

Past and current practices of food security management

Michiel A. Keyzer and Cornelia F.A. van Wesenbeeck¹

Abstract

Arguing that assurance of food security is a core task of government, and has been since Biblical times, next to other security tasks assigned to the military, the fire brigade, the police and the judiciary, we consider current practices of food aid provision by the World Food Program and their effect on local governance. We postulate that food security management should distinguish three subtasks: (i) entitlement: to provide income entitlements that enable the needy to acquire sufficient food, (ii) delivery: to ensure that the food physically gets within the reach of the needy, and (iii) taxation: to secure funding that covers the full cost of the operations. Our review of literature and of practices of food security programs concludes that the tax element is often neglected as is the relation of all three subtasks to aspects of governance, in particular to the weakening of governance that inevitably results from the local population seeing that its public authorities continuously depend on foreigners to fulfil key security task. We also present a theoretical framework to deal coherently with the three subtasks, and discuss its application through a spatially explicit model of optimal food aid provision for Sub-Saharan Africa that is being developed within an ongoing joint research project between WFP and SOW-VU. Our main message is that foreign donors, called upon to intervene during food crises, should program an adequate exit for when the emergency is over, so as to ensure that local authorities can take over the tasks and do so in a way that is visible and recognized by the population, even if foreign financial support and technical assistance are to be provided during a transitional period.

Keywords: food security management, governance, food aid, welfare optimality, applied economic modelling, World Food Programme

1. Introduction

The paper reviews the basics of food security management, by comparison of the relaxed situation in the Garden of Eden with the tight food management in Joseph's Egypt, and the food crisis faced by Moses in Sinai, where manna from heaven brought relief (Section 2). Section 3 reviews the main lines of thought on food aid provision in modern times. Section 4 presents some facts and figures on present-day food aid and describes the operation of the World Food Program (WFP). Next, section 5 reviews impact assessments of food aid. Section 6 concludes that there is a need for a more formalized treatment of the issues, and formulates a theoretical framework to accommodate the three key elements of food security management – provision of income entitlements, supply of goods, and adequate funding of food security programs. Finally, as an application it also reports on the workings of a spatially explicit model of optimal food aid provision for Sub-Saharan Africa that is being developed within an ongoing research project conducted jointly by WFP and SOW-VU. Section 7 concludes.

2. Eden, Egypt and Sinai: three systems of food security

Eden

In Paradise, the hospitable Garden of Eden provided all food security needed (Genesis 2: 8-25). Adam and Eve could without any effort, pick all fruits from the trees (but one) and never

¹ Centre for World Food Studies of the Vrije Universiteit (SOW-VU).

suffered hunger. In historical times, the food system of Mesopotamia is thought to come closest to this ideal, with abundant and well irrigated fruit trees providing ample food throughout the year, and also allowing for easy drying and preservation of food for dry spells and for journeys across the territory. After being chased from Paradise, Adam and Eve had to work more but they could live peacefully with their offspring without need of any governmental agencies to protect them against threats from nature or from other tribes.

Egypt

How radically different was the situation much later, in Pharaoh's Egypt. Recall Pharaoh's Dream (Genesis 41: 1-4) of the seven fat cows coming out of the Nile followed by the seven hungry cows that eventually ate all fat cows. When called upon by Pharaoh, Joseph interprets this dream as a warning that after seven exceptionally rich harvests will follow seven years of hunger and (Genesis 41: 33-36) suggests the following measures to safeguard Egypt's food security. First, there is taxation: one fifth of all harvested grain should be stored in warehouses owned by Pharaoh. Indeed, in view of the Nile valley's seasonal flooding, stocks had to be kept high and dry, far away from the fields, presumably in caves up the East Bank. These caves had to be guarded. Since farmers had to work on the fields, special troops had to fulfil this task, justifying a standing army to be kept even during peace time. Genesis tells us that when the seven years of hunger began, the stored grain was sold to the hungry population, and in the seven years that followed, Pharaoh managed to get control over all resources of the population - initially, the population spent their cash reserves, then they sold their cattle to Pharaoh, next their land and, finally, they became his slaves (Genesis, 47: 13-25).

This narrative highlights the key role of stock holding in securing and to some extent justifying the power of the state, in this case even to the extent of leading to serfdom. Indeed, Pharaoh abuses his power: he had already taxed farmers, so why let them pay again for the stocks in time of need? Nonetheless, the contours of a more balanced food security policy emerge, as one envisages the functioning of the system once serfdom was established. Since the slaves had to be fed, and those who worked in the field had to be fed well, the later pharaohs must have distributed food from stock to their slaves, in good as well as in bad years. The able bodied among them may have received food-for-work but young children and elderly must have been entitled to food in another manner, possibly through vouchers or stamps of some sort, to ensure that they obtain food but could not visit the distribution point twice. Hence, the system must eventually have comprised the three basic elements of a food security scheme: (i) targeted provision of income entitlements to beneficiaries, in normal years the poor, in bad years the whole population (ii) adequate delivery, supported by stock operation and trade with the outside world, and (iii) adequate funding, through taxation or requisition in kind. We refer to (i)-(iii) as the triad of food security. People living at the rhythm of the seasons in the Nile delta were naturally led to abide by these rules, virtually natural laws, as long as food deficits could be covered from stocks or imports.

Sinai

Indeed, as Exodus 12: 31 tells us, the ruling regime eventually proved unable to deliver when hit the Ten Plagues (described in Exodus 8-12). Pharaoh had to let go the People of Israel, thus reducing the number of mouths to be fed but liberty came at price, as the exodus through they suffered from famine and lawlessness. The Lord, we are told, re-established His authority over His people by rescuing them, dropping manna and quail from heaven (Exodus

16 and Numeri 11), while punishing those who failed to be satisfied with the gift. After these miracles and revelations, Moses finds his people willing to accept the Law, in the form of the Ten Commandments. Under the new circumstances, individual transactions became important and property rights had to be protected through regulations, essentially demanding respect for the neighbours' life and property. The centralized planning of Egypt turned into a market economy.

Of course, with the transition and after reaching the Promised Land, the question of social equity and safety nets arose, as some families might not possess enough cattle and farmland to survive at times of hardship. The book Leviticus (25: 35) provides some guidance forbidding any profiteering from food sales to the hungry. Regarding equity, the same verse also orders the rich to help the needy. Furthermore, as proclaimed in Deuteronomium 15: 1-6, debt relief should be given every seventh year. However, as the Bible generally attributes the occurrence of natural disasters to Godly punishment for collective sins, such as disobedience and was addressed to the People rather than to its rulers, it does not contain many precepts as how to ensure food security per se. Indeed, under the dry conditions of the Middle East with limited possibilities for irrigation, and modest harvests, and poor means of transport, little could be done during prolonged periods of droughts or plagues. Regarding governance, Leviticus and later scriptures indicate that the Law carved in stone had to be protected by other security improving customs ("Hedge around the Law"), and by guardians with powers to decide in the face of circumstances: priests, judges and political leaders (the late "rules versus discretion"²). The many books of the later Babylonian Talmud were an attempt to codify a comprehensive set of rules, jointly with their prescribed interpretation, so as to offer security with respect to the law itself. Clearly, the mere vastness of the series compromised its use in practice, and even the text itself explicitly presents questions for further debate. Unlike in Egypt, adaptability became of essence in the new societies and for this some discretion and some separation of powers had to be established, but how much remains an unsettled issue, witness ongoing debates in Western societies whether to accept incursions in the private lives of citizens to protect against terrorist threat.

Be this as it may, in both Egypt and Sinai, the higher-level institutions derived their legitimacy from their capacity to protect the people from shocks they would be unable to address individually (self-protection and insurance) or jointly with family, friends and neighbours (mutual protection and insurance). In Egypt the natural demands of irrigated agriculture hardly supported any system of governance other than tight central control. In Sinai, decentralization became necessary, through regulations and specialized institutions that were able to enforce the law and to assure food security on the basis of the respect they commanded rather than through repression. After escaping from serfdom in Egypt, the People still needed to be governed, and to see that those entrusted with this task had the power and the means to fulfil their tasks and assure security.

3. Food aid in modern times

Enlightenment and Revolution

² The modern debate started with the seminal Coase (1960) article on how to deal with externalities

To date, food security in many parts of the world still operates under regimes very similar to those of ancient Egypt, and Sinai, governed by age-old traditions. However, in 17th century Europe, the Age of Enlightenment led philosophers to look for rational justification, with key contributions in the writings by Hobbes, Locke and Spinoza. The crucial element in this transfer of power is the notion that the state should truly represent the citizens (Spinoza's notions of 'acting as if by one mind', 1670; Hobbes' 1651 emphasis on the inherent weakness of any leader who fails to perform basic functions). This rationalization pursued in the 18th century by Rousseau ("contrat social", 1762) and Voltaire (1759) emphasizes the nature of the state as an institution that is "of the people, by the people", and should therefore also be primarily funded by these people, not by foreign agents. Conversely, the French Revolution may have been inspired by their writings but it was to a large extent triggered by the Ancien Regime's incapacity to provide sufficient food and purchasing power to the Paris population in the wake of a financial crisis. Recall Queen Marie-Antoinette's famous outcry 'Qu'ils mangent de la brioche' (let them eat cake) when told that there was no bread left. This is only one of the virtually uncountable tales on record of a leadership being overthrown because of failure of its food security management.

World wars I and II and their aftermath

While food crises arose throughout human history, concerted international actions to cope with them are a relatively recent phenomenon. Massive inflows of food aid, primarily from the United States, were supplied after World War I. In 1918-1919, the American Relief Administration (ARA) under the direction of future president (1929-1933) Herbert Hoover shipped nearly 4 million tons of food and other supplies to Europe, an immense undertaking that was paralleled only by Hoover subsequent action to address the Ukrainian famine of 1921-1923. By the summer of 1922, at the peak of operations, the US were feeding nearly 11 million people a day. The total cost of the mission were approximately \$60 million (or about 0.1 percent of GDP), of which \$20 million was an appropriation from the US Congress used to purchase corn and seed.

Also towards the end and in the aftermath of World War II, 1945–1948 the allies shipped millions of tons of food to Europe. For example, from April 29 until May 8, the British Bomber Command dropped 11,000 tons of food on the hunger stricken Northern part of the Netherlands, to save 3.5 millions from starvation. This famine, and the aid campaign that helped addressing it, under the fitting name of Operation Manna, is thought to have fostered the country's persistent support for development assistance.

After 1945, the US became a major donor of food aid (in kind), to former allies as well as to former enemies, in a complex mixture of benevolence and political strategy to "Win the Hearts and Minds of the People". This policy has been pursued uninterruptedly until present date.

It must be added that after World War II, political and commercial motives also became part of the equation. In a nutshell, subsidies to the farmer states in the Midwest became instrumental in attempts to win the primaries and to secure seats in Congress. Foreign policy was also a major driver, to establish goodwill and forge strong alliances in the post-war world, partly to avoid the spread of communism, partly to favour decolonization. Commercially, an explicitly stated motive was to win the taste of foreign consumers for US-

food products, especially in the mid 1950s, when economic life had recovered from the war, and US-food exports faced declining demand as agricultural production recovered in Europe and Asia, and these regions were beginning to become food exporters themselves. Against this background, the US Congress passed in 1954 the Agricultural Trade Development and Assistance Act, Public Law 83-480, known as PL480 or “Food for Peace Act”. PL480, jointly with the 1949 Agricultural Act provided the legal basis for subsequent food aid shipments to developing countries.

In the 1950s and 1960s, food aid became a major component of development assistance, reaching 20 percent of ODA in the 1960s (FAO, 2006), partly because the problem of hunger was viewed primarily as one of food scarcity, but also as a means to find outlets for the large agricultural surpluses in the US, and since the mid sixties in the European Community. This resulted in the shipments of around 10 million metric tons annually on average, mainly cereals. The aid was generally transferred to the government of the receiving countries, as a grant and as delivery at subsidized prices, mostly for sale on the domestic markets. In terms of the triad discussed in section 2, the approach focuses on the supply side (ii) through imports from donor countries, with grants and subsidies substituting for taxes (iii) but bypasses the entitlement side (i).

It took the 1974 floods and resulting famine in Bangladesh to change this perception, when probably as much as 80,000–100,000 people starved to death. Floods occur in Bangladesh every year, and are, therefore, like in Egypt, as it were built into the social fabric. However, in 1974 they lasted exceptionally long, and, governance was not yet well established as the country had just become independent two years earlier after a war with (West) Pakistan, and very short of funds and expertise. Because of the floods, the field work was postponed, leaving many landless labourers who used to be paid in kind, without livelihood (Ravallion, 1987). At the same time, prices rose due to expectations of a poor harvest, which did not materialize as, partly thanks to the floods, paddy yields came out to be even higher than in the preceding and following years. This phenomenon was not well understood at the time by the donor community, which delivered massive food aid in kind that the poor were unable to buy. Sen’s (1981a,b) brought this discrepancy to international attention, emphasizing that entitlements of the poor (purchasing power) rather than availability were the critical factor that caused famine in this case.

Bose (1990), in a comparative study of three famines in Asia during the period 1942-1945 concludes that in all cases, production decreases, if even present, could not be blamed directly for the famine. Lin and Yang (2000), in a case study on the Chinese famine during the “Great Leap Forward” in 1959-1961, also find support for the Sen thesis in the sense that the fall in production was not the direct cause for the famine. However, unlike Sen, who emphasized the role of government in preventing a famine, the Chinese authors conclude that government actually caused the famine as its procurement strongly favoured the urban population. In a review of literature, Ravallion (1997) mentions that price increases in rural areas come out as the prime cause for famines in many empirical studies. In relation to food crises in Sub-Saharan Africa, Keyzer et al. (2003) also find that, rather than adverse climatic conditions per se, entitlement failures and poor policies are the main causes of famines. Indeed, it appears that lavish provision of food aid may cause prices to become too low in rural areas, rather than too high, and through this discourage production.

Remarkably, while Sen's writings on entitlements have been very influential in academic circles, the US and until recently the EU, the two major donors, have kept on providing food in kind, and over time many practitioners have come to realize that all elements of the triad (entitlements, delivery, taxation) are important and need to be operated jointly and with great care.

4. Present-day food aid and the role of WFP

Worldwide over the last 25 years, some 10 million tons of cereals were on average shipped annually as food aid, peaking at 15 million tons in 1992 (FAO/WFP). Figure 1 shows the pattern by region.

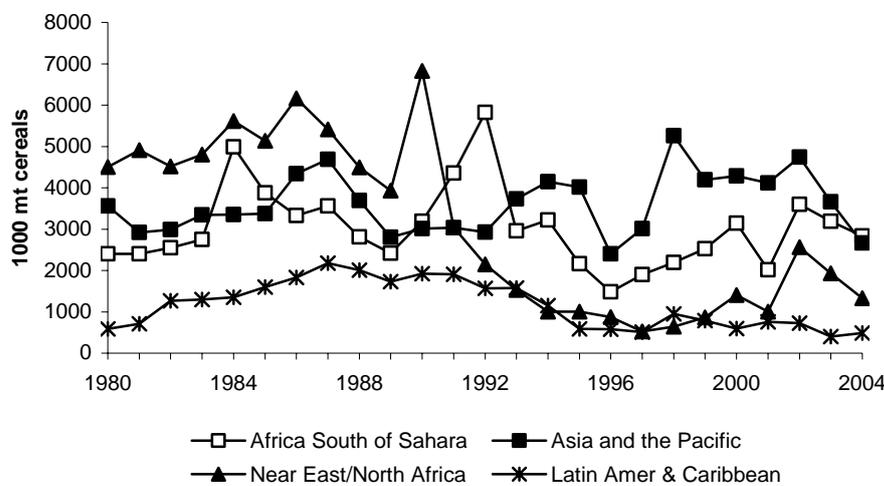


Figure 1: food aid flows by destination, cereals, 1980 – 2004. Source: FAOSTAT

As to the source of food aid, the amount purchased in the country itself (local procurement) and in other developing countries (triangular purchases) increased by about 67 percent in the last ten years (71 percent for Sub-Saharan Africa) but remains relatively low rising from 22 percent in 1996 to 33 percent in 2005 worldwide, while remaining almost constant in SSA. In fact SSA has ranked high in terms of relative share of local and triangular purchases (figure 2). This is the direct result of the EU emphasis on local and triangular purchases laid down in Council regulation 1292/96 that followed the review of the EU food aid policy. Yet, most of local and triangular purchases originate from few countries only; in 2007, in value terms, Uganda contributed 20% (mainly triangular), Ethiopia 18% (mainly local), Kenya 15% (both) and South Africa 14% (triangular) (WFP, 2007c).

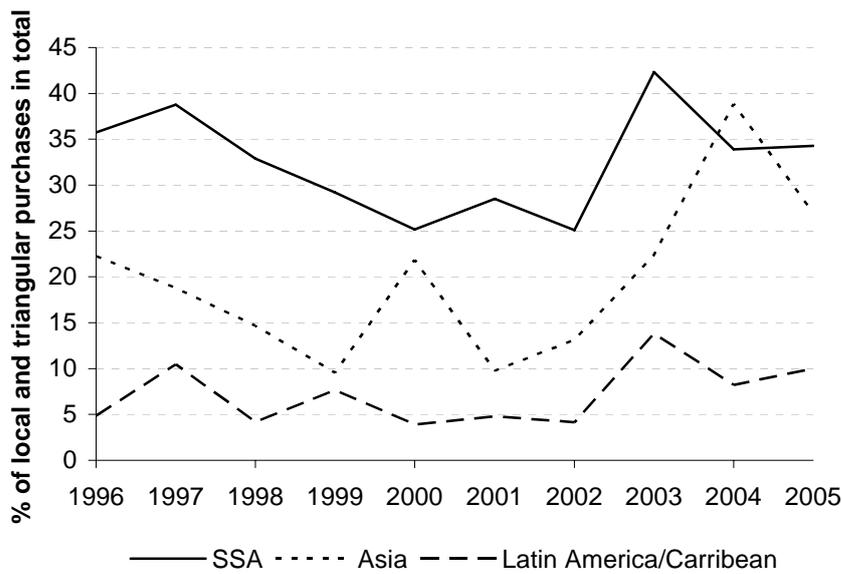


Figure 2: share of local and triangular purchases in total food aid by region. Source: INTERFAIS

With respect to the nature of the aid, a major shift has occurred over the last 20 years (Figure 3) from project and programme aid to emergency relief in response to sudden natural disasters, slow-onset disasters such as crop failures, and complex emergencies such as (civil) wars. In 2005, 64 percent of total food aid was emergency aid, as opposed to a mere 15 percent in 1988. For SSA the 2005 percentage of emergency food aid in total even reached 76 percent.

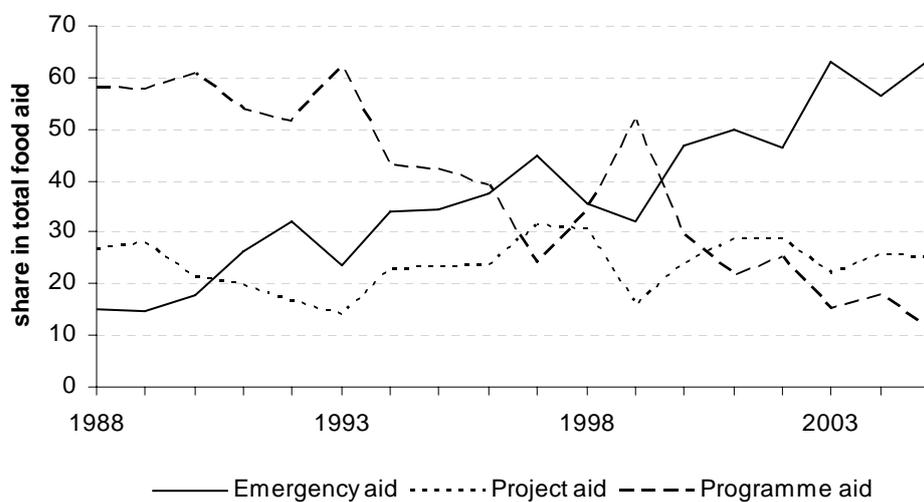


Figure 3: Composition of food aid, 1988 – 2005. Sources: WFP (2006a) and FAO (2003)

These shifts also reflect that over the years, the donor community has persistently lowered its expectations of program and project food aid contributions to development, witness the share of food aid share in total aid dropping from over 20 percent in the 1960s to 5 percent in 2005 (Barrett and Maxwell, 2006).

Role and mode of operation of WFP

Be this as it may, emergency food aid is there to stay as basic element of relief operations. Nowadays, the delivery of most of emergency food aid is coordinated by the UN's World Food Program (WFP). In 2005, 35 million people received 8.2 million tons of emergency food aid through WFP coordinated operations (Figure 4). Often, WFP cooperates with other UN organizations, in particular with the UN's High Commission for Refugees (UNHCR), to provide for millions of refugees and internally displaced persons who have fled war or natural disaster (figure 5)

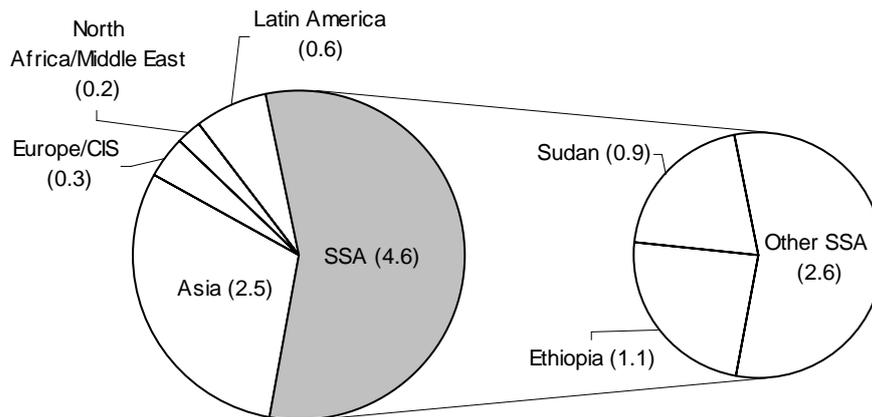


Figure 4: Emergency food aid shipments in 2005, by region in million mt. WFP (2006a)

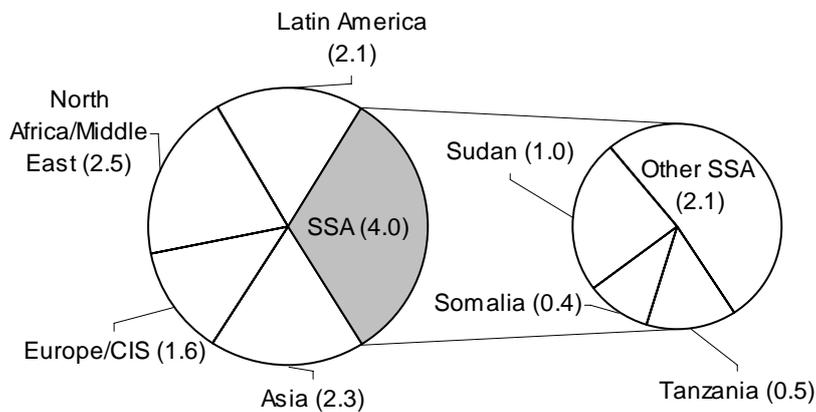


Figure 5: Refugees and IDPs in 2005 supported by WFP. Adapted from UNHCR, 2006.

Naturally, WFP-operations directly impact on the achievement of Millennium Development Goals 1 (MDG-1) for reduction of hunger and malnutrition. In addition, WFP refers to food aid as contributing to the other MDGs indirectly by improving the nutritional status of special groups such as women, children, and those affected by HIV/AIDS.

Regarding the financing demands of these MDGs, we may note that for 2005, WFP estimated its total operating expenditure at USD 2.9 billion to reach 96.7 million people (WFP, 2006b). This amounts to an average expenditure of USD 30 per person worldwide.. However, if Africa is singled out, average per person expenditure turns out to be almost USD 77 per person. This clearly illustrates that the financing requirements to reach the MDGs as presented in the Millennium Reports (USD 6.5 for MDG-1, 17 for MDG-2, and 28 for MDG-4 to 6), must grossly underestimate the actual MDG-financing needs (see also Keyzer and van Wesenbeeck, 2006).

WFP is the co-ordinating agency that brings food to those in need under emergencies. Its activities focus on procurement, shipment and distribution. In case of an emergency, WFP joins UN assessment teams to make an inventory of needs and possibilities for shipping food to the target groups. To cover immediate expenses, two sources of short-term finance are open to WFP. First, WFP-country directors can borrow up to USD 500,000 from the Immediate Response Account, a centrally held special account that is funded multilaterally, and usually is able to provide the requested resources within days, as loans that are later to be repaid to the IRA once dedicated funds for the emergency at hand have been received. Second, in December 2005, the Central Emergency Response Facility (CERF), a special UN-wide fund for humanitarian assistance has been established. The fund is projected to have financial reserves totalling USD 500 million in 2008, and is replenished via donations from public and private donors (in 2007, the Netherlands ranks third on the donor list, with a total donation of USD 53.4 million or 20% of total donations made up to May 2007). CERF, like IRA, provides the financial assistance needed to keep an operation afloat before dedicated funds have been received. In addition, this fund facilitates the continuation of “under-funded” activities, i.e. operations for which specific appeals have not triggered an adequate donor response. Allocation of CERF funds (mainly grants) to UN organization, specialized agencies and the international organization for migration is done by the Emergency Relief Coordinator, on behalf of the Secretary General of the UN. In 2006, WFP received USD 108 million from CERF, for instance for assistance to Darfur and to maintain aid to refugees in Kenya.

However important these quickly available financial resources may be to allow a timely response to emergencies, their size is modest relative to the total WFP-budget, of about USD 3 billion in 2006, up from from USD 130 million in 1971. This only confirms that WFP is in fact an executing agency that mostly acts on demand by its donors.

Besides its emergency operations, WFP also assists in recovery, with funds collected on the basis of dedicated calls to donors. In all these operations, the urgency of the needs tends to dwarf the depth of preparations, and WFP has increasingly been criticized for lacking any sort of comprehensive analytical framework to guide its operations (see DISI, 2006). The practice under emergencies is to send in missions that conduct rapid appraisals to gain an impression of the situation of those affected, while the follow-up focuses on target groups through dedicated projects, such as school feeding projects, food-for-work programs and food provided especially to those suffering from HIV/AIDS, as a temporary supplement to the diet to help the affected groups in rebuilding their productive lives. However, as is also concluded in the internal evaluation of the Darfur operation, the “machinery” of WFP appears to be deficient in monitoring the effect of such operations on the nutritional status and asset position of the recipients, as the focus is on the delivery of the goods rather than on its effects

(WFP, 2007b). Similarly, efforts at using food aid to promote sustainability of agriculture, as well as investment in education and infrastructure by lifting basic nutritional constraints, lack theoretical guidance and empirical foundation. Hence, the entitlement needs, first element of the triad, are essentially based on expert judgment. Regarding delivery, second element of the triad, the price effect of WFP actions on local markets does not receive much attention, even though the needs assessment indirectly account for it by seeking to eliminate deficits. Finally, the last element, local taxation, hardly enters consideration. Consequently, WFP cannot plan for disengagement without the ongoing aid projects being terminated. By the same token it does not avail of any explicit strategy to leave an adequate governance of food security when it retires.

Clearly, food aid is a subsidized export of sorts but one that is admitted under WTO-regulations, provided it is sanctioned under the Food Aid Convention (FAC), an international agreement, signed in 1999, “to improve food security and the ability of the international community to respond to emergencies”. To avoid the use of food aid as a balancing outlet for food production – providing much when prices are low and little if prices are high – minimum requirements for the provision of food aid were set. However, it appears that in practice low prices have corresponded to food aid exports in kind that greatly exceeded these minimum requirements, whereas tight supply corresponded to renegotiation of these levels (Huff and Jimenez, 2003). Over time, attempts have been made to reform the FAC in line with the stated objective, but this has so far only resulted in a widening of the array of commodities that could be supplied to fulfil the quota, and to the acceptability of contributions in cash rather than kind. This neglect of elements (i) and (iii) of the triad is in part attributable to the fact the FAC was established as a “by-product” of the Uruguay Round of multilateral trade negotiations. However, judging by the topics currently under discussion on a new FAC the prospects for a more balanced coverage seem dim, as the list of “key issues” for negotiation so far includes besides the representation on and housing of the Food Aid Committee such issues as the nature and level of commitments as well as the monitoring and enforcement of these commitments, (Hoddinott and Cohen, 2007), all exclusively referring to element (ii) delivery.

5. Impact assessments

Most of present-day literature on food aid is concerned with assessing the impact on local production and prices, for prevailing mode of delivery (e.g. cash, kind, school-feeding, food for work), type of commodity, timing of delivery and methods for targeting. This line of investigation is testing, on the basis of survey data, a subset of the eight propositions by Maxwell and Singer (1979) on the impact of food aid.³ In this section, we review contributions along these lines.

Impacts on food market

³ Specifically: (1) food aid may lift credit constraints to investment, (2) food aid may disproportionately benefit the most vulnerable, (3) food aid may assist governments in stabilizing food prices, (4) food aid is at least partly additional, (5) food aid has a disincentive effect on local food production, (6) the allocation of food aid reflects political and military interests rather than need, (7) food aid leads to greater dependence rather than greater self-reliance, (8) food aid often is a second-best option

For Mozambique, Donovan (1996) studies the effects of yellow maize inflows of food aid on the domestic production of the consumer-preferred white maize and concludes that, partially because of the strong preference for white maize, yellow-maize inflows only had a minor and short-lived depressing effect on the price of white maize. This conclusion holds for the war period of 1990-1993 as well as for the post-war period of 1993-1995, although effects were slightly more pronounced in the second period than in the first. The paper uses a VAR-technique supplemented with an assessment of the process of market integration within the country. By contrast, concentrating on the post-war experience, Tschirley *et al* (1996) conclude that the continuous inflow of yellow maize as food aid may have discouraged production of traditional white maize. They point to the co-movement of prices of white and yellow maize in non-emergency years as evidence that the untargeted inflow of yellow maize as food aid depressed prices of yellow maize and, via substitution effects of white maize as well.

For Tanzania, Tapio-Biström (2001) presents a model of the agricultural sector that allows for producer risk and also explicitly accounts for market segmentation, both geographically and in terms of the distinction between official, controlled markets and unofficial markets and finds a positive relation between food aid inflows and production. In this study, no distinction is made between program and emergency food aid because of the lack of consistent time series. Nonetheless, the author assumes on the basis of evidence from secondary sources that only a minor fraction of food aid was for emergency, while the bulk was sold on the open market. She finds that segmentation between official and unofficial markets makes it possible for food aid delivery to promote local production, along arguments similar to those of Von Braun and Huddleston (1988), who stress the fact that in many countries grain markets obey a dual structure with output sold at fixed (floor) prices to procurement agencies and consumers paying subsidized, low prices, for given rations. Clearly, this refers to the pre-structural adjustment situations, in which the procurement prices did not have to suffer when the shops selling to consumers were supplied from food aid but nowadays such a separation is rare. Yet, in some countries where coastal cities are supplied from foreign sources, while farmers are living in relative isolation in rural areas, undernourishment among the urban poor might be alleviated through imported food aid, without directly harming the rural areas. By the same token, however, rural development will require such aid to become sourced domestically as soon as rural infrastructure permits.

Many more studies of price impacts have been published, see e.g. Barrett (2002 and Tapio-Biström, 2001)) for surveys. From an econometric viewpoint, all, almost inevitably, have the shortcoming that food aid never is truly exogenous, since it is usually provided in circumstances that impact directly on production and prices as well, such as droughts, unrest, and speculative hoarding (Abdulai *et al.*, 2005). Straight reduced form estimations neglect these circumstances. At the same time it must be recognized that it is virtually impossible in this context to find reliable instrumentation variables that might cure this problem.

Impacts on labour markets

Another branch of investigations, less related to emergency evaluates whether food-for-work programmes (FFW) are more effective than free distribution. Advocates of FFW stress its contribution to the provision of public goods, usually road infrastructure, and its effectiveness as well targeted safety net for the poor, since the well-to-do will never participate. The

negative side is that FFW may discourage labour participation in more productive jobs. Along these lines, Osakwe (1998) formulates a small open economy model in which food intake raises labour productivity, in accordance with the efficiency wage relation (Dasgupta and Ray, 1986). The author finds that when food aid is used to finance infrastructure development projects it has no labour disincentive effects in the food industry and improves food security but has an ambiguous effect on aggregate welfare. When food is given to unemployed workers without any obligation to work, these workers stay away from the food industry and overall food security suffers but the effect on aggregate welfare can be of either sign. Quisumbing (2003) examines the effects of food aid on child nutritional status in rural Ethiopia and finds a gender effect: whereas food received as direct transfer mainly benefits girls' nutrition, FFW primarily helps boys. Holden et al. (2006) focus on Northern Ethiopia and conclude that effects are ambiguous and critically depending on the quality of program design and implementation, which unfortunately prove not to be positive on average.

Cash versus kind, targeting

In general, there is a growing recognition that many of the "failures" of food aid can be attributed to errors in targeting and timing of interventions. Targeting is often found to be more effective with food aid in kind. For example, Basu (1996) constructs a simple model with a threshold on consumption below which all income will be spent on food, and finds that aid in cash is less helpful since it raises food prices and through this harms those who are not included in the food aid program. Similarly, Arndt and Tarp (2001) in a computable general equilibrium model find that aid in kind is superior because it is less easily diverted from the poor.

More generally, on the issue of targeting, the overall conclusion of empirical research seems to be that it generally is deficient and driven by other aims than the assessment of nutritional status. Clay et al. (1999) use survey data for Ethiopia and cannot find a significant association between household food security and food aid receipts, while Barrett (2001) evaluates the performance of US-donated food aid under the PL480 programs using time-series data and concludes that it did not stabilize food availability per capita, as the response to crises was too slow, too politically motivated and the quantity provided was too small. However, Yamano et al. (2005) find for Ethiopia, based on three representative national surveys held in 1995-1996, that food aid does have a positive effect on child growth and mitigates the effects of weather shocks but also conclude that many villages that were exposed to such shocks did not receive food aid. Del Ninno et al. (2005) compare the experiences of four major recipients of food aid (India, Bangladesh, Ethiopia and Zambia) and conclude that the effects on production depend on the adequacy of targeting, its importance relative to local production, the extent it is a close substitute to local crops, and the extent to which it is accompanied by investment programs in agriculture. Finally, Donovan *et al.*, (2006) assess current procedures used in emergence needs assessments and advocate improving these to avoid depressing effects of food aid on production.

Until the nineties', Bangladesh has been operating a system of public food grain provision that comprises a mix of food-for-work programs, open market operations to stabilize grain prices, and rationing (through ration cards issued to individuals with which food in specialized shops can be bought), modified rationing for the population in rural areas, and

rationing to priority groups such as the military, and the police, patients in hospitals, and students in student hostels (e.g. see Ahmed, 1988). As discussed in Section 3 above, agreement has been emerging that entitlement failures have been a major cause of food crises in this country. Using the general equilibrium model developed for the third Five-Year Plan (1985-1990), Keyzer (1987) illustrates that the best policy to help the poor would be to increase the ration subsidy, which requires inflows of foreign aid as balance of payments support to supplement government finance. In a simulation run without balance of payments support but direct inflows of food grains as aid, calorie consumption is higher, but incomes of especially the poorest people are lower, and most importantly, domestic savings decrease, implying less investments and continued future dependency on aid. More recent studies for Bangladesh based on model simulations include Fontana et al. (2001) who with a CGE model study the effect of decreased food aid imports with and without compensating balance of payments support as two of the policy scenarios. Though the model is different in structure, its simulation outcomes are similar but with smaller effect. Dorosh et al. (2002) also find that continuous inflows of grain as food aid into the Bangladesh economy discourages rice production, while arguing that reduced inflows of grains should be compensated by aid in cash to allow the government to continue supporting the poor through income transfers.

For Ethiopia, Gelan (2006a,b) formulates a CGE model with food aid represented as an endowment injected into the economy as a perfect substitute to local food grains and without any costs to the recipients. The simulations compare food aid in kind, the cash equivalent of the costs the donor made to deliver the food aid (value of food aid on the market plus transportation costs), and the cash equivalent of the food aid received at local market prices. Here also food aid in kind is found to lower prices and to discourage local production.

Whereas all the contributions above take a static approach, food security naturally has an impact on expectations and through this on recipient behaviour, especially since individuals will try to avoid hunger by all means. Coate (1989) formulates a formal two period model, with decisions made in period 1 on consumption affecting the probability of survival in period 2. The model treats the possibility of famine as a catastrophic risk, by including a threshold level on consumption below which the probability of survival is less than one, and decreasing as consumption drops below the threshold. Another major innovation in this model is that it explicitly identifies the donor as an agent who seeks to minimize the prevailing level of mortality, subject to a budget constraint. The weakness is, however, that analytical results are obtained at the expense of theoretical rigor, with all incomes taken to be in cash and hence non-responsive to any price changes. It is found that, if food is exported from the region, cash relief is optimal as long as traders do not collude and are relatively efficient in transporting the food to the region. If food is imported into the region, then cash relief is to be preferred if traders are more efficient than the relief agency and do not have market power. The key point is that whether to opt for food aid in cash or in kind depends on the market conditions and circumstances and is definitely not a matter for ideological debate.

Entitlement and taxation through insurance

While the literature on food aid distribution under uncertainty is remarkably scarce, the branch on improving distribution of entitlements under uncertainty and associated taxation has been blooming in recent years, particularly through papers on semi-commercial crop

insurance, with indemnification generating entitlements and premiums-cum-aid playing the role of taxes in the funding of the arrangement. To reduce the monitoring costs the proposed arrangements are making use of index-based indemnification schedules depending on easily measurable variables on prices and rainfall, rather than on individualized post-harvest damage assessments. Pilot studies have been carried out in a selection of developing countries, including Mexico (Skees et al., 1999), Morocco (Skees et al., 2001), India (Kalavakonda and Mahul, 2005; Veeramani et al., 2005), and Malawi (Hess and Syroka, 2005), with mixed results so far. Remarkably, the delivery side is absent from these investigations, presumably because the current proposals are only targeting very small fractions of the rural population.

Dercon and Krishnan (2003) is one of the few papers directly linking insurance to food aid. For rural Ethiopia, the authors conclude that food aid inflows have reduced traditional risk sharing, by reducing the risk of being non-insured. This may not be a negative development, as it is increasingly being recognized that the poor often have to be very risk averse, which leads them to opt for low-risk, low-return livelihood strategies that leave them in poverty (Dercon, 2004, Carter and Barrett, 2006, FAO, 2006). In such a situation, food aid or insurance might encourage them to engage in more activities whose returns combine higher expected value with higher variance.

Summarizing

The above review is necessarily incomplete but a few conclusions can be drawn from it. On the one hand, the regression-based impact assessments essentially serve to inform the donor whether the money was well spent and on how to improve the mode of delivery. They tend to apply reduced forms that neglect endogeneity, and, therefore, might tend to attribute to the mode of food aid delivery impacts that should in fact be attributed to the forces that triggered the operations, often political unrest, drought, poor governance etc. Since food aid is increasingly distributed under emergencies only, this is to a large extent inevitable. At the same time it must be noted that for many indicators the cost of data collection is minor and hardly competes with additional deliveries to the needy.

On the other hand, policy makers and WFP-staff need more than ex post assessments alone. To plan effectively, they can also benefit from use of policy simulation models that may inform their choices. We have seen that such models have been developed in the past but it would seem that modern techniques could be relied upon to construct decision support tools that are better tailored to the planners' needs. Such tools should have the capacity to capture the key elements of food security managements. First, there is uncertainty itself. Food security is a risk management issue that needs to take into consideration that the future is unknown. It has to plan under uncertainty, and design prevention as well a coping mechanisms, such as stockholding, procurement in other locations, and indemnification through insurance arrangements. Second, all elements of the triad should receive due attention: the entitlements to avoid vulnerable groups being left out or receiving inadequate entitlements; the delivery to see to it that the entitlements are sufficient to buy the necessary food without price hikes causing additional undernourishment for non-participants; and finally, the tax-side, which should be developed in sufficient detail to show ways for the beneficiaries to contribute to the arrangements and eventually take charge of the arrangement,

so as to give local government institutions a chance to assume their responsibilities again and develop sufficient support among the population.

6. Towards a decision support tool for WFP

We conclude from the previous sections that the effective management of the triad of entitlements, delivery and taxation is a subtle operation that has challenged policy makers ever since the expulsion from the Garden of Eden. In Egypt, a very fertile soil, a most reliable rhythm of the seasons and a tight central control could not prevent calamities leading to famine. In Sinai and in the Promised Land, famine could not be eliminated, despite greater decentralization and reliance on free markets. Through excessive emphasis on the question of cash versus kind, debates have become unnecessarily polarized. These debates result in unwarranted attempts to formulate unified rules, where adaptive tailoring the solution to the specificity of the prevailing conditions should be the principle. In this section we present a theoretical framework for modelling the triad, and also describe the present status of a spatially explicit model for food aid deliveries in SSA, which is currently under construction in a co-operative venture between our institute (SOW-VU) and WFP.

Modelling the triad: theoretical framework

A theoretical framework may serve food security management in two ways. One is to describe how the various components of food security interact logically, in time and space, and how financial aspects relate to physical flows and satisfaction of needs. The other is to provide the underpinnings for the applied models that operate a food security decision support system. Though abstract, the theoretical framework has the major advantage that it sketches the scene without requiring construction of a database that in this field of investigation is bound to be incomplete and unreliable.

As theoretical framework, we use a single period welfare program in Negishi format with interdependent utilities representing empathic consumers, as a special case of the model specified and analysed in Ginsburgh and Keyzer, 2002, ch. 9, p. 330-336; we refer to this source for proofs and technicalities. Empathy drives consumers to care for the well-being of others in an uncertain future. This makes them willing to exhibit solidarity.

The model comprises donors as well recipients, characterized as consumers indexed i , $i = 1, \dots, I$. Each consumer maximizes a single period utility function with planning decisions made at the beginning of the period and uncertainty revealed at the end before coping decisions are made. Care for the own uncertain future find reflection in the curvature of this function. Each consumer I may also seek to avoid utility of any other consumer h dropping below some threshold. We represent this by supposing that consumer i attributes a non-negative empathy weight ρ_{ih} to the fate of consumer h , $h \neq i$. On the supply side of the economy, producers indexed j , $j = 1, \dots, J$, operate a convex technology under decreasing returns to scale, buying inputs at the beginning of the period and obtaining outputs (crops) subject to uncertainty, at the end of the period. The resulting welfare program reads:

$$\begin{aligned}
& \max_{x_{i0}, x_{is}, v_j \geq 0} \sum_i \alpha_i \left(\sum_s P_s \left(u_i(x_{i0}, x_{is}) + \sum_{h \neq i} \rho_{ih} \min(u_h(x_{h0}, x_{hs}), \bar{u}_h) \right) \right) \\
& \text{subject to} \\
& \sum_i x_{is} \leq \sum_j q_{js}(v_j) + \sum_i \omega_{is} \quad (p_s) \\
& \sum_i x_{i0} + \sum_j v_j \leq \sum_i \omega_{i0} \quad (p_0)
\end{aligned} \tag{1}$$

where subscript s refers to the possible states of nature, i to the various consumers donors as well as recipients, h is an alias for i , when looked at as possible a recipient of aid; P_s is the probability of occurrence of state s , α_i the welfare weight of consumer i ; $u_i(\cdot)$ is the strictly concave, differentiable utility function of consumer i , with arguments x_{i0} for beginning of period consumption and x_{is} for end of period consumption in state s ; \bar{u}_h is the threshold on utility below which assistance is required; $q_{js}(v_j)$ is the strictly concave production function of firm j in state s , with inputs v_j bought at the beginning of the period, ω_{is} are the state-specific endowments of the consumers, and ω_{i0} the endowments at the beginning of the period. Finally, Lagrange multipliers associated to the commodity balances (in brackets) are the market clearing prices p_0 and p_s . All vectors $(p_0, p_s, q_{js}, v_j, x_{i0}, x_{is}, \omega_{i0}, \omega_{is})$ are of dimension K ; commodities have subscript k , the number of commodities in the economy. Hence, care for the own fate finds reflection in the first utility term in the objective of (1), with risk aversion expressed via the curvature of the utility function, whereas empathy enters via the second term and is taken to remain effective only as long as utility does not exceed the threshold. The associated budget constraint for consumer i with utility above threshold is now:

$$\sum_s p_s^T x_{is} + p_0^T x_{i0} \leq \sum_j \theta_{ij} \left[\sum_s p_s^T q_{js}(v_j) - p_0^T v_j \right] + \sum_s p_s^T \omega_{is} + p_0^T \omega_{i0} + T_i, \tag{2}$$

where T denotes the transpose, θ_{ij} is the share of consumer i in the profits of firm j , and T_i a cash equivalent transfer from the donor minus the tax to fund arrangements. Hence, (net) donors will have negative and (net) recipients positive T_i -value. Determining this transfer is a somewhat technical but computationally straightforward matter, essentially amounting to treating the well-being of the recipient as a public good, to which every recipient consumer contributes by Lindahl-pricing of consumptions x_{i0k} and x_{isk} at discounted and probability weighted prices $\phi_{ih0k} = \alpha_i \rho_{ih} \delta_h \sum_s P_s \frac{\partial u_h(x_{i0}, x_{is})}{\partial x_{i0k}}$; $\phi_{ihsk} = \alpha_i P_s \rho_{ih} \delta_h \frac{\partial u_h}{\partial x_{isk}}$, where $\delta_h = 0$ if utility is above threshold and 1 otherwise; receipts obtained are treated as given. Hence, $\phi_{i0} = 0$ and $\phi_{is} = 0$ This defines the transfers:

$$T_i = \sum_h \phi_{hi0}^T x_{i0} + \sum_{h,s} \phi_{his}^T x_{is} - \sum_h \phi_{ih0}^T x_{h0} - \sum_{h,s} \phi_{ih s}^T x_{hs}. \tag{3}$$

Hence, model (1)-(3) provides a theoretical framework to represent the entitlement via budgets (2) and commodity prices from (1); the delivery via program (1) and the taxation via transfers (3) with marginal utilities obtained from (1).

We remark that premium payments for self as well as mutual insurance are also coming out of this model, and that a recipient of aid might also be a donor. Agents above the threshold ($\delta_h = 0$) receive no assistance since the donor derives no marginal utility from helping them. During emergencies, they rely on the indemnification from the insurance they bought at the beginning of the period. Whether all utility levels $\tilde{u}_{hs} = u_h(x_{h0}, x_{hs})$ will, for all possible states s in the solution reach these threshold depends on the empathy-coefficient ρ_{ih} as well as on the own thriftiness of the recipients and their willingness to take precautions (the curvature of the utility function).

A food crisis can be represented in this framework by assuming that in the state s that materializes, the value of endowments of some consumer i is very low, either because the quantity produced is deficient, say, with assets destroyed by disaster or war, or because the price of the endowments is very low, as in Sen's Bangladesh case discussed earlier (Sen, 1981a,b) with demand for the labour power of the landless and rural wages falling dramatically.

Regarding market imperfections, we note that budget equations (2) suppose that the consumer is perfectly able to smoothen consumption over time, by borrowing or lending, or by maintaining stocks. The opposite situation with zero borrowing can be accounted for via separate budgets for every state s , and state-specific welfare weights α_{is} . In this case, the individual will need more aid, as few coping options are left. This confirms that, improving the borrowing and lending operations may be as important as looking after food security directly, since it is key to the entitlement side of the issue.

Note that in this model selfish agents can free ride on others. It remains an open issue whether solidarity should be purely based on voluntary transfers as is done here in the Sinai-tradition via the purely subjective empathy coefficient, or imposed via some moral rule but clearly, it seems unsafe for vulnerable populations to put full trust on foreign donors, if only because even WFP almost fully depends on pledges made in reaction to alarming news, often under pressure from the public, and, therefore, too late for many of the victims of the disaster at hand.

Furthermore, the model illustrates that for the efficient solution of (1)-(3) to be attained, many institutions should be in place, in particular strong law enforcement to protect property rights i.e. enforce respect of budgets. This calls for a well respected leadership that can act without excessive repression. Hence, self-management of social safety is critical for more reasons than economic efficiency only. It should be clear to local government authorities that the donor will leave soon and that urgent action is needed to assume the tasks temporarily taken over by the donor's "intensive care". Clearly, like any good doctor, the donor should help the patient in reassuming his autonomy.

It would be naïve, however, to assume that dictatorial or fully corrupt regimes can be forced to change course in this way. Yet, we would argue that the current donor practice of

channelling aid through NGOs in such cases may act as a further undermining of the legitimacy of local institutions, possibly also those with agents acting in good faith. In short, good governance is both product and input of adequate food security management in all three elements of the triad.

Implications for donor presence

So far, the discussion suggests that the donor should keep distances and not be very visible in the recipient country. It also points to a dilemma: the donor should be well informed, and often act as substitute for the market's Invisible Hand when local market infrastructure fails. This means that very many data should be collected and that well-calibrated models should be made operational so as to avoid various failures in entitlement, delivery and financing aspects of every operation.

Besides guiding the operation, this will also help offering the necessary transparency to the donors, short of which their willingness to pay might erode, in terms of the model because of the uncertainty on their part that financial contributions actually help. Specifically, and admittedly somewhat in the margin of our main argument, we remark in relation to WFP that the organisation should go beyond offering well documented reports on its physical deliveries. It should, in addition, provide comprehensive analytical accounts of its management of financial resources, for example give perfect clarity as to the relation between its operations in local currency and the donor contributions in foreign exchange. Currently, funds donated in USD are used for local purchases of goods and services, obviously via the prevailing local exchange rate. Yet, in accounting, the official UN exchange rate is applied to convert costs in local currency back to a USD financial report. This obviously leads to accounting differences. At a practical level, this means that WFP should hold a permanent account in domestic currency from which local purchases can be made. Moreover, continued presence is also needed in situations where WFP seeks to assist beyond emergency relief, also in prevention of disasters and in reconstruction. This could obviously conflict with any principle of leaving as soon as the situation permits but it does not have to. WFP could maintain presence but its role and status should be a technical one, in support of the reconstruction of local institutions as much as of local infrastructure.

Applied model: Optimal food aid provision in SSA

Applied policy simulation models are key ingredients in performing this technical role, as a component of decision support systems. We end with a brief overview of such a model, as designed in a joint research project of WFP and SOW-VU.

Within theoretical framework (1)-(3), the most demanding component is obviously welfare program (1) that covers the delivery elements of food security management. When moving to application of such a framework, the first step is to make the index sets of consumers i , producers j , states s , and commodities k explicit. At this stage, the spatial dimension becomes critical, because circumstances (weather conditions, population densities, soil qualities etc.) vary strongly across space in SSA as much as elsewhere, and especially in SSA because the food aid may have to be procured very far from the deficit areas, and transport infrastructure

is deficient. Therefore, the model developed in this project is SSA-wide and distinguishes over 250,000 separate sites, points on grid of 5 arc minutes resolution (about 10 x 10 km).

In its present formulation the model considers the ex-post solution of (1)-(3) in any particular year, after uncertainty (essentially about production levels) has been revealed, and seeks to identify optimal coping strategies through routing of commercial as well as food aid flows across the continent. It generates consumption, production and trade of food for each cell on a grid, distinguishing between local food (produced by farmers for own consumption), commercial food (produced for sale), and food aid. At every cell on the grid, consumers buy each commodity, if available, depending on the prevailing market clearing price and on their purchasing power. Food aid in cash is represented as a general increase in purchasing power of (a sub-group of) consumers, food aid in kind as a specific increase in the power to “buy” the commodity food aid only. The model can generate efficient transport flows consistently over the entire grid, for a given configuration of freight costs, inclusive of tariff and non-tariff barriers and within the capacity constraints imposed by the available transport infrastructure. The model uses dedicated algorithms and software is now fully calibrated to represent the year 2000.

Regarding the data underlying this model calibration, the estimated calorie intake in 2000 is derived from data on women’s and children’s weights in Demographic and Health Surveys (DHS, 2006). Calories are obtained from three sources: locally produced goods, commercially traded food and food aid. Figures 6a and 6b indicate the share of commercially traded goods and food aid in total consumption, respectively. Figure 6a confirms the generally shared view that Africa is not a well-integrated continent and people still are largely dependent on food produced in the immediate surroundings; commercially traded goods are only important along the West-African coast, along the south-east coast and in the most densely populated areas in Ethiopia. In figure 6b, the particularities of the year 2000 are shown, when there was a major drought in the Horn of Africa. Hence, the share of food aid in total consumption was close to 1 in those areas. Other major areas of concentration of food aid are parts of Angola, and refugee camp sites scattered across the continent.

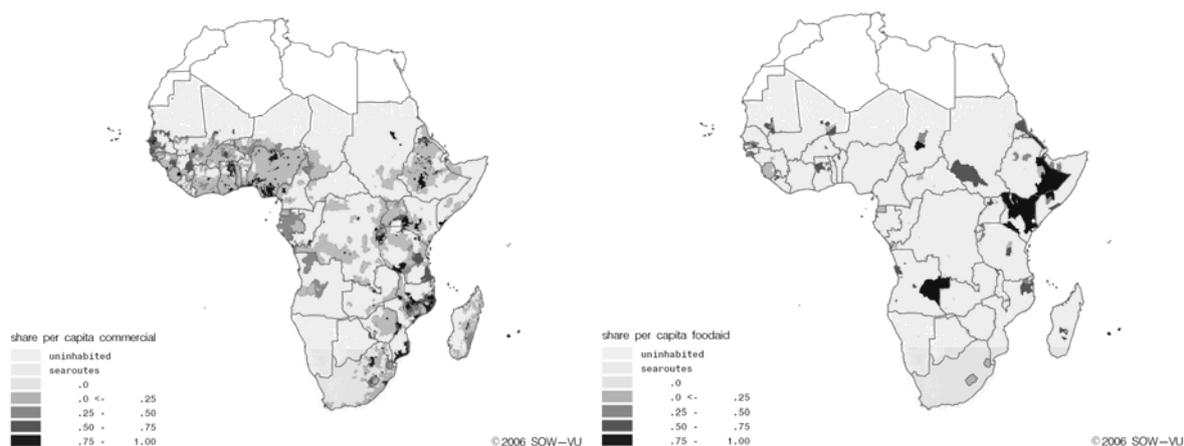


Figure 6a, b: share of commercial consumption and share of food aid in total consumption

Turning to model simulation, the issue is where to obtain the food from and how to route it at lowest cost to its destination. Figure 7 depicts the optimal flows of food aid, where the

recipients are predefined by the database for the year 2000, but the routes followed and the locations of procurement or import are determined endogenously by the model.

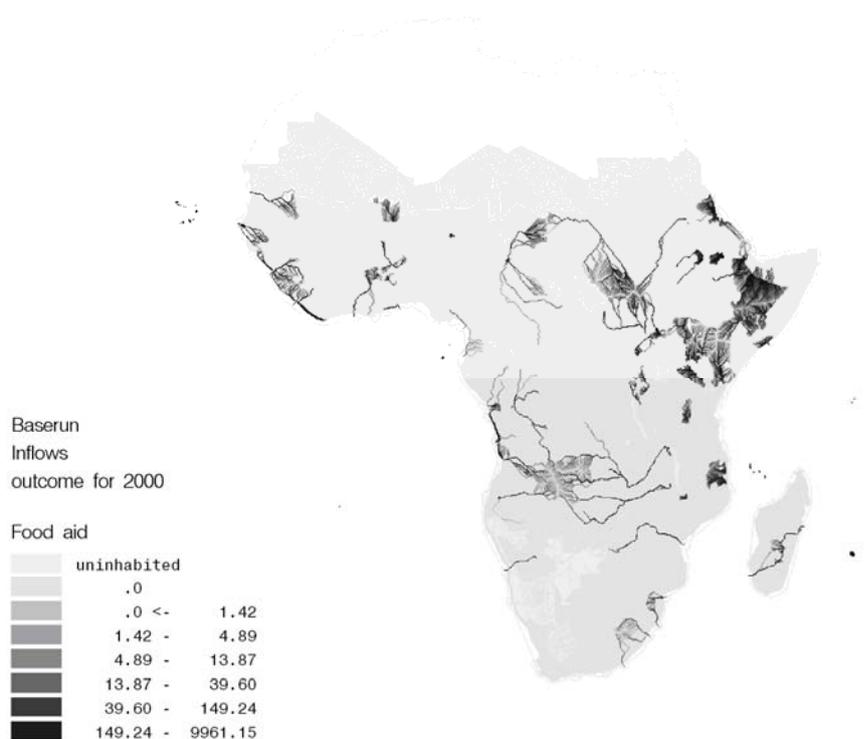


Figure 7: inflows of food aid

7. Concluding remarks

Emergency food aid does not solve the poverty problem, but it helps the needy when nothing else works. It is always given under circumstances of upheaval and unrest, when no time is to be lost, and when careful data collection and policy analysis should not stand in the way. Nonetheless, precisely because it deals with the most vulnerable segments of the world's population, the field deserves extensive research, to inform decisions better, to avoid capture of the subject and pro and cons of its implementation by various interest groups. The choice to be made should not be ideological. While those dispensing aid should be given a free rein, without excessive administrative burden, the food aid planners in the background should be given the means to act on the basis of sound empirical data within a state-of-the-art analytical framework.

At each emergency, the approach to be adopted should be chosen afresh but quickly, on the basis of a good understanding of the causes of the crisis as well as on the quality of the locally available physical infrastructure and the state of the social institutions. For this, the planners would seem to need decision support tools that are more up-to-date than those they rely on at present.

At the core of food aid provision lies the issue that it involves foreign intervention, which needs local presence to be well informed and effective, and at the same time has to recognize

that dealing with present and future food crises is primarily the responsibility of local authorities. Letting outsiders take up this responsibility may be natural in the wake of extreme events such as tsunamis, but even then the local authorities should remain in charge whenever possible, at least in the perception of their constituencies, short of which local governance will be undermined. This is not to deny that incumbent regimes are often more part of the problem than of its solution. Yet, in our view the lessons learnt since Egypt and Sinai must be that reconstruction after disaster relates to social as much as to physical infrastructure, and that the donor community, when disengaging from a place, should help building up a local governance that pays due attention to food security and attaches equal importance to all elements of the triad.

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