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Food Sector Instability and Food Aid in Sub-Saharan Africa

Implications for Food Security

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Food Sector Instability and Food Aid in Sub-Saharan Africa

Implications for Food Security

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Foreword

This report has been prepared to provide an overview of how food assistance may be used by Missions within the Africa Bureau of the U.S. Agency for International Development (USAID) to reduce food sector instability.

USAID has had a special emphasis on reducing African food insecurity since 1987, when Congress passed the Development Fund for Africa (DFA) legislation. In much of Africa, food production and prices fluctuate widely both seasonally and between years. This fluctuation is associated with large variations in income and consumption.

Although the consequences of moderate short-term food shortages among generally well nourished populations are not very severe, transitory hunger has detrimental long-term consequences for child survival and welfare among the chronically food insecure. Food sector instability not only worsens nutritional and health status; it also undermines long-term developmental efforts. It creates additional costs and leads to household strategies that, while necessary for survival in the short term, endanger sustainable development in the longer term. For these reasons, food sector instability and its consequences have become a key concern for African policy makers.

USAID has long encouraged the integration of food and development assistance. The objective of this technical paper is to better understand the causes of food sector instability in Africa. This report outlines strategies for making external assistance, particularly food aid, more effective in mitigating instability and alleviating the short- and long-term effects on food security.

This particular technical report has been prepared by Jaako Kangasniemi, John Staatz, and Cynthia Phillips of Michigan State University. Melanee Lowdermilk, the Africa Bureau Food Security Advisor, was instrumental in providing the analytical leadership for the Food, Agriculture, and Resources Analysis Division of the Africa Bureau's Office of Analysis, Research, and Technical Support (ARTS/FARA).

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John M. Staatz
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Glossary of Abbreviations and Acronyms

CMDT	Compagnie malienne de développement textile (extension service, southern Mali)
CV	coefficient of variation
DFA	Development Fund for Africa
FEWS	Famine Early Warning System Project
FAO	Food and Agriculture Organization of the United Nations
MSU	Michigan State University
OHV	Opération de la Haute Vallée (Mali)
OPAM	Office des produits agricoles au Mali (Malian grain marketing agency)
USAID	U.S. Agency for International Development
WFP	World Food Program

Executive Summary

Instability in food production, prices, and incomes of the poor is characteristic of much of Africa today. In the context of low productivity and poverty, the consequence is food insecurity. Famines remain a real threat to millions, and many more experience periods when they do not get enough food for a healthy, active life. In some African countries, most people at least periodically are food insecure.

The purpose of this paper is to provide a better understanding of the causes of food sector instability in Africa and its consequences for food security. The paper then discusses policies the U.S. Agency for International Development (USAID) can follow, particularly concerning the use of food aid, to (*a*) reduce food sector instability and (*b*) mitigate its adverse consequences. The paper reviews literature on the causes and consequences of food sector instability and draws on research conducted by Michigan State University and collaborating institutions under the Food Security in Africa Cooperative Agreement.

In Africa, food sector instability is closely related to transitory food insecurity, because the normal levels of availability of and access to food are so low. Instability causes food insecurity primarily among the poor, who have narrow margins of survival and limited opportunities to smooth their consumption through credit, savings, or other means. The key underlying problem is low productivity, particularly in agriculture, where most of the continent's poor people earn or fail to earn their living.

Instability also retards development by increasing the risks of input use and specialization, and by periodically decapitalizing the farms as the poor households are forced to sell their productive assets during droughts or other difficulties. By perpetuating low productivity and poverty, these both contribute to chronic food insecurity and make people more vulnerable to transitory problems.

While weather—in particular, variation in rainfall—is the main cause for production instability, civil disruptions and unstable public policies also play an important role. Food aid can reduce production instability by promoting stable policies and by supporting yield-stabilizing agricultural research, investments in water control techniques, etc.

Variations in local production need not destabilize local prices if trade, processing, or storage can be used to integrate markets geographically, across products, or over time. Extreme food price instability in much of Africa is largely a problem of poor market integration caused by the high costs of trading, storing, and transforming food. High trading costs are caused by poor roads and bridges; missing communication channels and facilitating institutions such as grades, standards, and market information systems; and arbitrarily enforced restrictive policies. High storage costs are largely determined by costly capital, which is a consequence of high risks and underdeveloped capital markets.

Instability in food production and prices creates food insecurity only to the extent that it destabilizes or reduces people's real (subsistence of cash) incomes and access to food. Production shortfalls reduce incomes not only in agriculture but also in the rural nonfarm economy that supplies farmers with inputs and consumption goods and markets agricultural products. High food prices reduce real incomes not only among urban consumers but also among the rural poor, many of whom are net buyers of

food, particularly in bad years. Especially vulnerable to droughts are pastoralists. Their livelihood is largely restricted to the most drought-prone areas and based on the exchange of meat and milk for grain that provides cheaper calories. During droughts, the terms of that trade tend to collapse.

Efficient use of food aid to reduce food sector instability and to mitigate its consequences requires indicators that provide guidelines for appropriate timing, identify the areas and households at risk, help to assess the performance of various activities supported with food aid, etc. Different needs call for different indicators, and using indicators that are appropriate for one purpose (such as total production as a guide of total food aid shipments) to guide other decisions (such as the allocation of food aid between households or regions), may render food aid ineffective.

Using food aid to compensate for shortfalls in domestic food production can stabilize supplies and prices but requires flexibility and timeliness from donors and recipient governments. The current trend toward multiyear food aid commitments is a welcome change if it makes food aid more predictable and less dependent on variations of donor country production. However, for stabilization, it is not enough. Price stabilization calls for commitments that are not fixed but *are contingent on production or prices in recipient countries*. By making commitments that let certain indicators automatically trigger additional food aid shipments, donors can speed up their action and increase the contribution of food aid to price stability. In some countries, donors and governments could go further and at least experiment with a commitment to bring enough food aid to keep prices below preannounced ceilings.

Another way of stabilizing prices with food aid is to support investments that improve market integration by lowering the costs of marketing. Rural roads and bridges, market information systems, and appropriate grades and standards are among the investments that often have high benefits relative to the costs.

A third approach to price stabilization with food aid consists of supporting policies that stabilize prices. Liberalization of food marketing is a prime candidate for stabilizing policy reforms, because in many countries restrictions on food trade, processing, and storage increase costs, reduce competition, and prevent consumers from choosing low-cost foods. Since abrupt policy changes themselves are destabilizing, support for gradual and early reforms in unsustainable sectoral and economy-wide policies also can be a good way of stabilizing prices with food aid.

Emergency food aid that is used to mitigate the consequences of instability rather than to reduce it, has often concentrated narrowly on the immediate impacts on human welfare and ignored its potential to promote long-term development. This is partly a consequence of inadequate preparedness, which has forced donors to rely on emergency camps and kitchens instead of on more constructive approaches. Even when food aid has been used to support food-for-work projects, the emphasis has often been on food distribution rather than on the productivity and quality of work. At the same time, the normal public works agencies have pursued their separate capital- and skill-intensive approaches with little consideration on temporary employment of unskilled workers.

Since productive labor-intensive projects take much more time to plan than emergency camps, they can become the dominant form of emergency assistance only if they are planned in advance for emergency implementation. To make the projects more productive, the dual structure of public works that use highly capital-intensive methods and donor-supported food-for-work projects that use very little nonlabor inputs needs to be replaced by an integrated, appropriately labor-intensive and flexible structure. Such organizations have been established in some African countries and deserve more help from donors.

Efficient use of food aid requires accurate information on the food sector issues in recipient countries. Given the paucity of empirical data in most African countries, policy-relevant research is a high priority. If conducted in collaboration with local institutions, such research

1. Introduction

1.1. Problem

In much of Africa, food production and prices fluctuate widely both seasonally and between years. This is associated with large variations in household real incomes and consumption. As discussed below, these variations, jointly known as food sector instability, are closely linked to each other.

In the context of low productivity and widespread poverty, large variations mean that many people do not always get enough food. In Africa, roughly one-third of the population may suffer from food insecurity. The Food and Agriculture Organization (FAO) projects that the number of undernourished Africans will increase to nearly 200 million by 2000 (Alexandratos 1988).

Although the consequences of moderate, short-term food shortages among generally well nourished populations are not very severe (Payne 1989), transitory hunger has detrimental long-term consequences for child survival and welfare among the chronically food insecure (von Braun and Paulino 1990). Besides worsening their nutritional and health status, food sector instability also undermines long-term development efforts. It creates additional costs and leads to household strategies that, while necessary for survival in the short term, endanger sustainable development in the long term.

For these two reasons, food sector instability and its consequences have become a key concern for development policies. For the U.S. Agency for International Development (USAID), improving food security is one of the four objectives of the Development Fund for Africa (DFA) action program.

1.2. Objectives and Layout for This Paper

The fundamental objective of this paper is to provide a better understanding of the causes of food sector instability in Africa and its consequences for food security. It then outlines strategies for making external assistance, particularly food aid, more effective in mitigating instability and alleviating its short- and long-term effects on food security. Reduction in year-to-year instability is the first specific concern under the DFA strategic objective of improving food security. The paper's discussion of instability and food aid also deals with many aspects of the three other concerns: increased famine preparedness, providing food and income to those most at risk, and increased agricultural production and utilization.

While chronically low levels of food availability and access are almost indistinguishable from the permanent problems of low productivity and poverty (Tweeten et al. 1992), *transitory food insecurity* can largely be attributed to instability in the food sector. Transitory food insecurity refers to temporary shortfalls in food availability, access, and utilization, and ultimately in food consumption and nutritional status. This paper begins in Chapter 2 by discussing how the chronic problems interact with instability and how they jointly produce food insecurity. With this road map at hand, Chapter 3 looks at the key aspects of food sector instability. It emphasizes how poor market integration across space, time, and different products contributes to price instability and looks at the role that nonfarm incomes play in helping people to cope with instability.

Using food aid to reduce food sector instability or to mitigate its impacts on food security requires indicators to measure the degree of

instability, to guide the use of food aid, and to assess performance. These are the subject of Chapter 4. Chapter 5 discusses how different types of food aid can reduce or mitigate food sector instability, review experiences and suggest where underutilized potential exists. Chapter 6 summarizes the paper's main points and presents its key policy conclusions.

2. Food Sector Instability and Food Insecurity

2.1. Transitory and Chronic Failures in the Availability of and Access to Food

Several links exist between food sector instability and *transitory* food insecurity. In the absence of offsetting imports, instability in production implies temporary shortfalls in food availability and periods of high prices. Low supplies and high prices reduce people's real incomes and access to food. If people have to migrate to cities and refugee camps their exposure and susceptibility to diarrhea, measles, and other diseases often increases, which means that also food utilization deteriorates.

At the same time, instability in the food sector perpetuates low productivity and poverty. Among other things, these impacts reduce availability of food and people's access to it in the long term. Long-term impacts both aggravate later temporary food crises and contribute to *chronic* food insecurity. Food sector instability both causes and is caused by low productivity and poverty, and it is the combination of instability, poverty, and low productivity that makes food insecurity such a widespread phenomenon in Africa.

Figure 1 illustrates the availability and access sides of transitory and chronic food insecurity. Transitory food crises are closely associated with food sector instability. Without offsetting imports, production instability implies periodic declines in local food availability, and variations in prices and incomes reduce food access. The three types of instability are interdependent. Chronic food insecurity is caused primarily by the key problems of the African economic landscape: low productivity and poverty. Low productivity means that domestic agriculture cannot make enough food available to the population. It also keeps people in poverty, which reduces access to food, whether domestically produced or imported. Transitory and chronic sides of the picture are related both because the chronically food insecure people are most vulnerable to the transitory problems caused by instability and because instability and the chronic problems reinforce each other.

The interrelationships between the three types of instability are discussed in the next chapter. This chapter proceeds with an elaboration of the links between instability, low productivity, and poverty.

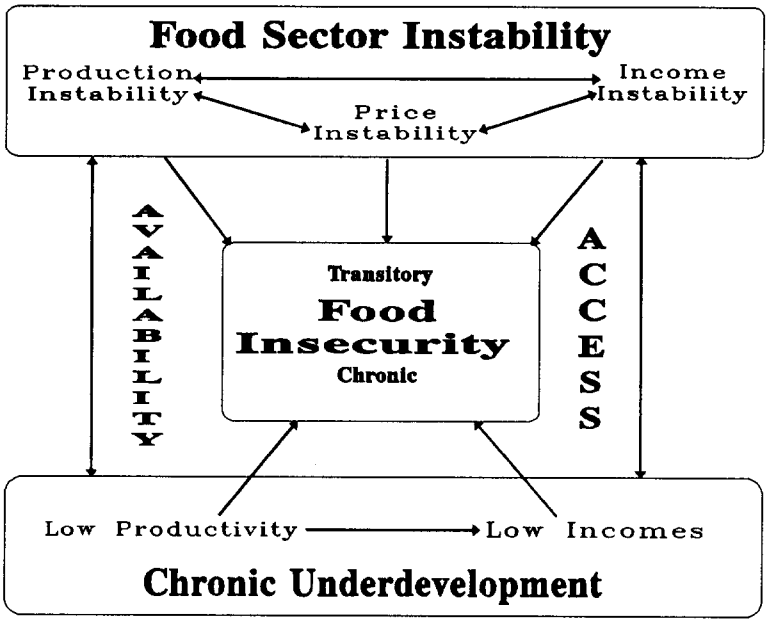
2.2. Instability, Low Productivity, and Poverty

Although poverty is closely associated with low productivity, many public actions can address one without necessarily improving the other. For instance, much discussion on food aid has concentrated on whether attempts to mitigate the consequences of poverty by providing poor people with additional entitlements to food has negative or positive impacts on production (Maxwell 1986; Srinivasan 1989). A key question in assessing agricultural research is how improved productivity affects poverty (e.g., Binswanger and von Braun 1991). The distinction between low productivity and poverty is important for us when we discuss the use of food aid to deal with food sector instability.

Poverty Increases Vulnerability

There are three distinct reasons why the consequences of food sector instability are particularly severe among the poor. First, their margin of survival is narrow. A proportional decline of, say, 10 percent in income that barely touches food

Figure 1. Dimensions of Food Insecurity



expenditures among the better-off groups can take the poorest groups below the threshold of sufficient access to food and other necessities.

Second, a large share of the (subsistence and cash) incomes of the poor goes to food. When food prices increase, a poor household faces proportionally larger declines in its purchasing power than does its better-off neighbor, provided that the two households are equally dependent on the market in their acquisition of food. The burden of adjustment falls even more heavily on the poor if they need to buy proportionally more in the market when prices are high (Mellor 1990; D'Agostino, Staatz, and Weber 1989).

Third, many mechanisms that the better-off households can use to smooth consumption fail for the poor. By definition, they have little to sell during difficult times. In general, the poor have no access to formal capital or insurance markets. If informal credit is available, it often carries high interest rates, primarily because of the high risks.

The poor also have limited opportunities to save for the "rainless day." Where formal savings institutions exist, they often pay negative real interest rates. Savings through the accumulation of wealth (animals, tools, jewelry) also may have negative expected returns because of high transaction costs and unfavorable price ratios (see discussion below on asset liquidation).

Reciprocal sharing among the kin or the neighbors is one way of compensating for failures in risk-related markets. Where incomes are highly covariant, such traditional safety nets may be grossly inadequate; sharing may not help much when neighbors and relatives are affected by the same droughts. There is also some evidence that traditional obligations may be eroding under the pressures of modernization, reliance on outside assistance such as emergency food aid, and population growth. Whatever the reasons, recent surveys in Ethiopia and Burkina Faso found that gifts did not play a major role in coping with drought (Webb and Reardon, 1992). Moreover, in Ethiopia, most gifts were received not by the poorest households but by their better-off (albeit still poor) neighbors.

Instability Perpetuates Low Productivity

The most direct link from food sector instability to low production is the low labor productivity caused by periodic malnutrition (Strauss 1986). Particularly during the critical preharvest hungry period, which often coincides with the period of hard agricultural work, lack of food can limit agricultural production (Kumar 1988).

In the long term, instability probably does more harm by leading to the loss of productive assets. The process of losing assets also may increase rural inequality, thereby creating more poverty than the productive impacts alone would suggest (see below).

Even more harmful may be the costs and risks that food sector instability creates for specialization in food production, cash cropping, and nonfarm activities. In the long term, productivity increases depend crucially on specialization and exchange in wider markets. Specialization not only means that people and regions concentrate on what they are good at and take advantage of economies of size. More importantly, specialization accelerates technical and organizational progress by making innovations and investments that embody them more profitable.

African food markets are dominated by the erratic sales of accidental surpluses. As prices and quantities traded vary widely, marketing becomes risky and assets specific to trading, transportation, storage, and processing of agricultural products are idle much of the time. Thus, per unit costs of marketing are high, implying high consumer prices, low producer prices, and little incentive to specialize (Staatz, Dioné, and Dembélé 1989).

The same logic applies even more forcefully to agricultural inputs and consumer goods farmers desire. When shortfalls in agricultural production and increases in prices reduce purchasing power, the poor use more money on food (though they get less). In general, their purchases of nonfoods collapse much more than those of food (Mellor 1978; de Janvry, Fafchamps, and Sadoulet 1991). This makes rural nonfarm activities very risky, which together with low volumes discourages specialized investments.

Besides risks, instability also increases transaction costs. Where yesterday's prices provide little guidance for today, buyers and sellers spend much time and resources to avoid bad deals. They haggle, walk far to compare prices, or trade only small quantities at a time. All participants incur high costs. Inefficient marketing increases the margin between the prices that consumers pay and those that farmers receive.[1]

Instability Worsens Poverty

Besides lowering agricultural production, instability redistributes wealth and income from the poor to the rich. Liquidation of productive assets such as livestock, draft animals, land, and farm implements is a prime example of the vicious cycle of rural differentiation initiated by transitory problems. During prolonged periods of food scarcity, the most food-insecure people frequently have to sell what little they have. In two of the most favorable zones of Mali (CMDT and OHV), most farm households were found to have experienced disinvestment in animal traction at least once (Dioné 1989). While animal diseases and lack of feed constituted the most common cause in the cotton zone (CMDT), food shortages caused by poor rainfall were a much more important cause for disinvestment in the zone where farmers' access to extension and credit is worse (OHV, particularly its northern part where rainfall is more variable).

Where markets are thin, the prices of the assets that people liquidate tend to be seriously depressed while food prices soar (Teklu, von Braun, and Zaki 1991; de Waal 1989; FEWS Project 1992). When the immediate food crisis is over, the trends are reversed. Crop prices decline

1. Although farmers lose because of price instability, traders may not gain. First, traders suffer from instability, too. Second, high margins are likely to attract more people into trading, reduce the volumes of each, increase the per unit costs of marketing, and drive down profits. High risk-adjusted profits are likely only when entry to trading is somehow restricted.

and asset prices increase. The reaccumulation of assets is difficult also because the distress sales have reduced productivity and incomes. This has been a serious problem in the Sahel, where asset losses in the early 1980s due to drought have reduced people's ability to cope with subsequent crises (D'Agostino and Sundberg 1992; Campbell 1990; von Braun, Teklu, and Webb 1991).

Even in normal years, seasonal price instability hurts mostly the poorest households. Many of them are buyers in the preharvest season when prices are high. To repay loans and to meet pressing cash needs (e.g., taxes) they often sell some grain after the harvest. Thus, high seasonal price increases redistribute income from these households to the largest net sellers, who often sell late in the season. A simulation using data on grain transactions in Mali found that a credit program for traders and village associations that reduces seasonal price increases helps mostly those households that both sell and buy cereals during the year, although also households that only buy would benefit from increased price stability (D'Agostino, Staatz, and Weber 1989).

Instability also may contribute to rural differentiation through wage employment. While paid employment is precisely what many poor people would need but cannot get, it can be a necessary evil for poor farmers. After bad years, immediate food needs may force poor farmers to work for others even during the peak agricultural season when their labor would be most needed on their own fields.

Migration is a frequent response to agricultural instability, particularly in West Africa. Usually it is a sensible coping strategy, but it also can cause severe long-term problems such as outbreaks of diseases. Hunter (1988, 133) reports that in northern Ghana and elsewhere in West Africa there is "a history of cyclical advance and collapse of human settlement" from crowded and overcultivated uplands to unused riverine lowlands: "The forces of famine drive settlers into empty and inviting valleys, where, 20 years later, the forces of riverine disease, such as onchocerciasis (river blindness) and trypanosomiasis (sleeping sickness), begin to take their deadly toll, leading eventually to the collapse of village life." In today's Africa, food sector instability often causes temporary and permanent migration to urban slums and emergency camps, exposing people to contagious diseases, such as measles (de Waal 1989). Also, the rapid expansion of AIDS to rural areas is closely associated to the temporary migration of young men to cities.

2.3. Multiple Uses for Food Aid

The strong interactions between instability, low productivity, and poverty suggest that policies to deal with instability should not be considered in isolation. On the one hand, reduction in the instability of supplies, prices, and incomes not only improves food security directly but also helps indirectly by raising productivity and reducing poverty. On the other hand, stabilization policies may not be the most cost-effective way of using resources to improve food security. Depending on the situation, other approaches through projects and policies that raise productivity and/or reduce poverty may give more "bang for the buck."

In principle, food aid is a resource transfer that can be used to support almost any development project or policy. While shipping food aid where and when domestic harvests fail may seem to be the obvious way of using food aid to improve food security, it is only one alternative among many others, and not necessarily the best use of the resource. In this paper, a wide variety of ways to use food aid to reduce food sector instability or mitigate its impacts are considered. Although not exhaustive, the review emphasizes some underutilized options.

3. Key Aspects of African Food Sector Instability

3.1. Production, Price, and Income Instability

Production Instability

The main source of production instability in most of Africa is unstable weather, particularly variable rainfall. Other natural sources include attacks by pests and outbreaks of plant and animal diseases. Wars and civil unrest are a major man-made source of production instability through their impact on availability of inputs and access to markets. Other man-made sources include changes in government policies and changes in farmers' expectations regarding prices and other production incentives. Man-made sources often exacerbate weather-induced instability, for instance, when political instability discourages investments in water control and other things that would "drought-proof" agriculture.

While rainfall is the undisputed main source of instability in much of Africa, the role of man-made causes is difficult to assess. In industrialized countries, this assessment if often done by attributing production instability to yield instability and area instability (e.g., Dalziell 1985 for the United States). The key assumption is that while variation in yield is caused by the vagaries of weather and other factors largely outside human control, variation in area reflects man-made causes. In many African countries, this assumption does not hold. In African drylands, planted areas also respond to weather, as farmers may plant less or not at all if rains are late or fail altogether.

The degree of production instability varies substantially between African countries. In general, areas with low average rainfall also suffer from irregular rainfall and high variability in production. While the humid regions of the continent are among the most stable in the world, both in terms of seasonal and interyear production variations, Africa's arid and semiarid regions represent the other extreme, with occasional year-to-year output changes of 40 percent or more (Valdés 1981). In total, Africa's food production varies more than that of other continents. For instance, in 1985 cereal production in sub-Saharan Africa increased by 25, percent and in 1987 it dropped by 17 percent compared to the previous year (World Bank and the World Food Program 1991).[2]

Price Instability

When *unstable supply* meets *inelastic demand* in *thin and isolated markets,* the resulting prices are highly volatile. This is the case in African staple food markets. In Zangasso, a major grain assembly market in southern Mali, for instance, the wholesale price of millet quadrupled between March 1987 and June 1988 (Staatz, Dioné, and Dembélé 1989).[3] Box 1 presents some empirical magnitudes.

Inelastic Demand

Demand is inelastic because staple foods are necessities. Consumers do not often substitute other goods for staple foods when their prices increase. When supplies decline, steep increases in prices are needed to reduce consumption, since the ad-

2. Since the quality of statistics on yields and areas planted in Africa is low (Lele and Candler 1981), the figures cited in this section are weak and should be interpreted cautiously.

3. The year 1987 saw record grain production in Mali, while in 1988 production was moderate (but certainly not poor).

Box 1: How Variable Are African Food Prices?

In the table below, the volatility of producer prices is characterized using the coefficient of variation (CV). This conventional measure of volatility is the standard deviation of a series divided by its mean and is expressed as a percentage. The CV is dimensionless but does not abstract from a trend.

Except for Mali, all data in the table are based on monthly observations of producer prices. In general, African cereal markets are considerably more volatile than aggregate farm prices in the United States. In some countries, cereal prices are even more volatile than U.S. prices for highly perishable fruits and vegetables. Unlike cereal markets in sub-Saharan Africa, the higher variability, and thus uncertainty, in U.S. fruit and vegetable markets is assuaged through various institutional structures.

Country	Crop	CV	Period
Mali	Millet*	16.2	1970–1988
Mali	Sorghum*	14.1	1970–1984
Mali	Rice*	9.7	1970–1984
Rwanda	Beans*	24.5	1971–1990
Senegal (Southeast)	Millet	27.8	10/84–12/89
Senegal (Southeast)	Sorghum	19.3	10/84–12/89
Senegal (Southwest)	Millet	27.5	7/84–12/89
Senegal (Southwest)	Sorghum	20.1	7/84–12/89
Chad (N'Djaména)	Millet	36.8	10/86–5/91
Chad (N'Djaména)	Sorghum	37.6	10/86–5/91
Chad (Abéché)	Millet	54.3	10/86–5/91
Chad (Abéché)	Sorghum	65.1	10/86–5/91
Malawi (Blantyre)	Millet	21.7	9/88–1/92
Malawi (Blantyre)	Sorghum	16.9	9/90–2/92
Malawi (Blantyre)	Beans	43.4	9/88–2/92
Malawi (Mitundu)	Beans	33.8	8/88–3/92
United States	Aggregate Farm Price	6.0	1/80–12/88
United States	Aggregate Fruit Price	28.0	1/80–12/88
United States	Aggregate Vegetable Price	14.6	1/80–12/88

* Consumer Prices (annual)
Sources: MSU, USAID/FEWS, USDA

justment must happen mostly through income effects.[4]

4. When people are very poor, price increases can "understate" the gravity of the problem. Droughts that reduce supply also reduce incomes, so that effective demand may decline even when needs increase. Demand that is not backed by purchasing power does not increase prices.

Thin Markets

In most of Africa, only a small fraction of total food crop production is marketed. Many rural households produce primarily for their own consumption and sell only accidental surpluses. Since farmers also have an inelastic demand for food, they retain most of what they produce in bad years and often become net buyers. Hence, not only

does marketed supply fall in years of poor production but market demand increases as well, exacerbating price volatility (Robert R. Nathan Associates 1988). Moreover, due to high transaction costs, some farmers who might otherwise sell or purchase small quantities do not participate in markets at all (Goetz 1992). This residual nature of African food markets means that the quantities farmers sell or buy in the market vary much more than the quantities they produce or consume.

Isolated Markets

When markets are isolated so that little trade occurs between them, variations in local production cause large swings in prices. Section 3.2 discusses the causes and consequences of poor market integration in African food markets.

Income Instability

Unstable production and volatile prices create food insecurity only to the extent that they destablize or reduce people's real incomes and access to food. To use Amartya Sen's (1981) terminology, hunger results from an entitlement failure: people are hungry not because food is unavailable but because they cannot obtain enough food.

There are three main links from low production and high prices to low incomes. First, poor harvests directly reduce farmers' subsistence incomes as well as the cash incomes of farm workers. Second, higher prices reduce the real incomes of those who are net buyers of food, including many rural people. Third, incomes in the rural nonfarm economy depend on farm production. When crops fail, there is less need for agricultural marketing and processing services and less purchasing power in rural areas. These links are elaborated below in section 3.4.

Figure 2 illustrates the main direct determinants of instability in food production, prices, and incomes, and the interactions between the three. The figure is not exhaustive. For instance, domestic policies and foreign aid that can affect almost all the elements of the figure, are not shown. These impacts are considered in Chapter 5.

3.2. Poor Market Integration across Products and Space

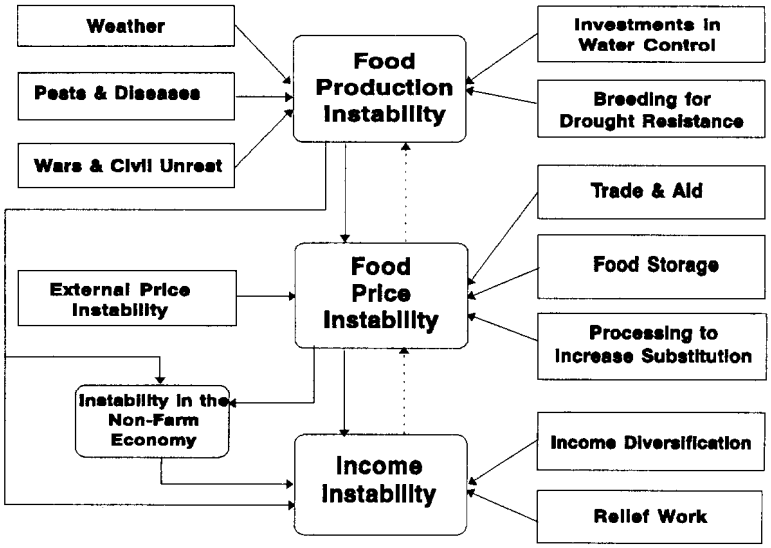
In isolated markets, shortfalls in local food production translate to reduced market supplies. Since the demand for food is inelastic, prices must increase sharply to equilibrate supply and demand. Through market integration, the burden of adjustment can partly be spread more broadly, either to other locations (in the country or abroad) or to other product markets. Since supply and demand shocks are not identical in different parts of the integrated market, they at least partly offset each other. This means that in the integrated market, supply and demand vary less than they do in the participating markets. Although it is possible that integration destabilizes some markets that become integrated, it reduces overall instability and stabilizes prices in most parts of the integrated market.

The degree of market integration depends on the costs of moving products from one market to another. These include both the costs of physical transportation or transformation activities and the costs of transacting—i.e., the costs of collecting information, negotiating and enforcing contracts, etc. An important source of price instability in Africa is the high level of such costs. This can be seen in the high margins between the prices people get when they sell and those they pay when they buy.

Wide Margins Destabilize Prices

Although traders throughout Africa are blamed for being exploitative, many studies have found food trading to be quite competitive (e.g., Mehta 1989). Marketing margins are wide primarily because the costs of marketing are high (Mehta 1989; Gabre-Madhin 1991; Dadi, Negassa, and Franzel 1992). Poor physical infrastructure makes transportation costly, and poor institutional infra-

Figure 2. Types of Food Sector Instability



structure, restrictions imposed by governments, and underdeveloped communication channels contribute to high transaction costs.

Wide marketing margins create price instability, particularly when the direction of trade changes (Jayne, forthcoming). At the local retail level, a household that switches from being a seller to being a buyer faces a large change in the price. When a local market switches from being an exporter to other markets to being an importer from them, wide margins between the markets produce a large swing in local market prices. The wider the margins, the larger is the price jump. Prices are usually most volatile in remote, poorly integrated areas that are roughly self-sufficient and frequently switch between surplus and deficit in a given product. As discussed in section 2.2, such instability perpetuates itself. Price volatility keeps households in subsistence production, which means that markets remain unreliable, investments in marketing remain unattractive, and volumes remain low. This keeps the margins high and the prices volatile.

But wide marketing margins increase instability even for those rural areas and households that consistently produce marketable surpluses. If, for instance, the mean wholesale price of millet in the capital city is 30 and the standard deviation is 10, a farmer who is separated from the market by a marketing margin of 10 faces a mean price of 20 and a standard deviation of 10 (assuming constant absolute margins). This means that prices are relatively much more variable at the farm level than they are in the capital city. In this hypothetical example, the coefficient of variation of the capital city wholesale price is 33 percent, while that of the producer price is 50 percent.

Figure 3 illustrates the urban/rural differences in price volatility in Mali. Between 1986 and 1991, the coefficients of variation (in percent) of monthly millet prices were much higher in the two rural markets (South CMDT and North OHV) than they were in Bamako, the main urban consumption center.

Figure 4 compares price volatility in four rural markets in Mali in 1986–88. It shows that millet and sorghum prices are most volatile in South OHV, an area that is roughly self-sufficient in foodgrains and poorly integrated with national markets. Prices are most stable in South CMDT,

Figure 3. Urban/Rural Millet Price Volatility in Mali

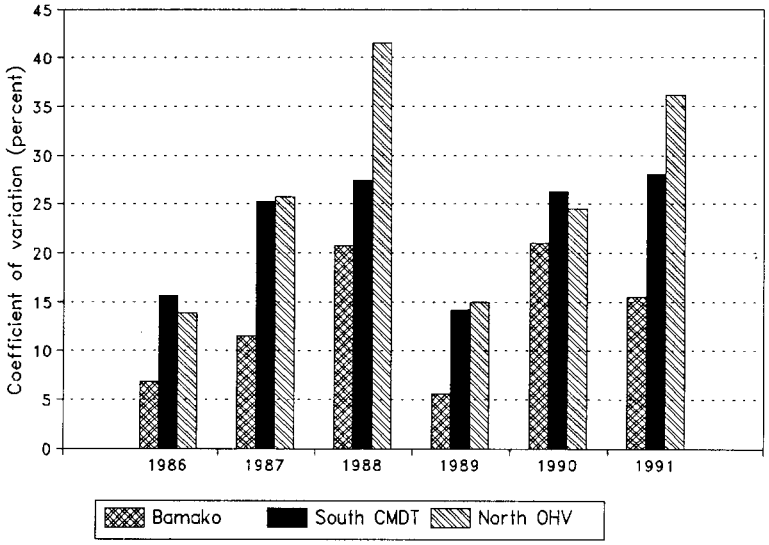
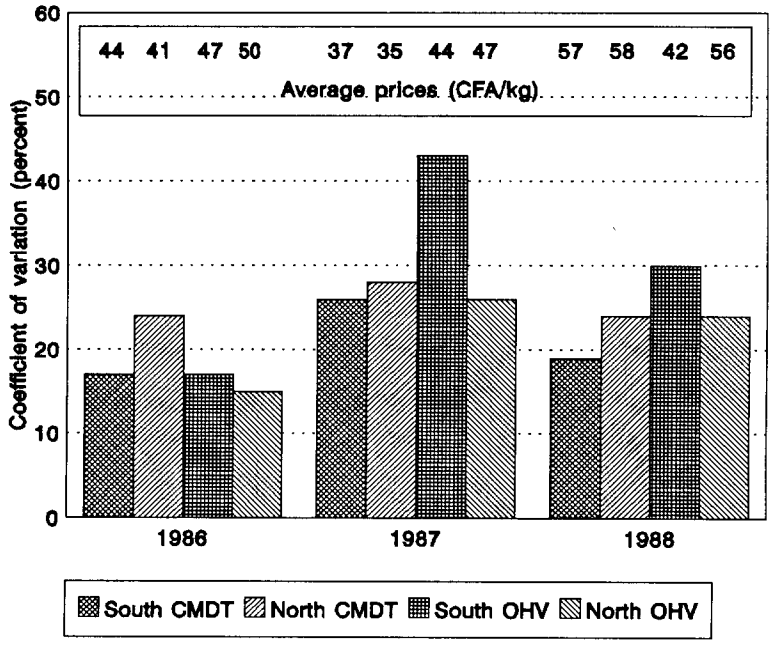


Figure 4. Millet Price Volatility in Four Malian Markets



a region that produces large surpluses and is well integrated with other markets.

Millet prices are more unstable in North CMDT than they are in North OHV. North CMDT is fairly well integrated and usually has surpluses in millet and deficits in sorghum. Due to the relatively low trading volumes and the occasional changes in the direction of the trade flows, prices vary more than in South CMDT. North OHV is chronically deficient in foodgrains and very poorly integrated with its import markets. Although absolute price changes are large, average prices are

also high. Therefore, CVs that measure *relative* volatility are lower in North OHV than in South OHV. This should not be interpreted to mean that poor people are less vulnerable to price instability in North OHV than they are in South OHV.

Foreign Trade Can Stabilize Domestic Prices

Just as integration to national markets usually stabilizes local supplies and prices, integration to international markets can stabilize national supplies and prices. In West Africa, for instance, year-to-year variation in regional grain production is significantly smaller than variation in most of the member countries (Badiane 1988). Improvements in regional integration could destabilize prices somewhat in the coastal countries, but they would significantly stabilize prices in the interior, where countries are more prone to droughts and where prices fluctuate widely.

Since foreign trade in food is strictly regulated throughout Africa, the role of foreign trade in price stabilization can be divided into two parts. In this section, trade liberalization is discussed, with the suggestion that, although it could help to avoid the extremes of high prices in many countries, it could not provide a very high degree of price stability and might destabilize prices in some countries. But, although unleashing private food trade alone could not stabilize much, managed foreign trade is an important stabilization tool for governments. Section 5.1 discusses the use of trade and buffer stocks in public price stabilization schemes, focusing specifically on the potential contribution of food aid.

Since the primary source of price instability in African food markets is instability in domestic production, the case for using imports and exports to stabilize domestic prices is strong. Where governments are restricting trade and not stabilizing prices themselves, it is likely that trade liberalization could do at least part of the task. For instance, it is unlikely that the 4-fold increase in millet prices in southern Mali in 1987–88 mentioned above, or the 10-fold increase in the sheep-to-grain price ratio in Darfur, Sudan, in 1984–85 (Teklu, von Braun, and Zaki 1991) could have occurred without restrictive trade policies.

However, although such policies are one source of food price instability in many African countries, their removal may not stabilize African food prices very much. The ability of international markets to stabilize domestic cereal prices is limited by four factors (Reardon, Pinckney, and Delgado 1987).

First, the import parity price is the world price *plus* the costs of transportation, handling, etc., whereas the export parity price is world price *less* these costs. In many African countries, these costs are large because of long distances, poor roads and ports, violence, corruption, etc. For landlocked countries, import parity prices for cereals can be twice the export parity prices. For remote areas and for perishable commodities, the differences are often so high that international trade never is a feasible option and the commodities are nontradable.

On the other hand, the costs of trade destabilize prices only if countries or regions alternate between being importers, self-sufficient, and exporters. This is true for maize in Zimbabwe, Zambia, Kenya, Tanzania, and Malawi and for sorghum in Mali, among others. Increasingly, however, African countries depend chronically on cereal imports. In many capitals and port cities, import parity prices are always the relevant border price.

Second, international food prices themselves are volatile, largely because many industrialized countries have stabilized their domestic prices by disposing of surpluses in the world markets—i.e., by exporting their instability to world markets. Grain trade liberalization in rich countries might increase the average price African nations would need to pay for their cereal imports, but it also would make world prices more stable and predictable (Johnson 1975; Zwart and Meilke 1979; Devadoss 1992).

Third, if the exchange rate is unstable, international cereal prices can be volatile in terms of domestic currency even if they are relatively stable in dollar terms. Domestic prices are destabilized

even when exchange rates are unstable due to unsustainable or inconsistent macroeconomic policies either at home or in important trading partners, but the impact is worse if currencies tend to depreciate when crops fail. This may happen when domestic crop failures call for food imports that are so large relative to total imports that countries are forced to devalue to deal with their foreign exchange shortages. While this is a very real concern for the countries most dependent on imports, food import bills comprise less than one-quarter of total imports in nearly all African countries (World Bank 1992). The share of basic foodgrains is even smaller. The problem is more serious if the demand for food imports is negatively correlated with export earnings. This is likely in countries that rely on agricultural products for most of their export earnings. When their food crops fail and import needs increase, their export crops are often short, too, thereby putting double downward pressure on the exchange rate.

Fourth, international trade suffers from long lags between orders and arrivals of imported food. This is a more severe problem in landlocked countries and remote regions than it is in coastal cities. Fortunately, however, additional supplies are normally needed most in the months prior to the next harvest, several months after the failed harvest. Unlike wars and earthquakes, drought-induced famines are slow-onset emergencies, usually known months in advance (de Waal 1989).

Processing Can Integrate Markets

Just as improvements in transportation and communication can integrate markets across space, improvements in processing can integrate markets across products. The idea is to transform products so they become more substitutable for each other, so that consumers can better respond to lower supplies and higher prices by shifting to other products. Ability to shift to roots and tubers is one reason why cereal prices are more stable and consumers less vulnerable in Africa's humid and subhumid areas than in the drylands, where cereals dominate food consumption.

In many West African countries, one source of instability in domestic cereal markets is the low degree of substitutability between domestic and imported grains. The two markets are separated by the much longer preparation times needed for millet and sorghum than for rice and wheat. After large harvests, millet and sorghum prices collapse because most urban consumers do not switch to them as prices decline.

Processing of millet, sorghum, and maize into precooked convenience foods could reduce the gluts and prevent the very low prices by opening the urban markets to domestically produced cereals. Processing also could reduce the vulnerability of urban consumers to higher rice and wheat prices caused by devaluations, import restrictions, or higher world market prices.

Another option for preventing price collapses is to process surplus cereals into livestock feed. The downside is that such facilities either would have to stand idle when harvests are normal or low, or would drive up prices when they already are high. Only the former option stabilizes prices, which implies that processing facilities should have low capital costs so that they are not too costly to keep idle when needed. This is one argument for preferring small mills to capital-intensive industrial facilities.

Macro and Sectoral Policies Change Margins and Affect Instability

As mentioned above, price instability depends largely on marketing margins and hence on public policies regarding transportation and communication infrastructure. But margins are also affected by sectoral and economy-wide policies, including monetary, fiscal, trade, and exchange rate policies. For instance, policies that make imported fuels more expensive destabilize food prices by raising transportation costs and reducing integration between different parts of the country (Reardon et al. 1992). This is not necessarily an argument against devaluations, since the other ways of dealing with currency overvaluation, such as various types of direct import restrictions or very high

interest rates intended to deflate the economy can disrupt food marketing even more. Neither does it follow that import duties on fuels should be abolished, since most ways of collecting government revenue have some negative consequences. Nevertheless, the disruptive effects of import duties on food marketing are something that policy makers should consider.

Unsustainable macroeconomic policies are prone to periodic crises and abrupt changes that destabilize the food sector and create food insecurity. When unsustainable fiscal policies mean that governments cannot pay their workers on time, the food security of the poorest public employees is threatened. The other side of the coin is a rapid and unforeseen decline in demand and prices in urban markets, which may impose large losses on cereals traders. Such losses can lead to decapitalization of traders (as occurred in the late 1980s in Bamako and is currently occurring in N'Djaména) and lead traders to demand increased risk premiums. Moreover, in some African countries, civil servants and soldiers have often responded to pay delays by collecting additional income on the roads, thereby increasing the costs of food marketing and creating much uncertainty in the system.

In many African countries, public marketing policies significantly raise marketing margins by increasing costs, imposing implicit or explicit taxes on food marketing, and reducing competition. Frequently, government control over one stage of the food marketing prevents competition at other stages. For instance, the restrictions on grain trade in Zimbabwe reduce competition and inflate costs at the processing stage by discriminating against small-scale hammer mills (Jayne and Rubey, forthcoming).

Many investments needed to reduce the real costs of food marketing can be made by the private sector. These include vehicles, storage facilities, telephones, mills, and employee training, among others. Risk-averse firms and individuals are reluctant to make such investments if much uncertainty exists regarding future policies. Predictable policies reduce risk premiums and increase investments, thereby contributing to lower margins, better market integration, and more stable prices. Thus, unsustainable or otherwise unstable policies not only are direct sources of instability but also can reduce the ability of the private sector to reduce it.

3.3. Sources of Seasonal Price Instability

Prices React to Information

Without trade and year-to-year variations in production, seasonal variation in production would be associated with prices that reach their lowest levels after harvests and increase gradually to preharvest highs, reflecting the costs of storage. Variations would be predictable, and people could be prepared to deal with them. Because of storage costs, prices would increase seasonally and create seasonal variation in consumption. Hence, there would be good reasons to schedule food aid or imports for the preharvest season.

Because of unpredictable year-to-year variations in production, and to some extent in border prices and import quantities, the reality is far more complex (Sahn and Delgado 1989). Interyear instability in production not only creates instability for annual average prices but also makes seasonal patterns less predictable. In some years, prices start to decline months before the harvest; in others, they surge at this time and do not decline at harvest time.

As the irregular price patterns suggest, storage is not simply a bridge from one harvest to the next. When production varies a lot from one year to another, people usually either store some grain for longer periods or rely on interregional trade, or do both. They do not just wait and see what happens. They try to anticipate what might happen and act accordingly. This brings about price changes not associated with the costs of storage. In economic jargon, price formation is anticipatory.

To illustrate, consider a hypothetical case

where a farmer has stored grains to feed the family until the next harvest and to cover 30 percent of the next year's needs. If rains are abundant so that the farmer starts to expect a bumper harvest, say, 10 weeks before the harvest, he or she may try to sell the extra grain while prices still are good. As many others do the same, prices start to decline ahead of the harvest. Similarly, if farmers expect a crop failure, most are reluctant to sell anything. So prices rise much more than would be warranted by storage costs alone. In thin markets characterized by small quantities and unstable sales of accidental surpluses, prices tend to be highly unstable.

Markets also anticipate shipments of food aid and imports (Sahn and Delgado 1989). An unexpected announcement of imports may reduce prices immediately or when the promise becomes credible, not when the imports actually arrive. Similarly, rumors that previously anticipated food aid may *not* arrive may drive prices up immediately.[5]

In sum, prices fluctuate continuously in response to constantly changing expectations concerning supply and demand conditions in the future. However, expectations of low future prices can bring current prices down only where substantial food stocks are held by farmers or traders. After good or normal years, this is usually true in much of the Sahel, where the extreme variations in production and prices make storage a central survival mechanism. It is less true in countries where private stocks are small due to the stable and almost continuous harvesting of many food crops (e.g., Rwanda), or where public price stabilization has reduced the incentives of private storage (e.g., Zimbabwe).

Where private stocks are generally small or have been depleted after one or more bad years, food itself (rather than good news about its future arrival) is needed to push prices down. For instance, in war-torn Mozambique, domestic stocks are so small that prices depend very directly on the food aid arrivals (Tschirley, Weber, and Donovan 1993). Figure 5 illustrates how food prices react strongly to the arrivals of food aid to Maputo but do not drop in anticipation of the arrivals.

Short-Term Price Instability Makes Storage Risky

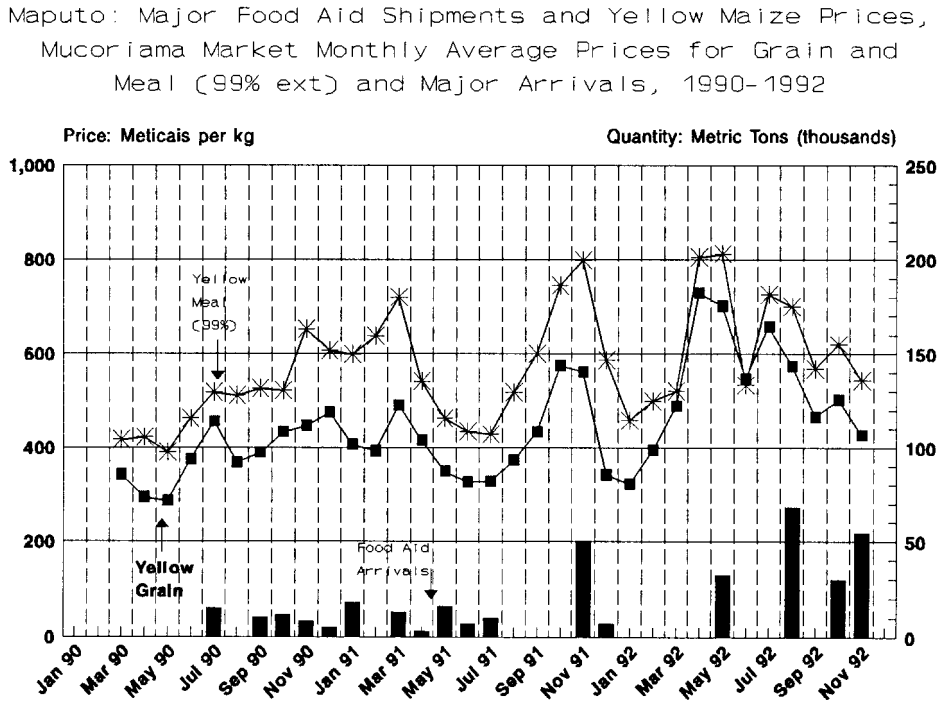
Anticipatory price formation means that markets are continuously predicting future prices, and the scope for improving on those predictions using readily available information is limited. In other words, prices are quite unpredictable. Theory suggests that storage in anticipation of higher prices later in the season is a risky activity, and ample empirical evidence exists to confirm this proposition. Although *average* seasonal price increases are usually high, they are very unstable and often too low to cover costs. For instance, studies in Mali (Mehta 1989), in Senegal's Peanut Basin (Ndoye 1992), and in five capital cities and 13 rural markets in five Sahelian countries (Berg and Kent 1991) found the seasonal price increases to be so low that returns to storage were negative in most years. Even where storage on average would have generated profits, it would have been a highly risky business. Many other studies in Africa and Asia have produced similar results (for references, see Sahn and Delgado 1989, 187).

Risky Storage Is Costly

A major component of storage costs is the cost of the capital invested in the stocks. The extreme riskiness of storing grain means that capital costs include very high risk premiums. Mehta's (1989) study used an annual interest rate of 30 percent, and Ndoye (1992) assumed a monthly interest rate of 3.25 percent, which translates to an annual rate of 39 percent. Both rates were based on trader surveys and represented average costs traders operating on borrowed capital must actually pay for their informal loans. Compared to the costs of capital in industrialized countries, these interest rates are high. Accounting for inflation does not

5. If prices are regulated, the comparable argument is that rumors of shortages tomorrow can create them now by encouraging hoarding. This is a major problem for food price stabilization schemes (Ravallion 1987).

Figure 5. Food Aid and Prices in Mozambique



change this assessment. In the 1980s, the average annual rates of inflation in Mali and Senegal were about 3 and 7 percent, respectively (World Bank 1992, Statistical Appendix, Table 13).

High costs of capital are not inevitable in risky activities. Finance theory suggests and experience in industrialized countries confirms that, when risks can be reallocated or diversified, they need not be compensated by unusually high returns. Capital is costly for African food traders partly because financial and insurance markets are underdeveloped.

Costly Storage Contributes to Instability

On average seasonal price increases must be sufficiently high to induce private storage. If the expected benefits of holding stocks do not cover the expected costs, farmers and traders will not hold stocks.

The main components of storage costs are the interest costs discussed above and storage losses. Storage losses vary substanstially depending on the products stored and techniques used. Cereals, particularly millet, store much better than most other food crops. Pariser (1987) reviews several studies and concludes that postharvest food losses in developing countries are at least 10 percent of production for cereals and 20 percent for perishables. Ndoye (1992) uses in his calculations storage losses of 5 percent per year for farmers who store unthreshed millet and 10 percent per year for wholesalers who store threshed millet in bags.

How high must the average seasonal price increase be to cover capital costs, storage losses, and other storage costs? A simple calculation shows that if storage losses were 10 percent during a six-month period and if the interest rate was 3 percent per month, just covering physical losses and interest costs would require an expected price rise of 33 percent over the six-month period. If the time span from postharvest low prices to the preharvest peak were nine months, and if storage losses were 15 percent, a monthly interest rate of 3 percent would translate to a 54-percent average seasonal price rise. Adding the costs of handling

and storage facilities would make the needed increase even higher.

In many developing countries, "speculative" and "exploitative" traders rather than high storage costs get blamed for the seasonal price increases, particularly when they are unusually high (Riley and Weber 1979). The numbers cited here and simple calculations based on them suggest that average price rises are high primarily because the costs of storage are high.

High storage costs are analogous to the wide marketing margins discussed above. Just as high marketing margins isolate markets over space, high storage costs isolate markets over time. In both cases, the consequence is increased price instability.

In sum, without interyear instability in supply and prices, intrayear price variations will be predictable and relatively modest. That price swings in many African countries are large, difficult to predict, and detrimental to food security is primarily caused by yeartoyear variations.

3.4. Victims of Instability

Income Diversification May Protect Households from Crop Failures

To cope with their unstable environment, farmers throughout Africa follow many riskreducing practices such as growing many crops and varieties, growing them in mixtures rather than in pure stands, cultivating many small fields to take advantage of different microclimates, staggering the timing of planting on various plots, and irrigating some fields if possible. Pastoralists reduce risks by moving their animals to new areas, reserving some areas for dry-season or drought retreats, and building up herds during good times and destocking in bad years. Previously, these policies were often considered irrational; now their value in a risky environment is widely recognized (Matlon 1990; McIntire 1990).

Besides diversifying their incomes *within* agriculture, rural households also can protect themselves against crop failures by engaging in off-farm activities, such as trading, rural small-scale industries, paid local employment, and migration to work in distant cities, plantations, or mines. Often, some members of rural households are engaged in farming activities while others work as traders, miners, plantation workers, etc. Recent research suggests that off-farm activities are much more important than previously thought, particularly in the arid and semiarid areas where instability in agricultural production is most pronounced (Reardon, Delgado, and Matlon 1988).

Although households whose crops fail are obviously hurt, income diversification means that the most severely affected households need not be the ones with the worst crop failures. Moreover, the much higher population densities in the more favorable areas (where the population is more heavily dependent on crop production) often mean that the margins of survival are narrower there and relatively modest shortfalls in food production can threaten food security.

Some Nonfarm Incomes Collapse with Crop Failures

The adverse impacts of crop failures are not limited to agricultural production, since in predominantly agricultural economies, the links from short crops to low nonfarm incomes are strong. Most of those employed in the rural nonfarm economy either trade or process farm products, or produce goods or services for farmers. Given semisubsistence production and the residual nature of agricultural markets throughout Africa, shortfalls in agricultural production can create relatively much larger declines in farmers' sales and purchases and hence in the employment and earnings of traders, millers, beerbrewers, blacksmiths, carpenters, tailors, etc. (de Janvry, Fafchamps, and Sadoulet 1991).

Thus, whether nonfarm incomes protect rural households from food sector instability depends on the nature of the nonfarm incomes and the relative size of the farm and nonfarm economy. Remittances of migrants who work in cities, mines,

or distant plantations usually are least affected by the fortunes of local agriculture. Incomes from irrigated gardening and public works can be countercyclical. But most other nonfarm incomes go up and down with farm incomes.

High Food Prices Also Hurt Rural People

Higher prices reduce the real incomes of those who are net buyers of food and benefit net sellers. This is not a simple distinction between urban consumers and rural producers. Rural household surveys in several African countries have found that many farmers are net buyers of cereals, and, when harvests are poor, their share often dramatically increases (Weber et al. 1988; Jayne and Chisvo 1991). A small minority of farmers produces most of the marketed surplus. In Mali, for instance, 43 percent of the farm households of two of the best agroclimatic zones (CMDT and OHV) were net buyers of cereals even in a good harvest year (Dioné 1989). Overall, 90 percent of net grain sales came from only 28 percent of the sample farms. In Zimbabwe, production for the market is even more concentrated, with 1 percent of farmers producing about 70 percent of marketed surplus (Jayne and Chisvo 1991).

Even households that sell foodgrains after a harvest often become buyers before the next harvest (D'Agostino, Staatz, and Weber 1989). These households suffer from high seasonal price increases twice, once as sellers when prices are low and again as buyers during the period of high prices.

Herders are particularly vulnerable to droughts (Sen 1981; de Waal 1989). Not only do they inhabit African drylands where the swings in rainfall are most severe, but they also depend on the exchange of livestock products for cereals to provide them with cheaper calories. During droughts, the meat-cereal price ratio usually collapses. For instance, between May 1989 and March 1991 the quantity of millet herders in Chad could get by selling one sheep declined from about 170 kilos to about 40 kilos (FEWS Project 1992). As mentioned above, in Darfur, Sudan, this ratio collapsed during the 1984–85 drought to one-tenth of what it was before the drought (Teklu, von Braun, and Zaki 1991).

In South Asia and Latin America, many or most vulnerable people are landless agricultural laborers. In Africa, abundance of land and indigenous land tenure systems have traditionally ensured almost all people access to land. With rapid population growth and other changes, the situation is changing rapidly. Landlessness is already emerging in the pockets of dense population, including much of Rwanda, Burundi, Kenya, and Nigeria. By the end of the decade, many victims of food sector instability will be rural households with little or no land to feed the family.

4. Measuring Food Insecurity and Instability for Policy Purposes

Since there are many ways of using food aid or other resources to ameliorate food sector instability or mitigate its adverse effects on food security, there is also a need for many types of indicators to guide those uses and to evaluate their effectiveness. Indicators that are helpful for one purpose (such as the appropriate timing of food aid shipments) may be very misleading when used to inform other decisions (such as how to target food aid to regions or families in need). For example, the use of harvest estimates for targeting purposes made food aid less effective in improving food security in Burkina Faso during the 1984–85 drought (Reardon, Delgado, and Matlon 1988). Based on its more severe crop failures, the Sahelian zone received 10 times more food aid per adult equivalent than the Sudanian zone. Yet households in the Sudanian zone were much more vulnerable, since they relied mostly on cropping, whereas Sahelian households had diversified incomes.

Although it is tempting to assume that variables closely associated with food insecurity are appropriate indicators to guide mitigating action, such as the use of food aid, there are at least three reasons to be cautious. First, the most accurate indicators may be too costly to collect, or not timely enough. For instance, anthropometric measurements that are useful in research on undernutrition are normally inappropriate for the day-to-day management of food aid operations. Atwood (1991) argues convincingly that the practical problems of using entitlement or income-based indicators are so serious that the indicators of aggregate food availability should remain central in the planning of food aid shipments and food imports. Second, the close association between an indicator and the problem may break down if the results are used for policy purposes. For instance, survey data on the number of meals per day may indicate food insecurity in research that has only indirect links to policy, but may be very misleading if the interviewed households learn that what they say may bring them food. Third, using behavioral indicators to target benefits may change those behaviors. This is one problem with the suggestion that household coping strategies should be monitored and used as a basis for relief action (cf. Campbell 1990). Consider, for instance, the survival mechanism of cutting down trees during droughts to exchange the wood for food (Teklu, von Braun, and Zaki 1991). If the link from that behavior to free distributions of food becomes too obvious, there is a danger that people cut trees just to get the food even when their needs are not unusually severe.

Much of the discussion on food security indicators has centered on the question of which variables to monitor, and much of the effort has focused on collecting data. In recent years, the Famine Early Warning System (FEWS) project has made considerable progress in several countries in collecting data on rainfall, vegetation, production, prices, and other relevant variables. Much more remains to be done in improving the use of that and other data so that more accurate and timely forecasts can be produced on production, prices, and numbers of vulnerable people. Michigan State University (MSU) is currently working with FEWS to develop time-series models that would provide better indicators of vulnerability by incorporating market prices into the analysis.

While FEWS is making progress on the indicators needed to improve the timing and allocation of food aid shipments to different countries, other indicators are needed to target food aid to the needy households. Since collecting and monitoring data on household incomes or purchasing power is costly, projects often target regions rather than families. This is usually very inaccurate, since

differences within regions are often larger than differences between them (Braun et al. 1991). Willingness to work hard at low wages is a household-level indicator that needs no separate monitoring beyond the considerable task of providing such employment (see section 5.4 on labor-intensive public works). But, for those who cannot work or have many dependents, the wages that can be paid may not be enough. Thus, a tremendous need exists for developing cost-effective and reasonably accurate household-level indicators of purchasing power or food insecurity so that assistance can be targeted to those most in need. Research on developing such indicators is currently underway at MSU under the Food Security II Cooperative Agreement.

Many other design issues in famine relief and other food aid projects call for additional indicators. For instance, the degree of market integration plays a major role in the decision of how to use food aid to stabilize prices. If markets are well integrated, it does not matter much where food aid is released, but, if they are not well integrated, reduction in price instability may not occur unless food aid is delivered to many different markets. The appropriate form of payment in public work projects also depends on market integration. In isolated locations, cash wages may increase food prices and hurt those not participating in the project, while food wages can do the opposite. In areas that are well integrated to larger markets, projects cannot change prices significantly, which weakens the case for food wages. The most straightforward indicator of how well two markets are integrated is the simple correlation coefficient between prices in the two markets.[6]

Progress indicators are needed to evaluate the effectiveness of different measures in reducing food insecurity or instability. To see whether food aid has stabilized food supply, one can build a time series model that shows the percentage of production shortfalls on average covered by additional food aid (Lavy 1992). Assessing the impact of food aid on food prices is much more difficult, among other things because of the forward-looking nature of food prices. In other words, food aid may seem to have arrived too late, though it may have actually been the expectation of large food aid shipments that pushed prices down before the arrival. Nevertheless, time-series models can be constructed to estimate impacts on prices. Similarly, models can be built to track the impact of food aid through lower prices on household access to food on food consumption, and perhaps even on nutritional status. Additional steps in the logic naturally mean that there are more intervening factors on which data may not be available. Unless food aid shipments represent a very significant portion of total supplies, as in Mozambique or in Somalia, the nutritional impacts of food aid may be difficult to identify or isolate. In the case of targeted distributions of food aid, nutritional impacts are more concentrated, and statistically significant links to food aid more easily identified.

The coefficient of variation and the more sophisticated measures of volatility can be used to indicate instability in food production or prices. These numbers reflect the magnitude of the problem and therefore tell how frequent production shortfalls or price increases of a certain magnitude are. Although this has important implications for long-term decisions regarding storage policies and the expected value of various precautionary measures, most operational decisions on when and how to use food aid depend on the production shortfall or price increase at hand rather than on the average magnitude of such occurrences in the past. Moreover, the use of volatility measures as the indicators of the success of price stabilization with food aid is limited to those few countries where food aid plays the biggest role. In most of Africa, weather and some other factors affect supply and prices more than food aid. In such conditions, calculating coefficients of variation (and possibly comparing periods before and after a country became a major recipient of food aid) is unlikely to be a good indicator of how well food aid has stabilized prices.

6. More sophisticated indicators of market integration are reviewed and applied to Senegalese data in a technical note that is available from the authors.

5. Using Food Aid to Deal with Food Sector Instability

There are many ways of using food aid to reduce food sector instability or to mitigate its adverse impacts on food security. As emphasized in Chapter 2, the chronic and transitory aspects of food insecurity are so closely related that almost anything that successfully increases productivity and reduces poverty also protects poor people against the adverse consequences of food sector instability. This chapter focuses on the *direct* uses of food aid to reduce food sector instability and *transitory* food insecurity, only occasionally emphasizing some key *indirect* impacts of food aid on food availability and access in the long term. Thus, this chapter sidesteps nutrition education and many other important ways of using food aid to alleviate chronic food insecurity.

5.1. Price Stabilization

Despite the serious problems caused by unstable agricultural prices, many economists have expressed reservations about public stabilization policies. Before studying the experiences from and problems of price stabilization with food aid, it is appropriate to briefly review these arguments and their limitations in the context of African food price instability.

At least six different arguments have been presented against public price stabilization policies (Newbery and Stiglitz 1981; Newbery 1989):

1. Price stabilization entails buying cheap and selling dear. When it is profitable, the private sector can do it. When it is not, its social desirability is questionable, since stabilization uses real resources.
2. If high prices are associated with low quantities sold, price instability can reduce income instability. This means that stabilization policies may end up destabilizing producer incomes.
3. Both producers and consumers may be able to stabilize their incomes and/or consumption by using markets for futures, insurance, credit, etc.
4. Where these markets fail, it may be cheaper to correct their shortcomings than to stabilize prices.
5. If more public action is needed to improve food security, direct transfers of food or purchasing power to the vulnerable groups may be more cost-effective than price stabilization.
6. Badly operated public price stabilization schemes may destabilize prices.

While all the above arguments have some merit, their applicability to food price stabilization in Africa is limited:

1. Whether storing or transporting food for the hungry is socially desirable has very little to do with its profitability. Neither the immediate food security benefits nor the dynamic economic benefits of price stabilization are fully reflected in the price differences that private players can capture (Timmer 1989). Due to the high transportation and storage costs, private arbitrage leaves prices very unstable in much of Africa. Moreover, many African societies discourage "profiteering" on food.
2. The possibility of destabilizing producer income may be an important consideration when the policy focuses on stabilizing producer incomes. It is less relevant in food price stabilization whose main objective is to improve food security. Those who are net sellers of food in bad years are usually more food se-

cure than net buyers. Moreover, many or most food producers are net buyers in bad years; lower prices would help rather than hurt them (see section 3.3).

3. As discussed in section 2.1, poor consumers have little access to credit and insurance markets. And, although futures markets can be used by African governments to hedge food import bills and thus to support public price stabilization, they offer little help for consumers without government intermediation.
4. While African governments clearly should do more to develop their credit, insurance, and other contingent markets (Stiglitz 1989; Ravallion 1987; Bromley and Chavas 1989; Krause et al. 1990), they should not expect miracles. The experiences from rural credit schemes offer many cautionary lessons (Adams and Vogel 1990). Credit and other risk-related markets are no panacea for food insecurity, which usually hurts those who are not particularly creditworthy.

5&6. Both price stabilization policies and targeted transfers to the food insecure require money and other resources, including skilled administrators. Since lower prices reach the food insecure through markets while direct transfers need to be distributed individually, the administrative constraints tend to be more severe for targeted transfers (see Box 2).

In summary, while the above arguments suggest limitations and alternatives to price stabilization, the case for at least some degree of public action to reduce the instability of food prices remains strong. In fact, Joseph Stiglitz, often cited as an "opponent" of price stabilization, suggests that public price stabilization is a potentially valuable policy tool in developing countries where many markets are missing (Stiglitz 1989).

If governments decide to try to reduce the instability of food prices, they are faced with many questions on how to go about doing it. The extensive literature on the topic suggests that the details of the design and implementation are crucially important and that the appropriate choices vary substantially according to the circumstances (e.g., Newbery and Stiglitz 1981). Merely declaring stable prices generally does more harm than good; changes in the supply and demand conditions are needed. Moreover, these changes should be based on transparent rules and be predictable to the private sector. Except in the land-locked countries, foreign trade is usually a more cost-effective tool of price stabilization than domestic buffer stocks, whose use should be limited to bridging the gap before imports arrive (McIntire 1981; Ahmed and Bernard 1989). In general, modest price stabilization goals are achievable even in the poorest countries, but as governments increase the degree of price stability they want to achieve, the costs of price stabilization schemes increase rapidly (Newbery and Stiglitz 1981; Pinckney 1988). Some of these points are directly relevant to the use of food aid in price stabilization and will be discussed further below.

Experiences with public food price stabilization schemes differ. Many Asian governments have successfully stabilized rice prices, which presumably has contributed to their strong agricultural growth (Timmer 1989). In Southern Africa, Zimbabwe's maize price stabilization policies are generally regarded as a successful component of otherwise too restrictive marketing policies (Jayne and Chisvo 1991). On the other hand, the many attempts to stabilize prices in the Sahel have mostly failed. For instance, an attempt to defend minimum producer prices in Mali failed, when favorable rains increased grain production by 44 percent in 1985–86 and produced an even larger harvest in 1986–87 (Staatz, Dioné, and Dembélé 1989).

Past Experiences with Food Aid and Stability: Evidence from the Literature

A review of USAID food aid evaluations suggests that *inadequate attention has been given to assessing the direct and indirect stabilization effects of food aid programs.* Direct effects occur through food aid's impact on the level of supply and prices, while indirect effects occur,

for example, through the effect of food aid on policies or public and private sector investments. Where evaluations have explicitly addressed the effects of food aid on market stability, analyses have been primarily qualitative and anecdotal. The data necessary for conducting rigorous quantitative assessments of food aid impacts have been generally lacking.

The evidence found in other literature regarding food aid and market stability has been mixed. On the positive side, Victor Lavy, in an empirical study supported by the World Bank and World Food Program (WFP), found that emergency food aid and commercial imports from 1979–87 helped insulate food consumption in sub-Saharan Africa from random shocks in production. Lavy found that an average of 80 percent of food production shortfalls were compensated for by food from

Box 2. Stabilizing Food Prices with Food Aid in Mozambique

During its prolonged civil war, Mozambique, particularly its urban areas, have become heavily dependent on food aid, and the improved prospects for peace will not change that very soon. The challenge for donors is now to provide food aid in a way that facilitates domestic food production and the emerging private trading sector without sacrificing food security. The proposal put forward by a Ministry of Agriculture (Mozambique)/Michigan State University/University of Arizona research team suggests that food aid should be used to prevent prices rising above preannounced, monthly increasing ceilings.

In the past most of the commercial food aid donated by the United States was targeted to be monetized in government-sanctioned ration shops at highly subsidized prices, compared to import parity. In practice, most of this grain was diverted onto the unregulated or informal private market. The informal private sector, which also imports maize from Swaziland and Zimbabwe, is the principal supply source for the great majority of urban consumers, including many of the poorest households. Although the additional supplies from food aid benefit most consumers by reducing prices, the dual system was characterized by corruption and highly volatile prices in the private sector. The prices at which the food aid is monetized have now been raised, and donors also promote greater competition among large grain wholesalers who handle the commodities. However, farmers still face relatively low prices and consumers still face steep price increases due to delays and/or mistakes in estimating food aid requirements.

A proposed additional change in the food aid program would further alter how supplies of maize would be allocated to private traders. To facilitate planning by farmers and traders, the prices at which food aid would be monetized would be announced well ahead of planting for the entire crop year. Prices would reflect world market supply and demand, and would increase during the course of the crop year to reflect normal costs of storage. Thus, the private sector would have sufficient incentives to hold stocks and to offer farmers higher prices. Donors would make a commitment to continuously meet all demand at the preannounced prices. This commitment would cap prices in the private sector, and there would be no need for auctions to prevent excessive profits by the traders.

This proposal would facilitate the recovery of private farming and trading and stabilize prices for urban consumers. It would still not, however, ensure access to food for those without effective demand to buy grain. Thus, subsidized or free distributions of food to the poorest consumers would need to continue.

Sources: Tschirley et al. (1992) and Weber et al. (1992)

Figure 6. Cereal Availability in Ethiopia

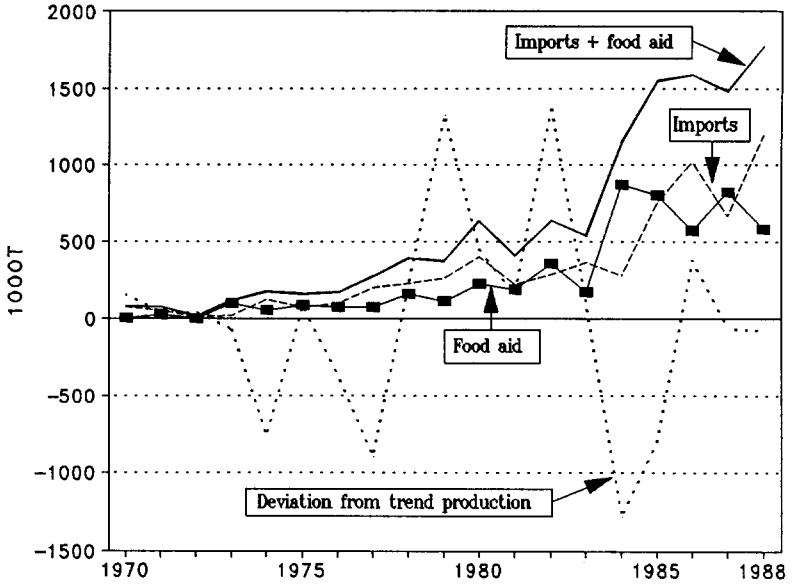
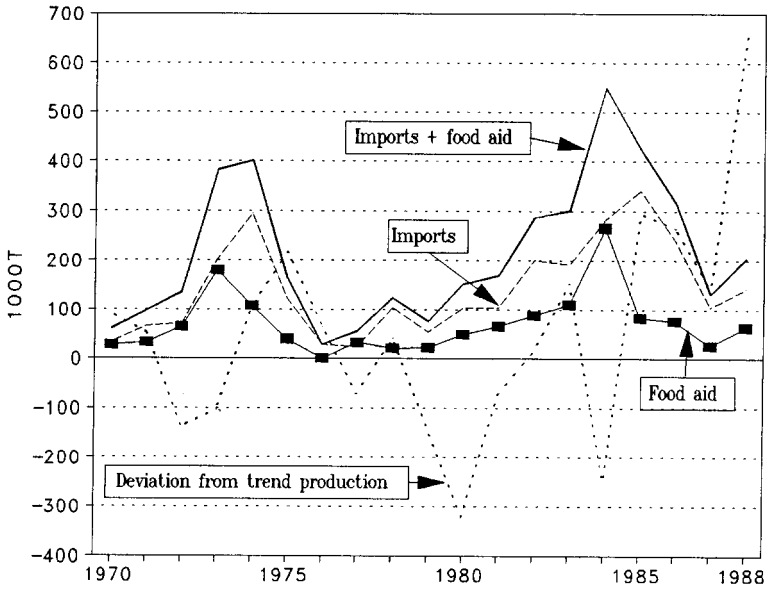
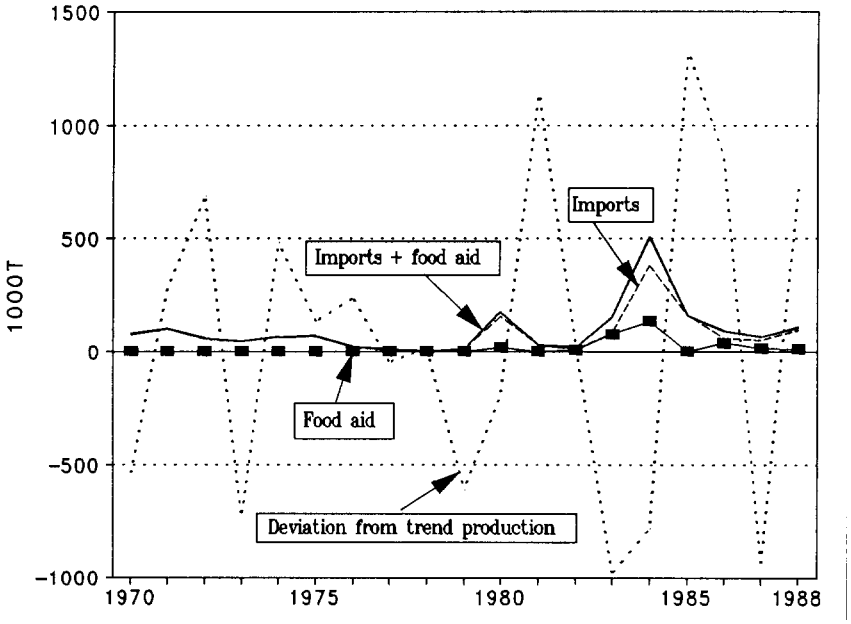


Figure 7. Cereal Availability in Mali



abroad over a four-year period, with about 60 percent of these shortfalls being made up within the first year after production shocks (Lavy 1992). Food aid compensated for approximately 50 percent of these food production shortfalls, and commercial imports for an additional 30 percent. Another positive study reported by the WFP observed that emergency food aid is more timely than is generally appreciated, with two-thirds of emergency food arriving prior to next harvest and much of the remaining one-third being used to replenish national security stocks or repay bor-

Figure 8. Cereal Availability in Zimbabwe



rowed food aid (World Bank 1991).

A more negative picture emerges from a study of the stabilization role of food aid in Senegal, Kenya, and Tanzania (Mellor and Pandya-Lorch 1992). The authors conclude that food aid has not been effective in reducing fluctuations in food availability or consumption for the poor. In Senegal, for instance, the study found that "food aid receipts appear to be on the whole destabilizing to total cereal availability—increasing when cereal production rises above the trend and decreasing or remaining steady when cereal production is below trend." In Kenya, food aid was stabilizing during some years in the 1980s but destabilizing during the years 1984 and 1985 when production fluctuations were greatest. Tanzania was also problematic, as food aid receipts declined during 1983, the year that had the most dramatic production shortfall during the period of the study.

In Figures 6–8, FAO data are used to extend Mellor and Pandya-Lorch's analysis to illustrate how food aid and imports affected cereal availability between 1970 and 1988 in Ethiopia, Mali, and Zimbabwe. In Ethiopia, food aid did little and commercial imports only slightly more to offset the production shortfalls in 1974, 1976, and 1977. During the next five years, food aid increased despite the record harvests of 1979 and 1982. Donor reaction to the 1984 crop failures was a dramatic and timely increase in food aid. This is in striking contrast to commercial imports, which declined in 1984 and peaked only in 1986 when food production was again above the trend. In sum, Ethiopia's food aid donors made mistakes in the 1970s but learned from their failures and used food aid to stabilize availability in early 1980s.

When Mali's cereal production collapsed in 1972–73, donors increased their food aid substantially. In 1974, when production recovered, food aid declined but commercial food imports continued their increase. During the 1979–82 drought, both food aid and imports grew only gradually. Food aid peaked in 1984, when production again collapsed. Commercial food imports were again late, peaking in 1985, which was a year of record production.

During the next three years, relatively high domestic production reduced commercial and concessional food imports, but in 1988 both increased despite record harvests. Overall, food aid

has responded to Mali's crop failures in a more timely manner than commercial imports. Moreover, the policies that food aid supported during the 1980s probably reduced instability in food availability and access at the household level (see Box 3).

In Zimbabwe, the role of food aid and imports was minimal between 1970 and 1988. Only during the 1983–1984 drought did imported cereals significantly help to offset shortfalls in domestic production.

Many other examples in the literature have also described situations in which untimely food shipment arrivals have exacerbated instability in recipient countries. A USAID Inspector General Audit, for example, found that "nearly all Title I food deliveries to Somalia in 1985 and 1986 arrived at the worst possible times, the harvest months, and none at the best time, the critical hungry period" (Thomas et al. 1989). In another

Box 3. Cereals Market Liberalization in Mali

During the 1960s and 1970s, cereal marketing in Mali was a legal monopoly of the official grain marketing agency, OPAM. Roadblocks were established to inhibit private shipments, and farmers were occasionally forced to deliver cereals to OPAM. The repression increased the costs of private traders and hence marketing margins and price instability, but failed to raise OPAM's market share above 20 to 40 percent of total grain marketed.

In practice, OPAM's dominant goal was to provide cheap cereals to preferred customers, such as the army, hospitals, and government employees. Subsidized consumer prices together with mismanagement led to large deficits, which the donors were increasingly reluctant to finance.

In 1981, the government of Mali agreed to abolish OPAM's monopoly and encourage private sector marketing. In exchange, donors pledged to ship food aid to urban areas for several years. This was based on the assumption that Mali would continue to need food imports. Donors also assumed that raising official producer prices would significantly increase incentives and production, reduce costs of private trade, and benefit most farmers, who were assumed to be net sellers of cereals.

Reality and research soon showed that many of these assumptions were wrong. In 1985–86, favorable weather raised Mali's coarse grain production by 44 percent compared to the previous year, and the next year's harvest was even bigger. Need for food imports disappeared, and prices collapsed despite OPAM's attempts to defend official producer prices. On the other hand, low prices were not as detrimental to the rural poor as expected. Surveys found that a significant share of rural households were net buyers of cereals and that the bulk of sales came from a small group of relatively wealthy farmers. Studies also suggested that higher prices alone could do very little to increase production that was constrained more by other factors.

Based on the new evidence, reforms were revised. In 1987, the government of Mali agreed to abandon market stabilization and sell off its buffer stocks. OPAM's activities were restricted to the managemenent of the national security stock and food aid, ensuring food supplies in chronically food-deficit areas, and developing and maintaining a market information system. Several donors responded to good harvests by sending in cash rather than food aid.

Despite incorrect initial assumptions, the reform has achieved some encouraging results. It has reduced the public and private costs of grain marketing, thereby lowering marketing margins, which stabilizes prices, especially in rural areas. A major benefit to consumers, including many farmers, is improved availability of grain.

Source: Staatz et al. 1989

case, the late arrival of a shipment of yellow maize food aid was identified by market participants as the reason for drastic food price increases in the Mozambican city of Beira in May 1990 (Weber et al. 1992). Figure 5 (Chapter 3) shows how uneven arrivals of food aid contributed to price instability in Maputo.

Many reasons have been given for the apparent lack of success in stabilizing markets through food aid programs. These include:

- *Bureaucratic and transport delays*. Long time lags, as much as two years, between when food aid is requested and when it is actually received, significantly reduce the linkage between deliveries and recipient needs. In Sudan, for example, because of transportation constraints, only 64 percent of food aid pledged for 1984–85 was actually distributed in that period, even though 91 percent had reached the ports (Mellor and Pandya-Lorch 1992).

- *Conflicting objectives*. Food aid serves several purposes, some of which may not be consistent with market stabilization. For example, the "surplus disposal" objective, though its importance has been diminished in recent food aid legislation, has been "an inherent instability in the food aid system to the extent that ... availability of food aid is negatively correlated with recipients' need for it" (Thomas et al. 1989). Supporting specific projects or policy reforms may call for food aid or counterpart funds from its monetization at times when domestic food production is high and prices low.

- *Donor and recipient country inflexibility*. Donor flexibility in responding to changing circumstances is frequently hampered by programmatic and budgeting constraints. The capacity of recipient countries to respond to food crises, in turn, is often constrained by inadequate storage facilities, foreign exchange shortages, or weak administrative capacity.

- *Lack of effective food situation and food aid impact monitoring*. Using food aid to promote market stability is inhibited by a lack of accurate and timely methods, and the requisite analytical capacity, for assessing food aid requirements and impacts. Assessing the impacts of food aid on food market and consumption stability is an important research priority. In Mozambique, such research is going on under the Food Security in Africa Cooperative Agreement.

Alternative Approaches to Reducing Price Instability with Food Aid

Stabilizing prices directly with food aid requires releases that are countercyclical to domestic supplies or prices. This implies flexible food aid flows that are adjusted based on harvests and prices in recipient countries. There are both technical and political problems with such flexibility.

First, correct timing is inherently difficult. As discussed above, food prices are forward-looking: prices increase when future shortages are expected, not just when they actually occur. Similarly, in areas with substantial stocks, anticipation of bumper crops may reduce prices months before the harvest. Whether food aid shipments scheduled to arrive, say, two months prior to the harvest actually face high or low prices depends significantly on the rains during the time the shipment was on the way. To some extent, mistakes in timing of shipments are unavoidable. By storing food aid in recipient countries, the timing of releases can be improved, but long-term storage is very expensive. The argument against large buffer stocks also applies to imported food.

Second, food aid that responds to unpredictable shortfalls is itself unpredictable and unstable. This implies that the cheapest and administratively most straightforward ways of moving food may not be appropriate. A trade-off between cost and usefulness exists. Or, if funding is fixed, the trade-off is between quantity and timing. The same money buys larger quantities of food aid that can arrive whenever

costs are lowest than food aid that arrives when the needs are greatest. Yet, given the high value of timely deliveries in the recipient countries, such costs often are worth paying.

Third, using food aid to reduce price instability may conflict with other objectives of food aid. Even for reducing food insecurity, support for direct price stabilization is only one tool among others. Supporting policy reforms, funding projects that directly give food or income to the food insecure, and funding investments crucial to economic development may all require food aid or proceeds from its monetization at times when food prices are low and food aid releases would not be needed for price stabilization.

Fourth, stabilization with food aid has political constraints. Food aid partly exists because of agricultural surpluses in donor countries. To make food aid less vulnerable to changes in these surpluses a recent report by the World Bank and the World Food Program called for "longer-term, multi-year food aid commitments to provide stable and well-timed supplies" (1991, 14). Food price stabilization that not only requires independence from donor-country surpluses but also adjustments based on harvests and crops in distant countries may not be very attractive to donor-country decision-makers. More generally, both donor governments, recipient countries, and agencies organizing food aid face political and budgetary pressures that do not necessarily coincide with the needs of food price stabilization.

Despite these difficulties, the case for improving the timing of food aid releases is strong. Poorly timed or unpredictable food aid can cause more problems than it solves. Food aid arriving at a wrong time can depress market prices below levels needed to promote production. It can add to price instability and reduce incentives and rewards for local producers and traders.

Full food price stabilization with food aid is possible only in countries that need food aid even after good harvests. That probably is the case now in Mozambique (see Box 2), but in most other African countries, the realistic goal for stabilization with food aid is *the prevention of exceptionally high prices*.

At the minimum, governments could make commitments to release their stocks when prices reach certain ceilings. In many countries, establishing clear rules on stock release would be a major improvement. A more demanding approach is to make a commitment to keep prices below the ceilings. Defending price ceilings requires satisfying all demand at the preannounced price. A commitment to do so amounts to insurance, which the governments of poor countries may not be able to provide to their food insecure citizens. With contingent commitments to deliver food aid when, say, precipitation is low or domestic prices high, donor countries can help African countries with partial or full reinsurance.

Such commitments naturally face more restrictive administrative and political constraints than mere intentions to ship more food aid when prices threaten to rise very high. Depending on transportation and storage costs, lead times for commercial and concessional food imports, the reliability of forecasts, and above all the chosen levels of price ceilings, defending ceilings may require substantial financial resources and organizational capabilities. On the other hand, they may convince governments in recipient countries to refrain from more costly stabilization schemes based entirely on domestic buffer stocks.

Defending price ceilings does not mean that food aid is sold only when prices would otherwise exceed the ceiling. Smaller quantities may be sold even when prices are lower. For such sales, the standard recommendation is that food aid should be auctioned so that buyers cannot earn excessive profits. In contrast, when sales are intended to defend the ceiling, the price is the same for all buyers and auctions are not needed (Louis Berger International 1991; Tschirley et al. 1992).

The design of price ceilings should be based on a thorough understanding of the (dis)incentives they create for private actors (Newbery and Stiglitz 1981; Tschirley et al. 1992). If the price ceiling is simply one price for the whole year, the incentive to keep private stocks in anticipation of price increases disappears whenever market prices hit

the ceiling. Sometimes reducing speculative stocks may be a worthy objective, but frequently private storage from one harvest to the next should be encouraged. Instead of one price, a schedule of monthly increasing price ceilings over the crop year should be announced.

To illustrate, consider a situation where large farmers in a producing region have stocks they plan to sell before the next harvest to consumers in the same region. If prices hit the ceiling many months earlier, farmers may sell immediately to traders who take the grain to the capital. Some months later, grain needs to be transported back from the capital to feed the consumers in the producing region. A gradually increasing price would have avoided excessive transportation. It would have provided farmers in the producing region with incentives to keep their grain and sell it locally. Food aid would have been used in the capital city where it is cheapest to transport.

Price ceilings contribute to food security and may help people avoid distress sales of assets and other costly coping mechanisms. By capping food prices, they also encourage specialization in non-food agriculture and nonfarm activities. On the other hand, ceilings that market prices hit only occasionally do not guarantee attractive or predictable prices for farmers and traders. Full price stabilization that would provide such guarantees is extremely costly in many African countries (Staatz, Dioné, and Dembélé 1989; Pinckney 1988).

5.2. Targeted Transfers to the Food Insecure

Although the benefits of preventing unusually high food prices with food aid can be substantial, they don't help much those who can't afford to buy food. While lowering prices may be the best way of using food aid to help those hurt by unusually high food prices, targeted transfers of food aid or proceeds from its monetization may be more effective to help those who lost their crops or incomes. Emergency food aid is used mostly for targeted transfers, but project food aid may also be used for direct transfers to vulnerable groups.

The administration of targeted transfers is far more demanding than that of direct price stabilization[7]. While food aid intended to reduce prices can be auctioned in large quantities, direct transfers require an organization that can deliver thousands or millions of rations or food stamps to those in need. If the organization works poorly, benefits are easily diverted to the not-so-poor and the intended beneficiaries gain only indirectly through lower prices caused by the additional supplies.

Transfers must be targeted since, even with external aid, no African country can afford to provide direct transfers to all citizens. In societies where incomes and wealth are mostly unrecorded, finding those most in need is a major problem. Many indicators of poverty or food insecurity identified by researchers are too costly to use in practice, break down if used as a basis of providing benefits, or distort incentives (see chapter 4).

In this section, we review the strengths and weaknesses of some important targeting mechanisms that are used in Africa to reach the needy. Public works that are simultaneously investments and transfers targeted through a "work-test" are discussed in section 5.4. Some targeting mechanisms discussed below are normally used to deal with emergency problems, others more often to address chronic food insecurity. Yet, with proper sensitivity to instability in the food sector, school meal programs and other remedies for chronic food insecurity can be temporarily expanded to address transitory problems.

Relief camps and kitchens are one of the major targeting mechanism for emergency food aid. Relief camps can be set up rapidly, and they can transfer large quantities of food aid to many recipients with

7. Note that if targeted transfers of food aid increase when domestic supplies are low and prices high, they also indirectly stabilize prices, since transfers never are fully additional. Some fraction of them is sold in the market or reduces purchases from the market.

reasonable administrative costs. Health care can be easily combined to food relief in camps. Most entrants are likely to be needy, and if necessary, other criteria can be added to screen out those who can manage without assistance.

The main problem with relief camps is that they completely disrupt the normal life of the recipients. Thus, they either keep people away from their normal work or break up families when some family members leave and other stay at home. Crowded camps also increase exposure to diseases.

Due to their timeliness, relief camps are appropriate responses to sudden catastrophes such as earthquakes and refugee flows created by wars. For droughts and other slow-onset emergencies, better alternatives normally exist (Soule, Nelson, and Due 1991). That relief camps are often used in such emergencies in Africa suggests that early warnings either were not received or did not induce action before it was too late to do anything else.

Geographic targeting assumes that most people in certain areas need transfers and those outside it mostly don't. Again, this assumption may hold for floods and other sudden crises but it seldom is appropriate with food insecurity created by droughts or diseases. In general, household food security varies substantially within regions. Even the most food insecure regions tend to have many households that are less vulnerable than most households in adjacent areas. Besides, finding the most food insecure regions is not a trivial task. As discussed in chapter four, the importance of off-farm incomes means that crop failures are a poor guide to nutritional needs.

Subsidies on foods consumed mostly by the poor can combine appropriate targeting with the administrative simplicity of operating through markets. It also may be possible to combine such targeting with price stabilization. The problem is to find foods that are simultaneously self-targeting, nutritious, and not too suitable for other uses such as feeding animals or brewing beer.

In West Africa, consumption patterns of different socioeconomic groups are so similar that finding self-targeting foods is difficult (Rogers and Lowdermilk 1991; Staatz et al. 1989). The question to ask is whether such foods could be imported or introduced. In particular, introducing a cheaper substitute for imported rice might improve food security among the low-income urban consumers, especially if the suggested increases in rice prices occur.[8]

In Mozambique, where farmers produce and consumers prefer mostly white maize, some self-targeting has been achieved by importing yellow maize (Weber et al. 1992). Yellow maize imported as food aid has helped to create markets where poor consumers can obtain nutritious yellow whole meal at low price while their not-so-poor countrymen pay much more for refined white flour.

Targeted transfers through schools and health clinics can simultaneously increase the use of such services and reach vulnerable households. If necessary, additional criteria such as nutritional status can be used to screen recipients, although the administrative costs of doing this can be significant.

Although some studies have found little improvement in the nutritional status among those receiving school meals this should not be interpreted to mean that such transfers have been ineffective. Families adjust their intrahousehold food distribution to take account of such transfers. Since much of the food leaks to other family members, the key question is whether targeting through schools and clinics reaches the neediest families (Pinstrup-Andersen 1988). When households rather than just their children are studied, school

8. Devaluation of the overvalued CFA is a frequently offered medicine for the chronic current account deficits in the CFA countries. Another suggestion is to impose steep import tariffs for rice to protect local rice production. Reardon (1993) and Reardon et al. (1992) show that these measures would fall heavily on poor urban consumers.

feeding programs appear much more successful (Babu and Hallam 1989).

Such targeting may work well in middle-income developing countries. In Jamaica, where parallel systems of private health clinics used by the rich and public clinics used by the poor exist, targeting through public health clinics screened appropriately at low administrative costs (Grosh 1992).

Most African countries are much poorer than Jamaica and do not have extensive parallel systems of private and public services. Moreover, where many of the poorest households do not send their children to school or do not use health clinics, targeting through them may leave out those most in need. In addition, transaction costs to recipients are likely to be much higher in rural Africa than in densely inhabited Jamaica.

In sum, school meals and transfers targeted through health clinics may be a good way to reach the food insecure in some areas. In other areas, user fees and low coverage among the poor mean that public services do not target those most in need.

Seasonal targeting is based on the observation that many of the poorest rural households sell cereals immediately after the harvest when prices are low and buy cereals before the next harvest at much higher prices (D'Agostino, Staatz, and Weber 1989). In contrast, the largest producers often sell their cereals late in the season when prices are high. Thus, food aid releases designed to reduce the high preharvest prices automatically target the poorer households. Programs that improve traders' or farmers' access to credit so that stockholding becomes more competitive and seasonal price increases more modest, could help many of the poorer households both by increasing the prices they get when they sell and by reducing the prices they pay when they buy. Although this is an argument for improving capital markets in rural Africa, one should remember that projects providing highly subsidized credit have frequently failed in the past (Adams and Vogel 1990).

Targeting based on estimated purchasing power should not be dismissed just because written records on wealth and income mostly do not exist. Simple proxies for wealth and income can be developed, based on observable facts (tin roofs, windows) or on self-reported income. The relatively successful Jamaican food stamps program partly relied on a simple means test (Grosh 1992).

Estimating household purchasing power is administratively demanding and easily creates corruption if used for targeting. Estimates based on what people tell create incentives to lie, and those based on what people own can distort their choices.

Since the constraints of administrative capacity are very limiting in most of Africa, the scope for means-tested transfers is smaller than in many Latin American and Asian countries. Yet, food insecurity is so severe a problem in both rural and urban areas of many African countries that transfers need to be designed to reach the very poor (Lele and Adu-Nyako 1992). Finding proxies of purchasing power that are operational and inexpensive to use, and do not distort incentives, is a major research challenge. Part of the problem is that proxies of household wealth may not be good proxies for nutritional status of the household's children, due to other intervening factors.

Though consumer subsidies primarily seek to improve human welfare, they also can have developmental impacts. First, better-nourished people are more productive (Strauss 1986). Second, targeted transfers during emergencies can prevent distress sales of productive assets and decapitalization of farms, which is a major long-term harm caused by droughts (Dioné 1989). Third, well-designed transfers can encourage or make possible desirable behavior such as staying in school, participating in preventive health care, or staying on the farm. Yet, care is needed, since inappropriately planned transfers can distort rather than correct incentives.

When transfers and subsidies are established, the beneficiaries often become so interested in maintaining them that reforms become politically

impossible. This implies that inappropriate targeting mechanisms can become very costly in the long term. Moreover, even targeting mechanisms that perform well when designed can turn out to be costly mistakes if they become biased later but cannot be changed. Examples include situations where feedlot operators start to use subsidized foodgrain as a feed, or where the list of food stamp recipients becomes outdated or gets corrupted.[9] Consequently, great care and foresight is required in designing transfers.

5.3. Support for Stabilizing Investments

Most productive investments can *indirectly* mitigate the impacts of food sector instability by improving the *average* levels of food availability and access, thereby making people less vulnerable and better prepared to deal with transitory problems. In this section, however, we focus on a subset of these investments and concentrate on those productive uses of food that *directly* reduce variation in food availability and access to food.

The standard recommendation regarding public or donor-funded investments is that they should concentrate on investments with high social rates of return that are not made because they are not privately profitable. This also applies to stabilizing investments. Many stabilizing investments from water control and storage facilities to vehicles and employee training can be done by farmers, traders, and private firms without external assistance. Donors can help most by supporting investments with large benefits that cannot be captured by those who pay the costs. Examples include investments in drought-resistant varieties, rural roads, and well-functioning markets. Because of the difficulties of excluding nonpayers from using these 'public goods,' private producers often find it difficult to cover costs by charging users. Thus, private investments may not occur though the benefits to users exceed the costs of production by a wide margin. Sometimes the problem can be solved by helping producers to exclude nonpayers (patents, monopoly rights, etc.), but frequently public or external funding is needed.

The view that investments supported by external assistance should produce public goods is not an argument for an expanded central government. Some public goods are local and best governed by local communities. Others can be produced privately even when the characteristics of the goods call for public (or external) funding. Finally, external assistance for public investments indirectly supports private investments by (i) making them more profitable, (ii) increasing private incomes and savings, and (iii) reducing the need to collect taxes to pay for the public investments.

Agricultural research is a prime example of potentially attractive investments in public goods. An overwhelming majority of the nearly 200 ex-post evaluations reviewed by Oehmke et al. (1992) found very high social rates of return. Although good research projects probably are more likely to be evaluated than bad ones, we can still conclude that research has been successful in a wide variety of situations. Moreover, by reducing consumer prices, agricultural research distributes benefits widely. Relative to incomes, the poor consumers are often the main beneficiaries of research in food crops, since they spend a large share of their income on food (Scobie and Posada 1990).

Agricultural research can directly address agricultural production instability by developing varieties resistant to pests, diseases, or droughts, or early varieties that allow multiple cropping in irrigated fields and therefore help to make irrigation profitable. Research that increases the yields of crops or varieties that already have desirable characteristics such as earliness or drought resistance but suffer from low yields, can reduce instability through its impact on farmers' crop choice (Longhurst and Lipton, 1989). Although African agricultural research has not lived up to the expectations over the past decades, experiences from

9. Political pressure from donors may be valuable in reforming such inappropriate but politically "immortal" transfers and subsidies. See section 5.5.

other continents and from the few success stories in Africa suggest that a substantial potential exists (Oehmke et al. 1992). For the high potential to materialize, research must be focused, long-term, responsive to farmers' conditions, and accompanied by extension, credit, and other complementary inputs (Eicher 1989).

Water-control techniques (irrigation, water-harvesting, etc.) both increase and stabilize agricultural production. Throughout Asia, water-control techniques are widely used and have significantly reduced instability in agricultural production. Unlike large, formal irrigation schemes which have not been very successful in much of Africa, small-scale informal water control techniques often provide high social rates of return and are slowly becoming more widespread in the continent (Nagy, Sanders, and Ohm 1988). One obstacle to their wider use is that they often serve many farmers and are beyond the means of individuals (Woodhouse 1989). Although many villages throughout the world have made such investments through local cooperation, external aid can play a useful role in promoting such efforts. In Africa, the need for such a catalyst is probably particularly high, since due to the high rates of population growth and other rapid changes in the socioeconomic environment, local cooperation in yield-increasing and yield-stabilizing investments is becoming profitable and necessary in places where the relevant traditions and institutions are missing. Also adapting water-control techniques to local conditions requires much publicly or externally funded research.

Rural transportation and communication infrastructure (roads, bridges, telephones, etc.) is a key ingredient of agricultural development. By lowering the costs of agricultural marketing, improvements in infrastructure reduce input costs, increase the farmgate prices of outputs, and reduce the volatility of both sets of prices. As discussed in section 3.2, high marketing margins caused by high transportation and transaction costs isolate markets and make prices highly unstable, particularly at the farm level and when the direction of trade changes from sales to purchases or vice versa. Lower costs of food trading integrate segmented markets, reduce price instability, and therefore directly make rural people less vulnerable to transitory food insecurity.

The 'developmental' or long-term impacts of infrastructure investments can be equally important. While more favorable prices (lower for inputs and higher for outputs) make increased input use and specialization more profitable, more stable prices make it less risky. Both are essential for agricultural growth, since higher productivity generally requires specialization and increasing quantities of improved seeds, fertilizer, and other nonfarm inputs.

Infrastructure investments are most useful in a situation where other ingredients needed to get agriculture moving exist and marketing is the most limiting bottleneck. Their value is questionable if improved technologies such as high-yield varieties do not exist, or if some other inputs are missing so that reductions in marketing costs cannot increase agricultural production much. Lipton (1987) claims that this has often been the case in Africa and that investments in "central physical grid infrastructure" have often served primarily urban populations and foreign trade and used inappropriately capital-intensive techniques while neglecting maintenance. By using scarce resources that could have been spent in, say, agricultural research or water-control investments, they may even have retarded rural development.

On the other hand, some benefits of infrastructure investments are not dependent on agricultural modernization. Price stabilization and regional specialization can happen even when technologies are essentially stagnant. In Rwanda, for instance, Loveridge (1991) found that road construction significantly improved market integration. Although the use of nonfarm inputs in Rwandan agriculture is minimal, country's relatively good roads had promoted trade and specialization both inside the country and across the borders. Specialization is based on comparative advantage with the most densely populated re-

gions exchanging labor-intensive products for beans that require more land and high-altitude temperate areas exchanging potatoes for bananas grown in the warmer low-altitude areas. While densely inhabited Rwanda may be a special case, lessons from Mali (see section 3.2) and elsewhere confirm that while technical change in agriculture makes rural roads more valuable, technical stagnation does not mean that benefits are absent.

Lipton's suggestion that in sparsely inhabited Africa rural development should be designed to economize on "bitumenized highways" is a useful reminder that the valid justifications for rural infrastructure can be misused and that each project needs to be evaluated on its own merits. However, this is not an argument against substantial investments in rural infrastructure. In fact, on the importance of labor-intensive investments in rural feeder roads, bridges, etc. Lipton (1987) seems to agree with the advocates of infrastructure investments, such as Mellor and Pandya-Lorch (1992).

Market information systems can reduce the private costs of acquiring information or dealing with lacking information. Although the direct costs of information gathering may appear small, it should be noted that many costly features of African agricultural marketing (extensive haggling, low volumes per trader or per vehicle, costly monitoring of employees, etc.) are responses to lacking or asymmetric market information. Improved market information can reduce these inefficiencies and make markets more competitive (Breimeyer 1976; Johnston and Kilby 1975). To the extent that market information systems improve forecasting, they may improve the allocation of stocks and productive resources (Hayami and Peterson 1972; Bullock 1981). In addition to reducing the costs incurred by market participants (farmers, traders, and consumers), public market information systems can also help banks that value inventories for the assessment of collateral, donors that design development projects, and research institutions and governments that evaluate and formulate policies (Alridge 1992).

Although no generally accepted methodology for their appraisal exists, well-designed information systems are usually estimated to produce high rates of return in industrialized countries (Bullock 1981). In developing countries where transportation and communication networks are poor and the costs of private market intelligence high, returns could be much higher. Empirical confirmation of this hypothesis would require comparisons of market performance before and after the introduction of market information systems. What little African evidence exists suggests very high returns. In Mali, "price differentials between Niarela and the other Bamako town markets have dropped by 50 percent since prices have been broadcast on the radio. ...this drop in prices would be reflected in savings of around 500.000.000 CFA francs for consumers in the other districts" (Sall 1990). A study of the margins between retail prices in Bamako and producer prices in Zangasso, the largest rural collection market in the main grain-surplus region of southern Mali, suggests that marketing margins declined by some 20 percent during the six years when the market information system and other related reforms were introduced (Staatz and Dembélé 1992).

As discussed above, lower marketing margins not only make prices more favorable to farmers and consumers, but also stabilize prices. The benefits are highest at the farm level, particularly if the bundles of services included in the marketing margins are expanding. This may happen if, for instance, asymmetric market information has forced farmers to transport their products to the market even when traders have more appropriate carts or vehicles for the purpose.

Investments in food processing can reduce instability by increasing substitutability between products. As discussed in section 3.2, this is an important issue in the Sahelian countries where long cooking times make domestic cereals unattractive for many urban consumers. If food industry could process millet and sorghum into easy-to-prepare foods when domestic supplies are large, it could prevent the periods of

extremely low prices that tend to make specialization in cereal production unattractive in the region.

While the private sector probably can and should be allowed to operate processing facilities once proven technology exists, public investments and external assistance can be valuable in the phase of technology development. Besides sorghum and millet, processing constraints are important for many other food crops. For instance, advances in the processing of cassava and sweet potato could improve food security by increasing the production and consumption of a food crop that has higher and more stable yields than many alternatives (Pearce 1990).

The legal foundations of the market economy consist of a wide group of activities that governments need to carry out to facilitate private markets. Without law and order, well-defined property rights, and enforceable contracts, private actors may not be able to invest in the specialized assets needed to integrate markets, stabilize yields and/or prices, or to open up new opportunities for people adversely affected by food sector instability (North 1990).

In agriculture, 'communal land tenure' often is seen as a major obstacle to investments, including many water-control investments that would stabilize or 'drought-proof' production, but the issue is more subtle (Bruce 1986). Traditional land tenure systems usually provide farmers with sufficient security. As population densities grow, land becomes scarce, and investments in land become important, tenure generally evolves to include the rights to inherit, sell, and rent. There may be both equity and efficiency reasons for governments to intervene, but in most of Africa wholesale formalization of the traditional system would be premature. A key concern for governments and donors should be to help local institutions in designing and enforcing equitable rules that guide the use of village forests, wells, pastures and other restricted-access common property resources. Otherwise, inappropriate policies together with the pressures of population growth and commercialization may otherwise transform such resources into unprotected and rapidly degrading open-access "commons." Also water-control investments often require land tenure changes that ensure and restrict the benefits to those who do the work or pay the costs.

In agricultural marketing, even the enforcement of private property rights has often been lacking. In several African countries, many traders belong to ethnic minorities. They are frequently harassed by other ethnic groups and occasionally, by governments. Sometimes governments have accused them of speculation and confiscated their stocks. More generally, *arbitrary* enforcement of restrictive policies has often increased the risks and costs of private marketing and thereby reduced the ability of private markets to stabilize prices through regional trade and storage.

The development of efficient agricultural markets also requires that governments enforce private contracts and facilitate trade with appropriate grades, measures, and standards. According to some observers, missing or inappropriate grades and standards are among the most important bottlenecks of African agricultural development (Klitgaard 1991). Grades, standards, and enforceable contracts contribute to price stabilization by lowering marketing margins and thereby widening market participation.

5.4. Labor-Intensive Public Works

Labor-intensive public works are increasingly advocated as a way to combine targeting that addresses acute food insecurity with investments that promote sustainable broad-based growth and therefore improve food security in the long term (Drèze and Sen 1989; Singer 1989; von Braun, Teklu, and Webb 1991; Mellor and Pandya-Lorch 1992). The "work test" targets the working poor with low opportunity costs, and it also may target right times and places, if projects are expanded when and where there are many people applying for work. Besides creating valuable public goods such as roads and village waterworks, public works also may

add to private assets by preventing decapitalization of farms or even providing income for savings and investment.

In Bangladesh and India, labor-intensive public works form an important part of national food security policies (von Braun, Teklu, and Webb 1991). For example, the Maharashatra employment guarantee scheme in India guaranteed employment to all those willing to work at a specified low wage. This implied automatic expansions according to local needs. The scheme successfully dealt with crises that otherwise might have resulted in famines.[10]

In Africa, labor-intensive public works have generally been less important than in Asia, but there are significant exceptions. In Lesotho, food-for-work projects have employed a large share of the rural population and produced one-half of its rural roads and much other infrastructure. In Ethiopia, food-for-work projects have been an important form of emergency assistance. In 1980s, interest in public works increased rapidly in Africa. The World Food Program, USAID, and other donors have supported food-for-work projects in almost all countries. Besides formal projects that pay workers in food, some food aid has been given to villages to be used to provide meals for those who show up for communal work.

Given the deficient infrastructure and the increasingly serious resource degradation throughout Africa, there is a pressing need for the assets that can be produced through labor-intensive methods (Mellor and Pandya-Lorch 1992; Lipton 1987). Appropriate targets include rural roads, irrigation, village waterworks, resource conservation, afforestation, etc. As discussed in the preceding section, many of these investments both increase productivity and decrease instability in food production and prices. Several studies have found that labor-intensive methods in road-construction and other public investments are usually more cost-effective than the more capital-intensive methods commonly used (von Braun, Teklu, and Webb 1991).

The various objectives of public works often conflict with each other (Pines, Schlossman, and Lowenthal 1992). While keeping wages low may restrict benefits to those in need, it also may mean that participants do not earn enough to feed their families. Onerous work that screens out the better-off, may also eliminate those who cannot work because they are sick, live in remote places, or have many small children. Linking pay to performance may give least money to those who need it most, but paying everybody the same tends to erode productivity. Administrative efficiency may call for full-time adult workers, which may exclude female-headed households. Food security requires flexibility, but rapid expansions during emergencies are not conducive to high quality or productivity.

Evaluations from Africa and elsewhere suggest that food-for-work projects are often seen primarily as welfare-oriented food distribution projects (Bryson, Chudy, and Pines 1991). The emphasis has been in equality and nutrition rather than in the quality and productivity of the work. Complementary nonlabor resources such as tools and technical expertise have often been missing and the maintenance of the assets has frequently been neglected. For equity reasons, participants have been paid for "showing up" rather than for their performance. At worst, participants have worked slowly to stretch the work and the pay, even when they have had more than enough work (but no pay) at home.

Food-for-work projects have usually been organized separately from the host-country organizations responsible for infrastructure investments. Instead of making the existing organization more labor-intensive and flexible to enable expansions during droughts and other emergencies, food-for-work programs have created parallel activities. While the existing organizations have maintained their capital-intensive and urban biases the parallel organizations have used almost no capital or technical expertise. Recently, many

10. The Maharashatra scheme lost some of these features in 1988, when average real wages were increased by one-third. This made participation so attractive that workplaces had to be rationed (von Braun et al. 1991).

African governments have established public works institutions that emphasize labor-intensive methods (von Braun, Teklu, and Webb 1991).

In the 1980s, donors have tried to make food-for-work projects more developmental (Bryson, Chudy, and Pines 1991). Although the integration to the mainstream of infrastructure development is still inadequate, pay is now usually linked to performance and more complementary resources are provided. Still, compensation is often kept so high that the "work-test" alone is not sufficient to limit participation. Instead of making projects self-targeting, workplaces are rationed, supposedly based on some measure of needs. The underlying assumption that the administrative assessment of needs can target the poor more accurately than the "work-test" may be true in welfare-oriented small projects run by private voluntary organizations, but whether it applies to large projects that emphasize productivity is questionable.

Although flexible design and good planning can combine high productivity and targeting to the working poor, some of the needy are too sick or old (or young) to work, or are very unproductive even when diligent. Given the need to link pay to performance to boost productivity, public works clearly cannot solve all the food insecurity problems. They can effectively target only those who can work, and their families. Other social policies such as targeted food distributions are needed to take care of those who cannot work.

Since droughts and other forms of food sector instability mostly create food insecurity by preventing the working poor from earning their normal incomes, creating employment through public works could take care much of the famine prevention. Not only does it contribute more to long-term development than direct distribution of food aid, but it also can be administratively more manageable than other attempts to identify those in need. One reason often given to the success of public works in Indian famine prevention is their limited scope; the task was kept manageable by concentrating on those temporarily out of work due to droughts or other problems (Drèze and Sen 1989). On the other hand, the Indian example also illustrates that even when famines are prevented, many of the poor can go hungry, particularly in families with many members unable to work.

Whether workers should be paid in cash or in kind depends on local circumstances (Coate 1989). When projects take place in food-deficit regions where local food markets are inefficient and poorly integrated to wider markets and where most participants have too little food, food-for-work projects may be preferable, provided that the food aid commodities are compatible with the local preferences. If the participants are served by well-functioning markets or already have enough food but need cash for taxes, school fees, etc., the case for cash wages is strong, particularly if the administrative costs of paying food wages are high. In Africa, the appropriate approach for rural public works is often to monetize food aid in urban areas and pay cash wages in rural areas (Singer 1989). This approach may help stabilize the existing thin markets by increasing the volume of products flowing through them.

5.5. Support for Policy Reforms

As emphasized throughout this paper, national policies play a pivotal role in influencing food sector instability and how people are affected by unfavorable changes in production, price, or incomes. The impacts of food aid on stability depend in part on the policies the aid implicitly supports or explicitly promotes. Explicit support for policy reforms is often a good way of reducing instability and mitigating its impacts on food insecure people.

Liberalization of domestic food marketing is a key stabilizing reform that food aid can support. In many African countries, restrictive and unpredictable policies destabilize food access by increasing marketing margins. Although the stated objective often is to stabilize some prices or ensure the availability of some products to some consumers, the consequence often is increased price instability or reduced availability of the staple

foods consumed by the poor, particularly in rural areas. In Zimbabwe, for instance, restrictions on private grain trade have often forced poor consumers to eat highly refined maize meal ("roller meal") rather than the more nutritious and less costly "straight-run" meal they would prefer (Jayne et al. 1991; Jayne and Chisvo 1992). Although roller meal prices are kept stable by regulations and subsidies, the restrictions have destabilized food access by creating shortages and inflating food costs, particularly in drought years when rural households are unusually dependent on purchased maize meal. Removing the restrictions of private grain trade would increase competition, reduce milling costs, and improve poor households' access to low-cost food products.

Although removing unnecessary restrictions and scaling down ineffective public or parastatal activities often are important parts of food policy reforms, they seldom are enough. Appropriate laws, regulations, and public investments are needed to facilitate private activity (see box 3 on cereals market liberalization in Mali). Reforms that reorient public policies and investments to better serve rural areas not only contribute to higher agricultural production, but also reduce instability in the food sector by promoting market integration.

Many important food policy decisions are "byproducts" of economy-wide fiscal, monetary, and trade policies. For example, overvaluation often leads to foreign exchange shortages, which then translate to erratic imports of food or fertilizer, or fuel needed to move them or domestically produced commodities. The importance of macropolicies for food sector suggests that donors should pay close attention to food security issues when promoting macroeconomic reforms.

Also policies that primarily focus on other sectors can have important implications on food sector instability. For instance, interest rate policies that require rural savings and credit institutions to pay and charge rigid and highly negative real interest rates can destabilize prices and food access. Reforms that replace them with positive and flexible rates, can make the poor less vulnerable in three ways. First, even the poor may be able to save more for the "rainless day" if they can do so without inflation eating up their savings. Second, positive real interests are likely to make credit more available so that the poor can avoid the informal loans with much higher rates. Third, even if the poor cannot avoid the distress sales during difficult times, it is in their interest that others can, so that the prices of the assets they sell do not get very depressed.

Finally, also the revenue side of government budget affects food sector instability and its consequences. For instance, rural household surveys in Mali found that in bad years many poor households with too little to eat are forced to sell food to get money for taxes and school fees (Dioné 1989). This suggests that tax relief for the poor or their exemption from the school fees might be a policy reform worth supporting with food aid, at least in bad years. This is almost the same thing as distributing food aid to the food insecure who need to pay taxes or school fees, except that administrative costs are saved at both ends. Besides the immediate food security benefits, such a reform may contribute to economic development by reducing the decapitalization of farms during bad times.[11]

Many necessary policy reforms hurt at least some people permanently or in the short term. The other side of the coin - that bad policies benefit some influential people - often is precisely why such policies persist. When the reforms hurt the poor, food aid can help by providing funds for compensation. For example, food aid can support limited food rationing or ensure reasonable food prices for the urban poor when food marketing is liberalized. When the current policies benefit privileged minorities and compensation is not regarded as appropriate, food aid can still make reforms politically more viable by supporting other activities that can substitute for the political support lost in the reforms.

This does not mean that food aid or any other

11. Partly in response to these concerns, Mali abolished its head tax in 1993.

form of aid should be used to pressure African governments to adopt economic policies that they do not believe in. Evidence on conditionality suggests that reforms forced by donors tend to fail, as unenthusiastic governments learn to play donors against each other and take advantage of their internal pressures to complete the projects and maintain presence in the recipient countries (Anon. 1991). Although these pressures may now have declined, the prospects are still best for reforms that recipient governments believe in and publicly advocate and that donors support with substantial resources and multiyear commitments.

On the other hand, learning by doing during reform processes can change the attitudes of both donors and recipient governments and create support for policies that governments initially did not wholeheartedly support (Staatz, Dioné, and Dembélé 1989). Where current policies are based on biased perceptions, support for policy-relevant research can be an important part of donor support policy reforms. More generally, policy reforms help only if the new policies are better than the old ones. Well-intentioned policies based on incorrect information can easily destabilize what they were supposed to stabilize. Using food aid to support policy reforms requires that donors have a good understanding of the conditions in recipient countries (Timmer, Falcon, and Pearson 1983). Given the paucity of empirical data on agricultural and rural issues in most African countries, policy reforms should be accompanied by substantial investments in research to find out the relevant facts needed in wise policy-making.

The extensive discussion of the disincentive effects of food aid has emphasized that food aid can simultaneously provide resources to support local food production and reduce the political pressure to do so (Maxwell 1986; Maxwell and Singer 1979). The argument applies to any policy, not just the promotion of food production. For instance, food aid for relief camps or for food-for-work projects can both save local resources for labor-intensive public works and reduce the domestic pressure on recipient governments to organize such activities.

Those studying agricultural disincentive effects have concluded that disincentives need not occur if the weaker domestic pressure to promote food production is offset by a stronger pressure from the donors (Maxwell 1986). Analogously, whether project aid to reduce food sector instability or mitigate its impacts on food security reduces or enhances incentives to broad-based sustainable rural development depends on how the associated political leverage is used.

5. Conclusions

Although variable rainfall often appears to be the main source of instability in food production, prices, incomes, and food consumption, man-made factors from military conflicts to restrictive or unpredictably changing policies usually exacerbate the problem. First, they often discourage investments that could stabilize production in the face of variable rainfall. Second, they may reduce market integration and thereby dampen the stabilization that private arbitrage over space and time would otherwise do. Third, civil disturbances and bad policies often limit people's opportunities and keep them poor and vulnerable to natural variations.

In the long term, alleviation of poverty through broad-based economic development is the main road out of food insecurity. In addition to the immediate transitory shortfalls in availability of and access to food, instability in the food sector contributes to chronic food insecurity by perpetuating low productivity and poverty. Instability increases costs of trade and exchange and discourages specialization. Productivity declines also in semisubsistence agriculture, as poor households often have to sell their productive assets during difficult times.

Instability hits hardest the poor. Not only are their margins of survival narrow, but also their access to various coping mechanisms such as credit and off-farm incomes are often small. Large seasonal price increases hurt most severely those rural households who are forced to sell part of their food production after the harvest to meet their pressing cash needs and then need to buy back some food before the next harvest at much higher prices.

Many different policies are needed to reduce its direct and indirect adverse effects of food sector instability on food security. Some of these policies deal directly with food sector instability. Others seek to enhance food security by reducing poverty. Still others are general economic policies that have important indirect effects on food sector instability.

What food aid can do to reduce food sector instability and to promote food security varies from one country to another. What follows are some key conclusions that apply across countries.

1. Shipping food aid when and where harvests fail and prices surge is only one of the many ways of using food aid to reduce instability in the food sector. The way the counterpart funds and/or the political leverage associated with food aid are used also affects instability and may be even more important for food security in the long term. Moreover, in addressing the problems of food sector instability donors should not restrict their horizons to those measures that directly seek to stabilize food production or prices. Depending on the situation, other measures such as promoting export crop production or nonfarm employment may be more cost-effective in improving food security.

2. Too ambitious price stabilization goals can be self-defeating. Stable prices are valuable but costly to achieve. The question is not whether to stabilize prices but how much stabilization to buy. In general, we can only say that extremely high prices are worth preventing and seasonal price increases related to storage costs are not. What is "extremely high" and what is "reasonable" varies from one country to another.

3. The central role currently played by relief

camps and kitchens in famine prevention is a sign of inadequate famine preparedness. Emergency food aid can be made more developmental primarily by channelling more food to public works. But productive employment in public works cannot be expanded fast enough during the crises unless projects are prepared in advance for emergency implementation. This cannot be done by private voluntary organizations alone; relief work must be integrated to the normal public works.

The challenge for donors and recipient governments is to change the administrative and political incentives that now trigger action only when it is too late to organize anything else than relief camps. By promising food aid for labor-intensive public works during emergencies, donors can create incentives for the recipient governments to get their public works agencies involved. And by guaranteeing employment at low wages, recipient governments and donors "reinsuring" such guarantees can commit themselves to early action and put pressure on their organizations to focus on making relief work developmental.

4. In the long term, the main road to food security is poverty alleviation (Tweeten et al. 1992). In most of Africa, poverty alleviation requires broad-based rural development spearheaded by agriculture (Mellor and Pandya-Lorch 1992). Since resources are very limited, public policies should concentrate on the essentials, including the key public goods needed to get agriculture moving, rural infrastructure, education, and basic health and sanitation services (von Braun, Teklu, and Webb 1991). Policies that deal with transitory food insecurity should be compatible with these priorities.

5. Much of what is said in this paper on direct transfers to the poor, investments in agricultural research and rural infrastructure and many other uses of food aid makes sense only in a context of bad policies. For instance, if African governments invested heavily in rural infrastructure using appropriate labor-intensive methods, there would be little need for donors to organize special food-for-work projects. Providing additional resources for the recipient governments so that they could expand their public works, particularly during bad years, would be more cost-effective. But where infrastructure policies are inappropriate, special food-for-work projects may be justified. To ensure that such projects do not reduce domestic pressures to change bad policies, donors may need to use their political leverage to promote reforms that reduce food sector instability and food insecurity.

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