601 | | | | | | | | | | | | | | 3,601 |
| **Trade margins** | **TMG** | | 8,300 | | | | | | | | | | | | | | 8,300 |
| **Total** | **TOT** | 88,843 | 116,243 | 68,158 | 57,885 | 35,387 | 11,040 | 305 | **257** | 15,973 | 19,185 | 3,200 | 5,556 | 169 | 3,601 | 8,300 | |

**Figure 1 Provision of food aid in Ethiopia by commodity type, 1993 - 2003**




Source: compiled from FAO (2005)

**Figure 2 Equivalent variations on household consumption**

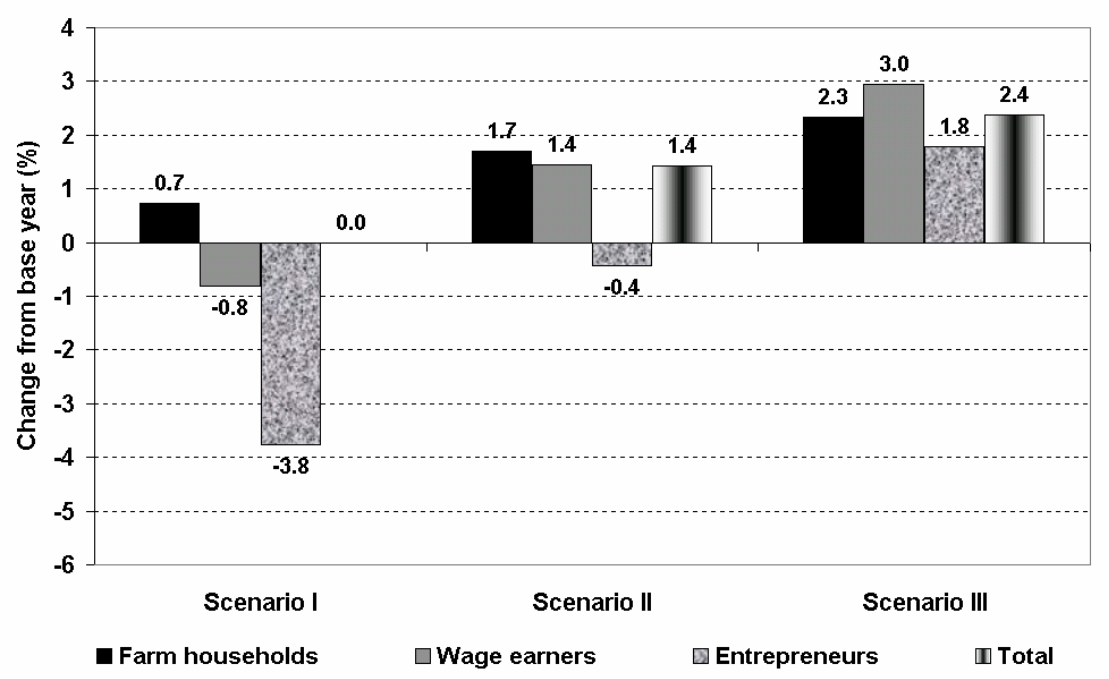


**Table 2 Commodity price and output effects**

| | | Scenario | | |
|---|---|---|---|---|
| | Base value | I | II | III |
| Commodity price effects: | | | | |
| Food crops | 1.14 | 1.16 | 1.18 | 1.20 |
| Traditional agricultural exports | 1.14 | -0.05 | 0.08 | 0.17 |
| Non-traditional agricultural exports | 1.27 | -2.46 | -1.94 | -1.61 |
| Other agricultural products | 1.16 | -4.14 | -4.40 | -4.57 |
| Agro-industrial products | 1.00 | -0.02 | -0.09 | -0.13 |
| Other industrial products | 1.01 | -0.06 | -0.39 | -0.60 |
| Public goods services | 1.15 | 0.32 | 0.27 | 0.21 |
| Other services | 1.14 | -0.10 | -0.04 | -0.01 |
| Commodity output (million Eth birr): | | | | |
| Food crops | 15,772 | 2.09 | 3.27 | 4.07 |
| Traditional agricultural exports | 13,826 | 0.17 | 1.28 | 2.04 |
| Non-traditional agricultural exports | 2,558 | 0.96 | 2.10 | 2.88 |
| Other agricultural products | 2,804 | 1.49 | 2.62 | 3.39 |
| Agro-industrial products | 6,737 | -0.62 | 0.76 | 1.68 |
| Other industrial products | 15,845 | -0.25 | 0.09 | 0.34 |
| Public goods services | 7,203 | 0.85 | 0.85 | 0.83 |
| Other services | 24,098 | -0.08 | 0.08 | 0.22 |

**Table 3 Employment and value-added effects**

| | Base value | Scenarios | | |
|---|---|---|---|---|
| | | I | II | III |
| Factor prices: | | | | |
| Family labour | 1.11 | -0.46 | -0.59 | -0.68 |
| Wage labour | 1.90 | -0.20 | -0.55 | -0.77 |
| Capital | 0.29 | -0.04 | -0.07 | -0.07 |
| Land | 0.48 | 0.00 | 0.00 | 0.00 |
| Factor demand: | | | | |
| Agriculture | | | | |
| Family labour | 17,621 | 2.66 | 4.13 | 5.13 |
| Wage labour | 2,332 | -0.24 | 2.13 | 3.70 |
| Capital | 16,655 | 0.27 | 1.08 | 1.60 |
| Land | 12,011 | 0.88 | 1.68 | 2.23 |
| Non-agriculture | | | | |
| Family labour | 1,303 | 1.14 | 1.79 | 2.28 |
| Wage labour | 3,817 | 0.67 | 1.92 | 2.75 |
| Capital | 78,796 | -0.06 | -0.23 | -0.34 |
| Sectoral value-added (Million Eth birr) | | | | |
| Mixed farming | 24,022 | 2.25 | 3.51 | 4.37 |
| Livestock production | 5,624 | -0.55 | 0.67 | 1.49 |
| Small scale manufacturing | 1,650 | -0.33 | 1.06 | 1.99 |
| L & M scale agro-processing | 1,650 | -0.57 | 0.96 | 1.98 |
| L&M scale other manufacturing | 901 | -0.17 | 0.26 | 0.55 |
| Other industries | 244 | -0.13 | 0.29 | 0.58 |
| Services | 20,559 | 0.26 | 0.51 | 0.69 |
| Total | 68,158 | 0.75 | 1.58 | 2.13 |

**Table 4 Macroeconomic effects of food aid (% change from base values)**

| | Base value | Scenarios | | |
|---|---|---|---|---|
| | (M. Eth birr) | I | II | III |
| Consumption | 43,505 | -0.00 | 1.42 | 2.38 |
| Gov't expenditure | 7,203 | 0.85 | 0.85 | 0.83 |
| Investment | 19,473 | -0.40 | 0.36 | 0.89 |
| Exports | 7,307 | -0.13 | -2.01 | -3.21 |
| Imports | 15,330 | -0.06 | 1.55 | 2.65 |
| | | | | |
| Real GDP | 62,158 | -0.03 | 0.59 | 1.01 |