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THE COMPETITIVENESS OF SAHELIAN AGRICULTURE

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## THE COMPETITIVENESS OF SAHELIAN AGRICULTURE

The competitiveness question raises broad-ranging issues, from those that are obvious, such as cost of production, exchange rates, fiscal and monetary policy, and the structure of world markets, to many that are perhaps less obvious, such as research capabilities and the efficiency and effectiveness of rural transport, marketing, credit, and input supply. The competitiveness of domestic cereal production is of particular concern in the Sahel. As world cereal prices fell in the 1980s, Sahelian imports of rice and wheat rose dramatically. A common response to such a situation is to seek means of protecting the domestic market. The merits of a protectionist strategy are assessed in part one of this paper. Part two then reviews a broader range of responses that might be considered to improve the competitiveness of Sahelian agriculture.

### I. THE PROTECTION ISSUE

This part of the paper first discusses the circumstances that have led to protectionist proposals for the Sahel. This is followed by an examination of the arguments that have been raised against protectionism.

#### A. THE ROOTS OF PROTECTIONIST PROPOSALS

The current call to protect Sahelian cereal markets springs from the immediate problem of sharply increased imports and from the long-run objective of sheltering cereal producers until they become a strong engine for broad agricultural growth.

##### 1. Growing Reliance on Cheap, Imported Cereals

The West African Sahel is relying more and more on imported rice and wheat to satisfy food consumption requirements. Delgado and Reardon (1987)

provide a concise overview of the evolving situation. In 1961/65, rice and wheat accounted for 13% (by weight) of cereal consumption in eight Sahelian countries, but by 1979/83 this was up to 23%, with more than two-thirds of these cereals imported. Per capita consumption of rice and wheat rose during that period while the per capita consumption of millet and sorghum fell.

This trend worries Sahelians and outsiders alike. Sahelian governments interpret it as a threat to food security. They see their countries more and more at the mercy of external forces, including, importantly, the domestic policies of cereal exporters. In addition, the rise of imported cereals (see Table 1) means a greater drain on foreign exchange and impeded domestic agricultural development. All of this lies behind the cereals self-sufficiency objective formally adopted by so many of the Sahel states, and has generated new concern over the competitiveness of agriculture in the region. Current proposals to protect local cereals production, including the Mindelo conference recommendations on a protected regional market for cereals, are based on these preoccupations.

The above assessment must be tempered by recognition that the coastal and inland Sahelian countries differ in their reliance on imported cereals. FAO data presented in Delgado and Reardon (*ibid.*, p. 370) imply that the share of rice and wheat imports in total cereals consumption in 1979-83 was 57% in The Gambia, 67% in Mauritania, and 52% in Senegal. In contrast, it was only 7% in Burkina Faso, 12% in Chad, 20% in Mali, and 9% in Niger. In a separate analysis, using USDA data for 1979-1981, Roth and Abbott (1983, p. 129) show that the land-locked countries each provided at least 95% of their cereal consumption from domestic production while Senegal provided only 60%.

In 1983, the three coastal countries accounted for only about 25% of the population of the seven (8.7 million out of 24.4 million), and Senegal accounted for most of that (6.3 million). In addition to having access to the sea, the three countries relying heavily on imported cereals have other noteworthy features. Senegal is the most urbanized and has the highest GNP per capita of all these seven Sahelian countries. Mauritania has very little arable land. It has relied on food aid for over 25% of its consumption for

Table 1. Average Volume of Cereal Imports\*

Thousands of metric tons

	<u>1970-74</u>	<u>1974-79</u>	<u>1980-84</u>	<u>1985-86</u>
Burkina	40	51	88	141
Mali	108	61	150	221
Niger	43	46	97	145
Mauritania	90	121	222	221
Senegal	338	327	522	520
The Gambia	14	41	45	74
Chad	20	18	46	94
Guinea Bissau	28	33	31	28

\* Commercial imports plus food aid.

Source: FAO Trade Yearbook, Vol. 40, 1987.

many years (see Martin, 1986, pp. 5, 60). The Gambia is a very small country with half of its cropped land in groundnuts. It has a strong tradition of reshipping imported rice to other countries, so official statistics on imports may overstate their importance in Gambian consumption.

The point is that reliance on imported rice and wheat varies considerably among Sahelian countries at present, and while all of them show trends toward more such reliance and all are concerned about future implications of those trends, the problem is clearly more difficult for the coastal countries than for those of the interior.

## 2. The High Cost of Domestic Cereals

Rice produced in Senegal cannot be delivered to Dakar at lower cost than rice imported from Thailand. In 1986, the average landed price of broken rice imported from Thailand was 52 CFA/kg, and in 1987 it fell to 44 CFA<sup>1</sup>. In 1988, world rice prices rose by some 50%, bringing the price of imported rice to around 70 CFA. The cost of rice produced in Senegal's River Basin, delivered to Dakar, is estimated to be between 160 and 250 CFA/kg (Martin, 1986, p. 94). Thus the price guaranteed to producers must be at least several times the import price to make Senegalese rice competitive. The same problem exists for the other coastal countries; Mauritania is considering a 45% tariff to protect its rice producers, and until 1988, The Gambia maintained a 36% duty. The interior countries are protected by transport costs, but they too feel forced to adopt protection--e.g. import restrictions and high specific duties (20 CFA/kg. for rice in Niger, for example).

One implication of this situation is that at least some farmers are blocked from using grains as cash crops. This can have a dampening effect on agricultural development in general. Another implication is that the capital

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1. In 1986, rice from Pakistan comprised 15% of rice imports (with an average price of 50 CFA/kg.) with Thailand rice constituting 58% of the total. In 1987, rice from Thailand comprised 40% of rice imports, and rice from Pakistan increased to 48% of the total, with an average price of 42 CFA (Index International, Mensuel d'Informations Economiques, Dakar, Senegal, Nov. 1988).

investment of costly irrigation systems cannot be paid off, and recurrent maintenance of irrigation systems may not even be covered. Thus the poor competitive situation of domestic cereals is seen as an impediment to broad agricultural development.

### 3. Artificially Low World Prices

The world prices of rice and wheat are strongly influenced by domestic policies in exporting countries. The U.S., Thailand, and other countries regularly subsidize their cereal exports. This is considered unfair competition by Sahelian producers. It is also thought to represent a high risk for the Sahel, since policies can change overnight. Finally, governments relying on cereal imports feel they lose some of their sovereignty when something as critical as food consumption is at the mercy of another government's domestic policies.

### 4. Unstable World Prices

Questions of risk and sovereignty also are raised by the instability of world cereal prices. This is particularly true regarding the world rice market which is described as "essentially a thin residual market" (Siamwalla and Haykin, 1983, p. 9). Small variations in weather in major producing and consuming nations can result in large percentage changes in their exports and imports, with resultant major changes in the prices faced by Sahelian importers. This natural tendency toward instability is reinforced when large producing countries manipulate variations in trade in order to stabilize domestic prices. As Huddleston, et al. (1984, pp. 13-19) note:

National policies to stabilize domestic prices of grain . . . have increased price instability in international grain markets. . . . Governments have sought to achieve price stabilization by varying net trade. Thus the internal instability of these nations has been reflected in the international market and in the economies of countries that permit their domestic prices to vary with the international prices. (emphasis added)

The instability of the world rice market is perhaps epitomized by Indonesia, which shifts from being a net exporter to a net importer, depending on weather and policies. Because of the size of its production and consumption, these shifts cause large reverberations in the world market. The prediction for 1988/89 is for a shortfall that will lead to imports of 2.1 million tons. This will probably be about 18% of total world rice trade (USDA, 1988, pp. 5, 53). Drought in Asia and Southeast Asia in 1987/88 has already caused a 45% increase in the price of Thai rice on the world market from 1986/87 to 1987/88.

#### 5. Overvalued Exchange Rates

The poor competitive position of Sahelian cereals is exacerbated by overvalued exchange rates that allow imports to enter at artificially low local currency costs. In the 1970s, domestic inflation was higher in most Sahelian countries than in the countries with which they traded or competed. For the Franc Zone countries, the appreciation of the \$U.S. in the period 1980-1985 reduced the severity of the problem. But after 1985, the decline of the dollar and other factors brought the exchange rate overvaluation issue to the fore.

Thus Sahelian cereal producers face at least three sets of problems. First, the world's major cereal producers have developed highly efficient, low-cost production systems. An important part of that picture is the large water control systems that already exist for Asian and American rice production. The second set of problems is the array of policies that subsidize the production and exports of the world's major cereal producers. Finally, there are the exchange rates and other policies in the Sahel which work to the disadvantage of domestic producers and to the advantage of imports. These three sets of problems, of course, are in addition to the pervasive challenges facing any poor nation in upgrading its infrastructure, developing and extending new technology, educating its population, and generally attempting to promote economic development.

## B. THE CASE AGAINST PROTECTION

The situation outlined above forms the main justification for protection of agricultural markets in the Sahel; protection is seen by many as necessary to overcome the difficulties in obtaining food self-sufficiency. However, recent research and analysis reinforces the view that more protectionist policies are not an appropriate response to either the dependency problem or the related issue of competitiveness. The reasons are both agronomic and economic and include production-related constraints to increased food production, consumer demand constraints, negative macroeconomic effects of protectionism, and negative food security impacts, all of which are discussed below. The CILSS proposal to form a regional protected cereals market is also discussed. The regional issue arises mainly because national protection is so difficult to maintain due to porous borders and the problem of smuggling.

### 1. Production Side Constraints

#### a. Technological Prospects

One concern with the prospects for increased food self-sufficiency in the Sahel is the apparent lack of viable technological options that will lead to increased productivity in millet and sorghum. Millet and sorghum accounted for almost 85% of total cereal production in the seven mainland Sahelian countries in 1985, with almost all of the remainder divided equally between rice and maize (FAO, 1987). New technology for significantly increasing millet and sorghum yields is not at hand. In his authoritative review of millet and sorghum in West Africa, Matlon (1987, p. 31) notes the following:

After several decades of research probably less than 5% of total sorghum and millet area in the region is sown to cultivars developed in modern crop improvement programs. Moreover, under normal rainfall conditions, and with low to moderate input levels under farmers' management, the yield advantage of most improved cultivars rarely exceeds 15% and is often negative.

Research on millet and sorghum is focusing more and more on varieties that can withstand or avoid drought stress. While success in this direction

may improve production stability, it is not expected to increase average production significantly. Nor is there much more hope to be found in modern inputs. While chemical fertilizer use in the Sahel has increased quite a lot in the past 25 years,<sup>2</sup> it has gone mostly to cotton and groundnuts and probably least to millet and sorghum. The profitability of fertilizer for millet and sorghum is questionable in drier areas. In wetter areas, it seems profitable for sorghum, but in these areas fertilizer is far more profitable on maize and rice (Matlon, *ibid.*, pp. 28-29, 40-41).<sup>3</sup>

Recent World Bank studies confirm this assessment. In Senegal, "there have not been any major successes in technology development, transfer, and adoption which may clearly indicate which are the principal sources of growth in Senegalese agriculture" (World Bank, 1987b, p. 19). An assessment of the situation in Niger concludes that modern technical packages suitable for Niger's rainfed agriculture have not yet been developed and that irrigation development is extremely high cost (World Bank, 1986, p. 7).

b. High Opportunity Costs of Greater Self-Supply

Yields of rice and maize are higher than those of millet and sorghum. Attention is usually devoted to the prospects of increasing the area devoted to these higher-yielding crops. There are at least three issues in considering this trade-off question: 1) the cost of developing (or

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2. Chemical fertilizer use increased at an annual rate of approximately 15% in the West African semi-arid tropics since the 1960s (Matlon, 1983).

3. Matlon (pp. 53-58) summarizes the prospects for millet and sorghum as follows: (1) in the Sahelian zone (<350 mm rainfall) there is little prospect of higher yields, and improvements will be through stress-avoiding varieties; (2) In the Sahelo-Sudanian zone (350-600 mm) the main challenge is soil and fertility conservation to avoid declining productivity; (3) in the Sudanian zone (600-800 mm) there could be gains in sorghum productivity through use of more fertilizer and improved varieties; (4) in the Sudano-Guinean zone (800-1100 mm) there is the greatest technical possibility for greater yields, but competing crops (maize, rice, cotton) are more profitable and hence are likely to attract most new inputs and investments. These four zones occupy 24%, 30%, 21%, and 24% respectively, of the land area in the West African semi-arid tropics.

rehabilitating) and maintaining irrigation works for rice; 2) the availability of virgin land for the expansion of maize; and 3) the trade-offs in shifting land (and accompanying inputs) from other crops to maize and rice, including the costs of a decrease in foreign exchange earnings from export crops.

A recent study (Abt Associates, 1985) examined these issues for maize and rice (and also, as appropriate, for millet and sorghum) in the context of analyzing Senegal's goal of producing 75% of its foodgrain consumption by the year 2000.<sup>4</sup>

The report starts with Senegal's 45% self-supply in 1985 and looks first at the prospects for increasing self-supply if millet and sorghum yields do not increase and if no land is switched out of cotton and groundnuts into cereals. In this case, an increase in self-supply must be derived mainly from an increase in areas planted in rice and maize, as well as some increase in maize yields. The report looks at the following ambitious, hypothetical developments: (1) an annual increase of 4,000 ha of irrigated rice area between 1986 and 2000; (2) an annual increase of about 4000 ha in double cropping of irrigated land along the Senegal River between 1988 and 2000; and (3) an annual shift of 5000 ha from millet and sorghum into maize in wetter areas. These major changes would result in Senegal providing only 52% of its own cereal consumption by 2000 (ibid., p. 69).

To reach 75%, there would also have to be a major increase in millet and sorghum yields or a major decrease in cotton and groundnut area to make way for greater cereal acreage. Via the former option alone, there would need to be a doubling of average yield. Via the latter alone, there would have to be more than a halving of cotton and groundnut area (ibid., p. 72). This implies a major shift of land and labor away from export crops and into cereals. To increase the self-supply from 45% to 75%, as much as 600,000 hectares would have to shift from peanuts and cotton into millet and sorghum, mainly in the Peanut Basin (ibid.). This would leave only 550,000 hectares in the two

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4. In 1986, the government had revised their goal to 80% food self-sufficiency by the year 2000 (Martin, 1988, p.59).

export crops, and that would severely weaken Senegal's foreign exchange position.

The irrigation development postulated above to reach 52% self-supply is very expensive. The report estimates that if the targeted area were achieved by 2000, the Government of Senegal would not be able to finance more than 10% of the annual maintenance (ibid., p. 86). The shift from cotton and groundnuts to cereals would also be costly to the government. A domestic resource cost study in the early 1970s showed that cotton and groundnut production was about twice as efficient as earning foreign exchange as cereals production was at saving it (ibid., p. 74). The detailed numbers have certainly changed since then, but the advantage still appears to be with the export crops. While some government reports claim that these trade-offs are not necessary because of ample virgin land for more cereal production, most analysts argue that very little new arable land is available (ibid., pp. 92-94).

In another simulation of the Senegalese case, it was found that a 100% increase in cereals prices would increase the nation's cereals self-sufficiency from 47% to only 55% (Martin, 1988, p.205). Martin gives two main reasons for the low supply elasticity of cereals in Senegal. The first is that groundnuts are far more profitable than millet or sorghum, even with substantial increases in their prices. The second is that the expansion of rice cultivation is strongly limited by a land constraint (ibid., p. 209).

The discussion thus far has concentrated on Senegal. In Mali, Mauritania, Niger, and The Gambia, expansion of irrigated rice has been the focus of considerable attention, but many analysts question the economics of the large-scale irrigation schemes that are relied on to generate new production. One study of The Gambia notes that labor, not land, is the critical constraint in central Gambia during the wet season. In the Jahally-Pacharr rice project, one hectare of fully water-controlled land requires 349 days of labor in the wet season compared to only about 90 days for the "upland" crops of millet, sorghum, or maize. For partly water-controlled land

the labor requirement is 262 days, and for traditional rice it is 217 days (Von Braun and Johm, 1987, p. 16).

On the output side, the marginal productivity of labor in upland cereals and in groundnuts exceeds that of rice grown under every type of water control studied, and the average productivity of labor in upland cereals and groundnuts was exceeded only by fully water-controlled rice (\$2.45/day vs. \$1.45-\$1.50/day). But the latter, of course, requires very large capital investment and maintenance costs. The low marginal productivity of fully water-controlled rice is caused by the project management's rules about work tasks that are geared to maximize yields per acre (ibid., pp. 18-19 and p. 21). These authors also note:

Staple food supply is increased through the new rice scheme at farm-household level, but this is achieved at considerable costs. These take the form of investment and operating costs in the scheme, but also of output foregone in the other wet-season crops from which labor was withdrawn (p. 24).

c. Supply Response by Cereal Producers

If it were possible to raise producer prices by raising retail prices, or lowering processing and transport costs, how would farmers react? Ever since Jones' (1960) pioneering work we have come to expect a positive supply response from African farmers. However, one must obviously go beyond this and examine the magnitude of such responses, which farmers would be involved, whether the responses represent aggregate increases or reallocations, and the factors limiting or facilitating greater responsiveness.

In a 1980 review of supply response studies (Scandizzo and Bruce, 1980, p. 2), the authors conclude that evidence on agricultural supply elasticity is both biased and weak. They note that most studies consider only acreage response and not yield response (and greater acreage does not necessarily imply greater supply). Yield response will better reflect more intensive use of labor, chemicals, manure and other inputs per acres. Well over half the estimates of elasticity of supply responsiveness listed by the authors (ibid., pp. 30-31) are below .67 and, of those, more than half are below .33. A more

comprehensive earlier review (Askari and Cummings, 1977) is consistent with those findings as are later reviews.

Virtually all the evidence reviewed by the above authors is for one crop. Marian Bond (1983) focuses on aggregate agricultural response in Africa. The average short-run elasticity for nine countries analyzed is 0.12 and the average long-run elasticity is .21 (ibid., pp. 721, 724). In this study, the dependent variable is per capita total agricultural output, and the independent price variable is measured as the average producer prices of the major agricultural products deflated by the consumer price index.

A recent survey of aggregate supply response studies concludes that the aggregate supply elasticity of agriculture with respect to prices in developing countries lies in the range of .3 to .9 (Chhibber, 1988). Chhibber suggests that it is higher, from .6 to .9, in the more advanced and land-abundant developing countries, and lower, at around .2 to .5, in poorer countries with inadequate infrastructure. He also states that the supply elasticity with respect to nonprice factors, such as public goods and services, is higher (around one) in countries with "inadequate infrastructure facilities, imperfect markets, lack of capital, and lack of private research organizations" (ibid., p.45). He concludes that improved price incentives alone will not be sufficient to raise agricultural output in these countries, and that adjustment programs must include some room for the provision of public goods and services.

Another researcher also looked at the relation between overall agricultural performance and prices, not to estimate elasticity but to identify determinants of growth.<sup>5</sup> He found that, in the 31 Sub-Saharan

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5. Kevin Cleaver, 1985. Cleaver's dependent variable is the agricultural growth rate per capita which he regresses against the Nominal Protection Coefficient for agriculture as a measure of price discrimination. His findings are that a 1% increase in the net protection coefficient (i.e., a reduction of price discrimination at farm producer level) is associated with a 0.05% increase in the agricultural growth rate. The price elasticity of agricultural growth implied by this equation is significantly greater than zero, but is quite low. In addition, the correlation coefficient is extremely

African countries he looked at, the impact on aggregate production of keeping many farmgate prices low is considerably less than is generally thought. Other factors such as efficient government involvement in farm output supply and marketing, population growth, the effort made by government in operating and maintaining agricultural research, extension and credit services, politics, and other as yet unidentified factors are of much greater importance in determining agricultural growth.

Braverman and Hammer (1986) formulate a model for Senegal that incorporates supply responsiveness (derived from production functions) along with demand effects caused by consumer price changes. They can thus trace the impact that an increase in consumer price prices may have on the production of millet and export crops and also the impact on the budget and foreign exchange.

The Braverman-Hammer model operates under three important assumptions: no increase in cultivated area; no reallocation of land among crops; and no interregional migration. The first assumption is close to what an earlier-referenced study (Abt, 1985) defines as the Senegalese reality. The second is imposed to provide the most optimistic prediction for export crop output and hence for foreign exchange earnings when millet production expands considerably.

The model predicts an 11.6% increase in millet production and consumption if the consumer rice price increases by 50%. This result assumes that the cross-price elasticity between rice and millet is one. Alternate assumptions of 0 and 2.0 show millet increases of 0.5% and 22.1% respectfully (Braverman and Hammer, *ibid.*, p. 248). Braverman and Hammer call 1.0 the best estimate of the cross-price elasticity, but this is based on a University of Michigan

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low, suggesting that only 13% of the variation in agricultural growth rates is explainable by the nominal protection coefficient (pp. 10-11, 16, 28).

study<sup>6</sup> of three rural villages. Some of the earlier discussion seems to imply a lower elasticity for urban areas which are perhaps the critical markets. The hypothetical 50% increase in rice prices also reduces real income and the budget deficit. The improved budget situation is largely due to tariff revenues on rice imports.<sup>7</sup>

Thus there seems to exist a high and apparently growing degree of consensus among students of Sahelian agriculture to the effect that higher producer prices will have little effect in increasing cereals self-supply, at least in the short run. Existing policy targets as expressed, for example, in Senegal's recent Plan Céréaliier, are unreachabale. even at a high cost.

Why is supply responsiveness likely to be limited in the Sahel? The earlier discussion of slow progress in varietal improvements is obviously relevant. Land availability is another factor. Substantial portions of the Sahel are unsuitable for agriculture given existing technology due to desert conditions, large expanses of rock outcropping, periodic flooding, etc. Soil quality varies widely, and Sahelian soils tend to be unstable with rapidly declining productivity occurring under conditions of continuous cultivation. Although a small percentage of the land may be under cultivation in any given year, it may be misleading to refer to agriculture in the Sahel as being "land-abundant".

Another cause of low supply responsiveness is the production strategies the farmers follow to counteract the extreme environmental risk that they face. These production strategies include: diversification of crops, varieties, and land types; intercropping; plot scattering; and hand-tool

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6. Center for Research on Economic Development (CRED), "Consumption Effects of Agricultural Policies: Cameroon and Senegal", Ann Arbor, Michigan: University of Michigan, 1982.

7. The above discussion has dealt with the supply response of production rather than the response of marketed supply. The former is relevant to the national food security situation while the latter is critical for urban areas. The elasticity of marketed supply response is typically greater than that of production response, though this does not much change the general conclusion that supply response is sluggish.

planting and weeding (Matlon and Kristjanson, 1988). Crop diversification reduces farm-level income variability to the extent that individual crop yields are not closely correlated. Intercropping can improve stability if crop mixtures reduce the incidence of pests and diseases, or if the component crops can compensate yield losses in stress conditions. Plot diversification exploits imperfect correlation of crop stress across micro-environments. Diversification of varieties with varying maturities or varying susceptibility permits staggered plantings (spreading the risk of period-specific stresses) and reduces the risk of pest and disease.

Kristjanson (1987) found that farmers in Burkina Faso had also developed flexible production systems which allowed them to revise their cropping patterns as the season progressed and more information was gained as to the onset, amounts, distribution, and duration of the rains. These sequential adaptation methods included the following modifications: (1) shifting crops along the slope of the cultivated areas; (2) switching crops and/or varieties with late first plantings and replantings; (3) increasing plant densities through late plantings or replanting of the main crop or intercrop, or decreasing densities through thinning; and (4) adjusting the date, number, and intensity of weedings across crops and plots.

The incentives for private diversification and flexible cropping systems can have adverse effects on economic development in the semi-arid tropics<sup>8</sup>. Policies that create incentives to limit diversification strategies may increase the overall level of risk faced by producers without a corresponding development of insurance or saving schemes that achieve the same risk-alleviating (or risk-spreading) purpose. In fact, their own risk management strategies are one of the factors which severely limits the potential of many current available technologies (e.g. chemical fertilizer use and animal traction plowing in the Sahel).

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8. Diversification strategies make agricultural research and extension more difficult, since it does not allow a focus on a particular monoculture, for example. Transaction costs of trade are also higher.

If farming households were able to reduce their risk exposure, or to shift some of the risk from individual households (or even villages) to a larger group<sup>9</sup>, farmers would be more willing to specialize in the activities in which they have comparative advantage. This might also lead to more rapid adoption of technology and greater responsiveness to economic stimuli. Spreading or shifting risk means having rural financial/insurance institutions that farmers can use effectively. Unfortunately, viable institutions of this type face many problems, especially in the Sahel (see Binswanger and McIntire, 1987, Christensen, 1988).

## 2. Consumer Demand Constraints

One of the strategies to improve incentives for domestic cereal producers is to raise the prices of imported cereals. This will be more successful the more readily consumers switch from the latter to the former when prices change. That is, the strategy will be more effective if there is a high cross-price elasticity between the imported and local cereals. The strategy will be less effective if factors such as urbanization, per capita income, taste preferences, and dietary patterns are very strong relative to the importance of price in determining consumption.

Delgado's 1987 study of the relationships among cereal consumption, prices, urbanization and income between 1970 and 1983 in Senegal, Côte D'Ivoire, Burkina Faso, and Niger finds that urbanization is by far the most important factor leading to an increase in consumption of rice and wheat relative to traditional cereals (millet, sorghum, and maize). In contrast, the relative price of rice has a weak and/or insignificant effect on rice consumption in most of the study's regressions. (It is significant only in

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9. Spreading the risk over a wider geographic area is a critical need in the Sahel, due to the highly covariant risks (e.g. of drought) faced by a household or village.

Côte D'Ivoire where it is weak).<sup>10</sup> Byerlee and Morris (1987) found that per capita income and urbanization were significant factors in explaining per capita wheat consumption in 40 tropical countries including 20 Sub-Saharan African countries.

The literature gives strong emphasis to nonprice factors in explaining consumption patterns and low elasticities of substitution for rice. Millet stores less well than rice, and requires much more processing, which is highly important for urban populations. There is little dissent from the conclusion that rice is a strongly preferred cereal, as is wheat, though to a lesser extent. Recent studies concur: consumption of the imported grains will not decline sharply in reaction to policy-induced price increases (Josserand, 1984; Delgado, 1987; Reardon, 1988; Rogers and Lowdermilk, 1988).

Reardon (1988) found that rice as a proportion of cereal consumption stayed relatively stable despite wide price fluctuations during the year even for the poorest segment of the sample urban population in Ouagadougou, Burkina Faso. He attributes this in part to the high consumption of street-vendor rice for the midday meal, when both sexes of the household are typically working away from home, and cannot return home to eat due to high transportation costs and the nature of their jobs.<sup>11</sup>

A few cautions should be raised in interpreting these studies. First, since one cause of the current levels of rice consumption is often alleged to

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10. Delgado's summary regression combining data from all four countries indicates that a 1% increase in urbanization leads to almost a 2% increase in the proportion of rice in total cereal consumption. This result is statistically significant. The same regression shows that a 1% increase in the price of rice relative to the price of traditional cereals leads to about a 0.25% decline in the proportion of rice in total cereal consumption. But this result is not statistically significant. The results for wheat are similar.

11. Rogers and Lowdermilk (1988, p. 17) also found low price responsiveness of rice consumption in urban Mali. They note, however, that the price of rice during their study ranged from only 129 CFA to 164 CFA per kg. and state that: "recently, the price of rice has risen...to 220 CFA/kg. in the capital. Local reports suggest that consumers are now beginning to shift their consumption away from rice toward coarse grains, even for the midday meal."

be several years of low prices in the 1980s, one might be led to think that consumers are sensitive to price in their cereal consumption decisions. There may be a ratchet effect, but the evidence is not clear. A second caution relates to the time allowed for adjustment. The Reardon et al. (1987) study measures price elasticity with monthly data over a one-year period. Low elasticities over such a short period may not be indicative of the impact that higher prices will have over several years. A third caution relates to the interpretation of insignificant coefficients for the price variable. The proper conclusion is that the results do not allow rejection of the hypothesis that the coefficient is zero. It is not proper to jump from that conclusion to interpreting the results as if the coefficient were zero or even very small (i.e. that price has no influence on quantity consumed).

Finally, the importance of coefficients and even elasticities cannot be evaluated unless one also considers the likely changes in the "denominator." For example, a low elasticity for relative price changes and a higher one for the percent of the nations' population living in cities need not mean that changes in percent urbanization will play a stronger role in determining rice demand. Delgado (1987, pp. 33, 44) finds that a 1% increase in the relative price of rice is associated with a -.23% change in the percent of rice in total cereal consumption, and that a 1% increase in the percentage of the population living in cities is associated with approximately a 2% increase in the percentage of rice in cereal consumption. However, the relative price of rice can increase very rapidly with a tariff, or as noted above, with changing world conditions. A 50% increase in one year is not unheard of in world prices. In marked contrast, the percentage of the population living in cities grows very slowly. From 1960 to 1982 this figure increased from 11% to 22% in Sub-Saharan Africa (World Bank, 1984, p.85).<sup>12</sup> Thus, even with a larger elasticity, the growth of urbanization may not be more important than price in determining the demand for rice in West Africa.

We conclude that the evidence presented is very weak regarding consumption sensitivity to price changes. At best, the recent studies raise a

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12. In Senegal the increase was from 23% to 34%.

yellow caution flag about the potential effects of protectionist policies which attempt to stimulate greater demand for domestic cereals. We do not consider the evidence strong enough to reject with confidence the hypothesis that consumers will switch to domestic cereals if imported cereals prices rise significantly.

### 3. Negative Macroeconomic Effects

#### a. Reduced Foreign Exchange Earnings

As this discussion of reallocation of resources implies, significantly greater self-supply of cereals means lower production of export crops in the short- to medium-term. This seems unavoidable given the lack of new technologies and the scarcity of productive resources. There will, of course, be some opportunities to increase cereal yields and to bring some additional resources into production, but major increases of self-supply, like those contemplated by Senegal, will force trade-offs with export crops in the absence of unforeseen changes.

Because of this trade-off effect, other costs may be involved. One is foreign exchange earnings. Cereal imports accounted for about 10% of the value of commercial imports of each Sahelian country in 1983 and increased to an average of 14% in 1985 (Table 2). Groundnuts and cotton accounted for from 20%-70% of the countries' export earnings in 1983, although this declined somewhat in 1985 (ranging from 12% in Senegal to 60% in Burkina). An increase in domestic production in cereals could decrease foreign exchange expenditures, but a drop in production of groundnuts and cotton (as discussed above) would lower foreign exchange earnings. The net result depends on how efficiently domestic resources are converted into foreign exchange (earnings or savings) via cereals versus groundnuts and cotton. Thus Domestic Resource Costs (DRCs) must be examined.

The DRC indicator is the ratio of the social opportunity cost of domestic resources to the value added measured in world prices that is created by using those domestic resources. A country has a comparative advantage in a given

Table 2. Commercial Imports and Exports 1983

	\$000 (% of Total)					
	IMPORTS		EXPORTS			
	<u>Total</u>	<u>Cereals</u>	<u>Total</u>	<u>Live Animals</u>	<u>Oilseeds &amp;Oils</u>	<u>Textile Fibers</u>
Burkina Faso	287,517	31,311 (11)	56,972	5,033 (9)	9,001 (16)	31,191 (55)
Chad	100,000	12,320 (12)	140,000	67,800 (48)	--	60,000 (43)
The Gambia	105,891	9,322 (9)	45,500	--	24,392 (54)	--
Mali	345,711	40,417 (12)	240,000	127,295 (53)	5,373 (2)	68,400 (29)
Senegal	1,044,460	106,522 (10)	545,795	3,344 (1)	110,507 (20)	9,001 (2)

Commercial Imports and Exports 1985

	\$000 (% of Total)					
	IMPORTS		EXPORTS			
	<u>Total</u>	<u>Cereals</u>	<u>Total</u>	<u>Live Animals</u>	<u>Oilseeds &amp;Oils</u>	<u>Textile Fibers</u>
Burkina Faso	250,000	41,670 (17)	60,000	8,134 (13)	8,862 (15)	26,265 (44)
The Gambia	104,660	14,637 (14)	50,010	--	15,600 (31)	1200 (2)
Mali	410,000	56,073 (14)	210,000	73,250 (35)	10,300 (5)	--
Senegal	796,390	90,458 (11)	484,700	--	44,113 (9)	15,205 (3)

Source: FAO. FAO Trade Yearbook, Vol. 40, 1987. FAO Statistics Series No. 78.

activity if the ratio is less than one, that is if the cost of domestic resources is less than the value added created. A  $DRC > 1.0$  means that it is not advantageous for a country to attempt to earn (or save) foreign exchange by producing that particular crop, since the value of domestic resources used in that crop's production could be traded directly to earn more foreign exchange than if those resources are used to produce the commodity.

Calculating DRCs requires judgement about which prices should be used to value inputs, outputs and foreign exchange--e.g., official prices, border prices, local prices, shadow prices, current prices, trend prices, or predicted prices. A recent study of Mali (Stryker, et al., 1987) reveals the importance of these judgements and provides valuable insights into Malian agriculture. The study found that rice is a less efficient foreign exchange earner than millet, sorghum, or maize (p. 48). Cotton is more efficient than any cereal at predicted 1990 and 1995 prices; but not at 1986 world prices. Thus the future foreign exchange situation for Mali would be worsened if resources were shifted from cotton to cereals.

For Senegal, a previously mentioned study (Abt, p. 74) cites figures from the mid-1970s that show peanuts or cotton being very efficient foreign exchange earners (DRCs  $< .50$ ), millet and sorghum favorable (DRC =  $.62$ ) and rice unfavorable (DRC =  $1.02$ ). Somewhat later calculations in Pearson et al. (1981, pp. 285, 286) show DRCs for rice well above 1.0 (unfavorable) with a few small exceptions.

Thus, for Senegal at least, it seems that a switch from export crops to cereals (especially to rice) would worsen the foreign exchange situation. Export crops become even less attractive (relative to cereals) as the world prices of cotton and groundnuts decline. Such tradeoffs are less clear in other countries. For example, in Mali rice is grown predominantly in one place (the Office du Niger), while cotton is grown elsewhere, so it is not a case of planting cotton instead of rice in a given plot.

The competitiveness of domestically produced cereals is quite sensitive to the location of their consumption. Pearson et al. (ibid., p.286) showed

that in 1981, the DRC for some rice technologies was less than 1.00 for consumption on the farm but it is greater than 1.00 for consumption in Dakar. The difference, of course, is transport costs.

b. Budgetary Effects

Substituting cereals production for export crop production would affect national budgets as well as foreign exchange reserves. Budgetary effects would be felt on revenues and expenditures. The seven mainland Sahelian countries have relied on import duties (from all imports) for from about 11% to 64% of total budgetary revenues in various past years (Table 3). We know that cereals imports have comprised about 10% of total imports but we do not have specific information on the relative importance of cereals import duties. However, in some years, governments do regard cereals import duties as important revenue sources. For example, Mali accepted IMF recommendations to raise rice duties and fully enforce coarse grain duties at least in part because of government revenue considerations (Stryker, et al., 1987, p.57). In The Gambia, where a very high fraction of revenues comes from import duties, these are set primarily to raise revenues, not for protection. This did not, however, prevent the Gambian government from removing import duties on rice when the Senegalese price was cut from 160 to 130 CFA/kg in 1988. In analyzing Senegal's budgetary situation, the World Bank (1987b, p. 23) noted that "the slow growth of tax revenues, particularly of customs duties, has emerged during the last two years as a particularly important factor slowing down the pace of financial consolidation." Part of that decline is attributed to a shift of imports from official to clandestine channels. Senegal's budget did benefit to the tune of over 20 billion CFA from its high tariff on rice in 1987, however.

Export duties are usually less important as a source of budget revenues.<sup>13</sup> Export crops, however, have contributed significantly to budget revenues when government buying agencies keep producer prices lower than world

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13. These ranged from only .5% to 5% of total revenues in recent years (Table 3).

Table 3. Budget Revenues and Expenditures

Billions of Francs (\*unless otherwise noted)  
(% of Total)

	REVENUES				EXPENDITURES	
	<u>Total</u>	<u>Import Duties</u>	<u>Export Duties</u>	<u>Other Tax on Int'l Trade</u>	<u>Total</u>	<u>Agric., Forestry &amp; Fishing</u>
Burkina Faso (1985)	72.7	21.3 (29)	1.4 (2)	1.9 (3)	63.4	2.7 (4)
Chad (1976)	15.1	6.6 (44)	1.2	--	23.2	4.8 (21)
The Gambia (1982) *million dalasis	87.1	55.5 (64)	3.8 (4)	.4	159.5	17.6 (11)
Mali (1985)	79.7	8.6 (11)	4.4 (5)	.3	165.9	8.0 (5)
Mauritania (1983) *million UM	8,963	2,832 <sup>1</sup> (31)	31	--	10,109	781 <sup>1</sup> (8)
Niger (1980)	77.4	24.4 (32)	3.1 (4)	.65	98.7	6.7 (7)
Senegal (1983)	182.72	62.32 (34)	1.06 (.5)	.03	250.04	18.63 (7)

<sup>1</sup> 1979 values.

Source: IMF. Government Finance Statistics Yearbook. vol. XI, 1987.

prices. This has been the case with cotton, for example. The cotton parastatals pay producers well below world price parities; the "profit" is really an implicit export tax.

A shift toward cereals at the expense of export crops would probably have a negative effect on government revenues if it implies fewer cereals imports and lower yields from explicit and implicit taxes on exports. The effect on expenditures is less clear. Expenditures may decline if government agencies that buy the export crop receive less net government financing. For example, in 1980, ONCAD, which handled Senegalese groundnut marketings, received financing that amounted to 50% of the national budget (Martin, 1986, p. 6). Elimination of ONCAD surely helped the Senegalese budget. On the other hand, a policy to expand cereals production may include price floors, input subsidies, better infrastructure, and other elements that would all increase budget outlays.

We can conclude, then, that while the effect on government revenues would be negative, the effect on expenditures is unpredictable. No absolute statement can therefore be made about the budgetary impact of greater cereals self-sufficiency.

#### 4. Negative Food Security Impact

Recent research results argue that positive producer price policies are also likely to worsen income distribution and the nutritional status of the poor, in the short run at least. This is so because many, if not most, rural households are net buyers of grain.

In surveys of about 200 farm households in Mali, and 200 in Senegal, a recent study (Weber et al., *ibid.*, pp. 2-3) found that only 48% and 29% respectively were net grain sellers. The surveys were conducted between 1985 and 1987 in major grain-producing areas. In another study, surveys of 322 farm households in nine Burkina Faso villages between 1984 and 1985 found that only 52% of all grain producers (not just net grain sellers) sold grain (Sherman et al., 1987 pp. 148-149). Five of the Burkina villages were

characterized as surplus producers and 84% of these surplus area households sold grain. In contrast, only 12% of sample households in the 4 deficit area villages sold grain.

These statistics serve as reminders that farm households are not homogenous. Individual households may be affected differently by the same policy. Net grain sellers are both short- and probably long-term gainers from policies that stimulate production via higher prices, while net buyers may lose. Reutlinger and Pellakaan put it this way:

If . . . much of the marketed surplus of domestically supplied food is not produced by the chronically food insecure but many of the purchasers of food are chronically food insecure, their food security can decrease, at least temporarily, when food prices are raised. (Reutlinger and Pellekaan, 1986, p. 32.)

These possible negative food security effects at the household level are not counterbalanced by a reduction of risk at the national level, such as is often posited to follow from greater food self-sufficiency (defined as greater self-supply). The argument is that risk will be reduced as a result of reduced exposure to uncertain and unstable world commodity markets. However, a shift to a greater self-supply does not necessarily involve a reduction in risk, but rather a shift in risk exposure toward the variability of domestic cereal production and away from the combined variability of domestic groundnut and cotton production and world prices for cereals, groundnut oil, and cotton. To the extent that the latter production and price movements are not closely correlated, reliance on them should be less risky than greater reliance on domestic cereal production.

During drought periods there will be declines in Sahelian production of cereals, groundnuts and cotton. The effect of these declines may be moderated if world groundnut and cotton prices rise or stay strong and world cereal prices fall or stay low. This reliance on world prices for food security is not looked upon favorably by Sahelian governments, but it may be less risky than alternative options.

Tables 4 and 5 show Sahelian production of millet and sorghum from 1962 to 1985 and world prices for cotton, groundnut oil, rice, and wheat from 1962 to 1986. The tables highlight some problems: declines of more than 10% from one year to the next in millet and sorghum production and world groundnut and cotton prices, and increases in world rice and wheat prices of at least 10% from one year to the next. These problems are most evident in millet and sorghum production in Senegal and Mali and in world groundnut oil prices.

Extended, major changes in world prices of groundnut oil and rice that were disadvantageous to the Sahel occurred in six different periods (see Table 5). However, in five such periods a damaging change in one price (e.g. a fall in groundnut oil prices--as happened from 1981 to 1983 and again from 1984 to 1986) was countered by a favorable change in the other--e.g. a fall in rice prices.

Thus there does not seem to be clear evidence that Sahelian countries face less risk to food security when they cut reliance on world markets in favor of greater self-supply of cereals.<sup>14</sup> There is at least one other factor to consider here. At least some Sahelian countries have a comparative advantage in their export crops; and when world prices turn against the Sahel, cushioning devices exist that are not available if cereals import replacement occurs at the price of reduced exports--for example, STABEX and IMF compensatory facilities.

##### 5. A Protected Regional Cereals Market

A protected regional market that aims at setting prices above trend levels is subject to the same objections as national protection that raises imported cereals prices above their trend level in world markets: if it were effective it would be a costly and inefficient means to increase domestic cereals production and would probably not contribute to enhanced long-term competitiveness.

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14. Although Martin (1988) finds a slight reduction in risk in Senegal with increased cereals self-sufficiency.

Table 4. Millet and Sorghum Production (1000 mt)

Year	Burkina Chad	Gambia	Mali	Maurit- ania	Niger	Senegal	Total	% Change Total Prod'n	
1962	772	650	50	867	89	1255	428	4111	-
1963	784	896	50	770	90	1329	482	4402	7.08%
1964	850	710	51	661	90	1329	536	4227	-3.98%
1965	820	614	49	720	100	1056	557	3916	-7.36%
1966	860	630	44	765	90	1119	423	3931	0.38%
1967	868	647	47	857	90	1343	655	4507	14.65%
1968	907	661	50	757	95	948	450	3868	-14.18%
1969	938	651	46	913	110	1381	635	4674	20.84%
1970	973	610	52	715	83	1102	401	3936	-15.79%
1971	780	585	52	725	50	1226	583	4001	1.65%
1972	788	415	51	624	38	1128	323	3367	-15.85%
1973	742	400	52	660	25	754	511	3144	-6.62%
1974	978	530	55	800	50	1102	795	4310	37.09%
1975	1130	522	54	925	45	836	621	4133	-4.11%
1976	890	507	29	830	36	1307	558	4157	0.58%
1977	998	574	27	751	21	1473	420	4264	2.57%
1978	1022	580	37	910	31	1495	803	4878	14.40%
1979	1034	520	28	746	21	1608	521	4478	-8.20%
1980	903	450	32	708	37	1734	553	4417	-1.36%
1981	1106	257	47	950	66	1636	736	4798	8.63%
1982	1056	280	54	1057	40	1651	585	4723	-1.56%
1983	1009	331	34	900	20	1689	352	4335	-8.22%
1984	971	254	38	800	15	1023	471	3572	-17.60%
1985	1406	526	55	1100	32	1746	950	5815	62.79%

Source: FAO, 1987.

Table 5. First Quarter Prices\*

Year	US\$/lb. Cotton	US\$/mt. Groundnut Oil	US\$/mt. Rice	US\$/bu. Wheat
1962	29	306	138	1.67
1963	30	264	140	1.86
1964	30	265	137	1.81
1965	29	360	133	1.71
1966	28	300	145	1.61
1967	30	300	171	1.86
1968	32	254	224	1.71
1969	28	378	182	1.71
1970	28	347	151	1.42
1971	31	470	126	1.72
1972	40	433	131	1.63
1973	41	456	192	2.77
1974	83	1059	566	5.67
1975	47	1040	400	4.22
1976	66	708	260	4.07
1977	83	887	259	2.96
1978	66	962	366	3.21
1979	76	972	304	3.79
1980	93	747	403	4.64
1981	96	1108	485	4.96
1982	70	671	331	4.65
1983	75	453	271	4.49
1984	88	1031	254	4.15
1985	69	902	222	4.01
1986	53	607	229	3.61

Source: IMF Int'l Financial Statistics: Supplement on Price Statistics, Supplement No. 12, 1986.

\* Average of weekly quotations:

Cotton: Cotton A-MIDD 1-3/32 secs., Liverpool Index "A", Average of cheapest 5 of 10 styles, Jan.1968-May 1981, Med. Staple, SM 1-1/16, c.i.f. Liverpool.

Groundnut Oil: any origin, c.i.f. Rotterdam

Rice: Thailand white milled 5% broken, f.o.b. Bangkok export price.

Wheat: U.S. No. 2 Hard Red Winter, f.o.b. Gulf Ports, Ordinary Protein, Export price base.

The impetus for the regional cereals market idea comes from the perception that low world prices for rice (and wheat to a lesser extent) make local production of grains uncompetitive. At the same time, the permeability of frontiers makes it difficult to sustain national protection at levels significantly different than that imposed by neighboring states.

Aside from the questionable desirability of the protected market idea, its feasibility is extremely dubious. The choice of countries is one problem. Gabas, et al. (1987), in considering the possibility of a protected Sahelian regional cereals market, note that such a regional market would require a harmonization of cereal policies among the countries, but that this may be difficult because the countries face different economic and agricultural situations. Their proposal, therefore, ends up including only Mauritania, Mali, Senegal, and The Gambia as market members, but notes that this would pose a severe problem of rice moving from Côte D'Ivoire to Mali.

A problem not considered in the Gabas paper is exchange rates. The four countries have three different currencies. The real rate of exchange among them varies. The dalasi is floating and the CFA is fixed. Thus a common protective wall against non-Sahelian imports requires more than a common tariff. If Senegal and The Gambia both have a 30% tariff, imported rice will move from Senegal to The Gambia if the CFA is overvalued compared to the Dalasi.

A protected regional market calls for agreement on the level of protection, the level of input subsidies to domestic producers, adjustments for variations in exchange rates, and sharing of tariff revenues. It is hard to find any historical precedents for an agreement covering so large an array of policies, especially those that impinge on food supplies. It has to be regarded as highly unlikely to succeed in the Sahel.

Then there are the political strains associated with the uneven incidence of costs and benefits. The free-trade-oriented Gambia would suffer as would coastal countries in general, while surplus millet-producing regions and rice

producers (Mali and perhaps Mauritania) would benefit. The Gambia has already vigorously expressed its opposition to this approach.

The Sahelian situation has some elements in common with that in Asia. There, too, the ease of smuggling blunts domestic policies. Timmer (1986) concludes that it is unrealistic to attempt to solve the Asian problem with a regional protected market: "logistical capacity, political reality, and limited budgets make such a scheme impossible as a conscious policy." The same observations apply even more fully to the Sahel.

The alternative is a situation similar to the one which exists now, where each country imposes its own tariffs and some of the imported grain moves across borders if there are large enough price differences. This of course blunts the effectiveness of a tariff in stabilizing prices and providing better incentives to farmers. However, since all Sahelian countries are concerned with these issues, it is doubtful that grain will be entering the region completely untaxed. The Gambia, after all, had a 36% tariff on rice in 1987. But there will continue to be differences as each nation places different priorities on consumer welfare, production incentives, and maintenance of exchange rates.

Through consultation and formal or informal dialogue, better policy coordination might be achieved. Also, strengthened customs administration could reduce smuggling of the large-scale, pure tax-avoiding type that has been found to comprise a significant share of the cross-border trade between some countries--The Gambia and Senegal, for example. These limited and indirect measures may be the only regional response that is feasible in Sahelian conditions.

## II. POLICIES AND PROGRAMS TO INCREASE COMPETITIVENESS

If national protection is inefficient, costly, and of doubtful feasibility, what policies are suitable?

Prudence is called for in drawing policy inferences from the analyses reviewed here. The Sahel states differ among themselves in many basic ways, with differences between the coastal and interior countries especially apparent. Many uncertainties persist with respect to underlying elasticities of substitution in production and consumption. Food policy has many objectives--national security and risk prevention, social equity, income growth--and economists can speak only partially to the trade-offs involved.

The policy options that are assessed below include: devaluation, the role for price policies, structural policies, improving technology, and encouraging creative responses.

#### A. DEVALUATION

Exchange rate overvaluation has been pointed to as a major factor in the Sahel region's "lack of competitiveness" for many years, especially since 1985. When people say that their economy has comparative advantage in nothing, it usually signals a problem of overvalued exchange rates. The prescribed solution is a devaluation that will make exports and import substitutes more competitive.

Preoccupation with the exchange rate is warranted. It is the single most important price in these small, open economies. But overvaluation, and the resulting need for devaluation, is not as intractable a problem as it sometimes appears.

First, the overvaluation issue is usually seen as primarily a Franc Zone problem. But not all the Sahel states are members of the Franc Zone.<sup>15</sup> Four of the eight CILSS states (The Gambia, Mauritania, Cape Verde and Guinea Bissau) are outside UMOA, and have flexible exchange rate regimes.

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15. The Franc Zone consists of 2 units - the West African (UMOA) union of Côte d'Ivoire, Senegal, Niger, Mali, Benin, Burkina Faso, and Togo, and the Central African union of Cameroon, Gabon, Congo, Central African Republic, Chad, and Equatorial Guinea.

Secondly, not all Franc zone states have equally overvalued exchange rates. Table 6 traces the evolution of real effective exchange rates (defined below) for 6 Sahelian states since 1976. It suggests that the problem is more severe for Senegal, whose real effective exchange rate has been appreciating since 1981, but not as severe for Niger and Burkina Faso, who have seen declining rates during the 1980s.

Even if we accept the view that the CFA is significantly overvalued throughout the region, it does not necessarily follow that the appropriate policy response is a devaluation of the nominal exchange rate--i.e. a change in the CFA's parity with the French Franc. Alternatives exist, though all options raise vexing issues.

The first alternative is to use trade policy as a substitute for exchange rate regime changes. As is well known, a mix of import tariffs and export subsidies can be found which will have balance of payments effects and broader impacts on competitiveness equivalent to a given exchange rate devaluation.

Some approximation to this approach does appear to have been followed by most of the Sahel states. This is indicated by the fact that these states have been protecting both exporters and food crop producers, as shown by the nominal protection coefficients<sup>16</sup> (NPCs) in Table 7. High NPCs indicate that Sahel governments have been subsidizing exports and taxing imports--the appropriate mix for dealing with a problem of overvaluation of nominal exchange rates. Figure 1 shows the average NPC levels for sorghum and millet in 5 Sahelian countries (Senegal, Niger, Mali, Burkina, and Mauritania). Protection for these food crops stayed relatively constant over the period 1977-1983, and then increased quite sharply from 1983-1986. Protection (or subsidies) for cotton and groundnut in the Sahel also increased from 1984-1987

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16. NPCs measure farm-level price distortions as the average rates of farm-gate prices to world prices adjusted for internal handling and transportation costs. An NPC > 1 indicates the farm-gate price is greater than the world price, thus providing an incentive to produce the commodity and a disincentive to import it.

Table 6. Real Effective Exchange Rates, 1978-86

<u>Country</u>	<u>Year</u>									
	<u>78</u>	<u>79</u>	<u>80</u>	<u>81</u>	<u>82</u>	<u>83</u>	<u>84</u>	<u>85</u>	<u>86</u>	<u>87</u>
Senegal	105	105	100	89	92	92	94	103	112	106
Niger	102	101	100	105	103	90	89	84	79	72
Burkina	93	99	100	91	89	86	82	84	82	82
Mali	104	94	100	98	89	89	92	95	97	91
Gambia	98	99	100	96	96	97	90	98	71	75
Mauritania	103	100	100	116	126	124	117	110	100	94
							<u>1980-82</u>	<u>1987</u>		
Sub-Saharan African Average REER (unweighted):							104.6	80.6		

Source: World Bank, "Monitoring Agricultural Incentives and Policy in Sub-Saharan Agriculture", W.Jaeger, July 1988.

Table 7. Nominal Protection Coefficients

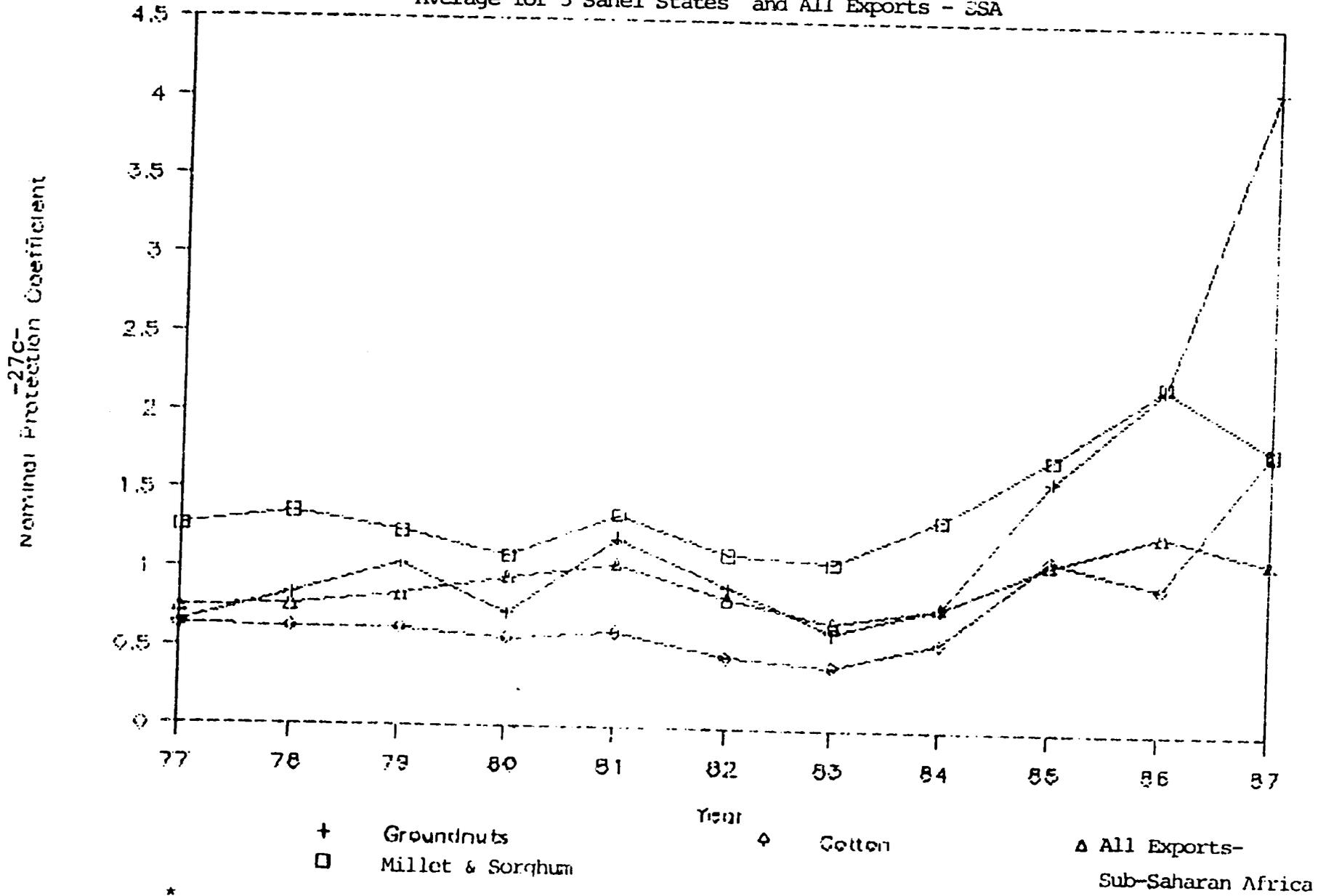
	Year										
	<u>77</u>	<u>78</u>	<u>79</u>	<u>80</u>	<u>81</u>	<u>82</u>	<u>83</u>	<u>84</u>	<u>85</u>	<u>86</u>	<u>87</u>
<u>Senegal</u>											
Grnuts	.65	.77	.99	.68	1.11	.72	.48	.56	1.98	2.90	4.80
Cotton	.63	.60	.60	.56	.59	.46	.40	.51	1.28	1.10	1.96
Sor/Mil	1.32	1.39	1.22	.94	1.06	.82	.80	.90	1.37	1.89	1.86
Rice	.77	.88	.70	.50	.78	.71	.76	.94	1.53	1.63	1.40
Maize	1.35	1.26	1.18	.87	1.01	.76	.68	.92	1.53	1.89	1.82
<u>Niger</u>											
Grnuts	.75	1.02	1.21	.78	1.09	1.09	.81	1.02	-	-	-
Sor/Mil	1.19	1.38	1.24	1.00	1.43	1.20	1.17	1.54	-	-	-
<u>Mali</u>											
Cotton	.56	.59	.63	.55	.61	.45	.42	.55	1.20	-	-
Sor/Mil	.46	.49	.53	.57	.64	.54	.54	.57	.78	-	-
Rice	.42	.53	.51	.45	.69	.68	.69	.80	1.05	-	-
Maize	.43	.45	.51	.54	.65	.54	.49	.53	.74	-	-
<u>Burkina Faso</u>											
Cotton	.67	.64	.59	.52	.55	.41	.38	.59	1.24	1.05	1.73
Grnuts	.49	.68	.81	.54	1.37	.92	.70	.80	1.74	1.55	-
Sor/Mil	.98	1.12	1.02	.83	.94	.87	.83	1.08	1.37	.94	1.4
Maize	.94	1.08	1.03	.81	.93	.78	.73	1.08	1.34	.93	1.35
<u>Mauritania</u>											
Sor/Mil	-	2.42	2.2	2.13	2.67	2.12	1.98	2.62	3.43	3.82	-
Rice	-	1.00	.77	.66	1.27	1.27	1.2	1.29	1.82	1.67	-
Maize	-	3.58	3.3	2.69	3.0	2.28	1.96	2.4	3.22	3.79	-
<u>The Gambia</u>											
Grnuts	.70	.90	1.18	.91	1.36	.90	.52	.76	1.33	2.35	3.41
Cotton	.71	.71	.70	.68	.70	.55	.42	.59	.78	.65	-
Rice	.99	1.23	1.00	.78	1.17	1.08	.85	1.08	.87	.87	.77
Maize	1.95	2.0	2.12	1.75	1.75	1.13	.83	.97	1.05	-	-

Source: World Bank, "Monitoring Agricultural Incentives and Policy in Sub-Saharan Africa", W. Jaeger, July 1988.

Figure 1.

# Nominal Protection Coefficients

Average for 5 Sahel States\* and All Exports - SSA



\* Senegal, Niger, Mali, Burkina Faso, and Mauritania

compared to the Sub-Saharan average level of protection for all export crops (Figure 1).

Obvious problems plague this second-best policy. It may create unsustainable political and/or fiscal problems. This was the case in Senegal, which was until 1988 heavily taxing rice imports and heavily subsidizing groundnut exports. Moreover, it is a difficult policy to sustain, since disparate tariff and agricultural pricing policies lead to increased smuggling, given West Africa's porous frontiers and well-established parallel markets.

A second alternative is to operate directly on the real exchange rate, without worrying about the nominal rate. The "real" exchange rate is the nominal rate (e.g. 50 CFA = 1 FF) adjusted for domestic inflation. If Senegal's nominal rate is unchanged but the country faces a 50% rate of inflation over a given period, then its "real" rate has appreciated by one half. For competitiveness concerns, what matters is the "real effective exchange rate" (REER), which takes into account not only domestic inflation, but inflation in other countries as well, i.e. Senegal's trading partners or competitors. If Senegal's nominal exchange rate stays unchanged (50 CFA = 1 FF), while its rate of inflation is 50% and the rate of inflation in France is 100%, then Senegal's real effective exchange rate has depreciated (been devalued) by 50%.<sup>17</sup>

The point is that by appropriate monetary and fiscal policy, competitiveness can be increased (and balance of payments adjustment achieved) without changing nominal exchange rates. Inflation has to be controlled--to rates below those of competitors.

Few economists would contest the general point that balance of payments adjustments and increased competitiveness can be brought about without devaluation of nominal exchange rates. The argument for devaluation, however,

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17. For simplicity, this assumes France is Senegal's only trading partner. Normally a "trade-weighted" price index is used for other country prices. Other simplifications are used in the discussion.

is that inability to use the exchange rate as an instrument of policy makes it harder for countries like those in the Sahel to deal with their problems of competitiveness and external balance.

For these reasons it is certainly true that, other things equal, "adjustment" (or increased competitiveness) is achievable at less cost with exchange rate flexibility than without it. However, other things are not equal, and because of factors specific to the UMOA, the net costs of being denied use of devaluation may not be substantial.<sup>18</sup>

Table 8 gives nominal and real effective exchange rates since 1970 for three UMOA Sahelian countries and France. Real effective rates appreciated in the UMOA states in the 1970s by some 15-30%. But between the early and mid 1980s, when structural adjustment policies were adopted, real effective rates fell substantially, despite the absence of nominal exchange rate devaluation. The appreciation of the US dollar between 1979 and 1985 and six devaluations of the French franc against other European currencies meant that the falls in nominal effective exchange rates helped the UMOA countries adjust. But real rates fell by more than nominal rates, reflecting tighter fiscal and monetary discipline. For example, in Niger the nominal effective rate fell by 5% between 1981 and 1987, while the real effective rate fell by 29%. In Mali, between 1976 and 1986, the nominal rate fell by 11%, and the real effective rate by 25%. And in Senegal, for 1975-1981, a nominal drop of 5% saw a corresponding real depreciation of 24%. (In the 1980s, Senegal's real rate appreciated, however.)

These findings parallel those in other studies<sup>19</sup>--that it is not Franc zone membership per se that determines effectiveness of economic adjustments, but rather domestic policies that will do so. Individual Franc zone countries, each acting directly on the real exchange rate, enjoyed different

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18. See Sylviane Guillaumont, "Dévaluer en Afrique?", in Observation et Diagnostique Economique, Revue de l'ODCE, Octobre 1988.

19. See G. Castillo, et al, 1986; K. Krumm, 1987; Guillaumont and Guillaumont, 1988.

Table 8. Nominal and Real Effective Exchange Rates, 1970-1987

	NIGER		MALI		SENEGAL		FRANCE	
	<u>N</u>	<u>R</u>	<u>N</u>	<u>R</u>	<u>N</u>	<u>R</u>	<u>N</u>	<u>R</u>
1970	100	100	100	100	100	100	100	100
1971	99	98	99	101	99	98	98	98
1972	100	103	100	104	101	99	100	100
1973	102	109	101	102	103	105	104	103
1974	100	97	99	93	100	105	97	97
1975	104	97	102	101	104	127	106	106
1976	103	108	101	102	103	116	103	103
1977	102	118	98	95	102	115	98	98
1978	101	119	97	95	102	109	96	99
1979	101	116	97	95	102	109	96	101
1980	101	113	97	92	103	105	96	104
1981	98	121	95	90	99	96	90	100
1982	95	119	92	82	95	98	83	96
1983	93	104	90	80	93	99	78	93
1984	91	105	89	83	91	102	75	91
1985	91	99	90	77	94	116	78	96
1986	92	94	90	77	94	116	78	96
1987	93	86	90	78	95	110	79	98

Source: Sylviane Guillaumont, "Dévaluer en Afrique?", Observation et Diagnostic Economique, Revue de l'ODCE, Oct. 1988.

degrees of success in their adjustment efforts--Cameroon, for example, doing much better than Senegal in the 1980s.

Would adjustment (and increased competitiveness) be better and easier with devaluation? Not necessarily. Stripped of that option, the UMOA states are first of all forced to follow stricter monetary and fiscal discipline. Most seem to have done this more effectively than comparable countries enjoying access to the full arsenal of policy instruments, though data weaknesses and other factors make such comparisons difficult.<sup>20</sup>

Secondly, a devaluation of the CFA after so long a period of parity with the French franc, would almost certainly lead to capital flight and enhanced inflationary expectations. As Guillaumont points out (ibid.), this would make the achievement of a given decline in the real effective exchange more difficult with a monetary/fiscal policy of given restrictiveness.

Also, the absence of a devaluation alternative can intensify the search for productivity-raising reforms which are essential for improved competitiveness. Devaluation increases government revenues and allows payment of higher prices for tradeable goods, thereby diluting pressures for greater efficiency in resource use. Denied this option, UMOA governments have to face the efficiency music more abruptly.

The response of the cotton sector in Burkina, Mali and Chad to the sharp decline in world prices in 1985 is one example. These Sahel governments were forced to scrutinize all points in the "filière," from the implicit taxing of price stabilization agencies, to fertilizer subsidy arrangements, to marketing efficiency including the management fee structures for cotton parastatals.

The result was a significant and general decline in real costs of cotton production--i.e. increased competitiveness.

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20. The West African UMOA countries were helped by the fact that they have borders with the Gambia, Liberia, Ghana, and Nigeria. The depreciation of the currencies of these countries after 1980, especially the Naira, combined with subsidization and other policies, undoubtedly contributed to a slowing of price rises in the CFA zone, by allowing massive import of cheap intermediate and consumer goods.

Finally, the devaluation option raises broader issues of the survivability of the Franc zone. Departures from existing CFA-French Franc parity cannot be made by Senegal (and the Côte d'Ivoire) alone, nor can each member state define its own parity without threatening the viability of the Franc Zone as a whole. The advantages of such a step are not without serious costs, and the net outcome is not sure to be positive.

None of this means that the UMOA states, or any government, always can and should do without devaluation. But perhaps too much emphasis has been put on overvaluation of the exchange rate and inability to devalue as a major reason for poor Sahelian competitiveness. The issue is more localized than current dialogue suggests. The problem is most pronounced in Senegal. In any case the devaluation option may not on balance be better than its alternatives.

## B. THE ROLE FOR PRICE POLICIES

### 1. Producer Price Policies

"Positive" or "incentive" producer price policies in foodgrains are inefficient instruments and hence of limited utility. Two of the principal issues now being debated in the Sahel fall within the scope of this proposition. These are tariff protection for cereals (national or regional), and minimum guaranteed prices for grain producers.

With respect to protection, the main issue is rice: higher duties on imported rice are urged to protect local producers of rice and coarse grains, and to discourage rice consumption.

We noted earlier that elasticity pessimism predominates in studies of consumer and producer responses to rice price rises. If this is true, rice protection will have few benefits and high costs. While registering some skepticism about these putative sluggish responses, it nonetheless does seem unlikely that the benefits of rice protectionism (import substitution and

reduced "dependence") will outweigh its costs (sacrificed income, exports, balance of payments stability, and negative nutritional effects.)

This doesn't mean that nothing should be done. Stabilization of rice prices is an objective that most observers would agree is feasible, and desirable, though there is much disagreement about the appropriate level around which to stabilize. In the Sahel, two proposals are usually in contention. <One would base the stabilized price on costs of production, the other on border parities.> This debate, which has been particularly lively in Mali and Senegal, is really about levels. But for the reasons already reviewed, we have argued that resorting to prices above border parity levels is a costly policy to achieve greater domestic cereals production. We will return to this question again below, when we address the issue of how to fix imported rice prices, once the principle of border parities has been accepted.

The stabilization target could be some estimate of the long-run trend in world prices or, depending on objectives, some amount above or below that trend. However, the latter is probably unrealistic. Timmer (1986, p. 86) notes that "no country has been able to guarantee long-run price stability at 'low' prices--below world market trends." At the moment, with very low world commodity prices, that is not the issue facing the Sahel. But it does serve as a warning that stabilization of import prices is likely to be one sided--i.e. operative only when world prices drop below trend.

If the objective is to stabilize around world market trend, how is the long-run trend of world prices to be estimated? Should it be a straight line trend over the past three, ten, twenty, thirty years? Timmer (ibid., p. 90) suggests that price takers should assume that very long-run, historic trends will continue. World Bank staff have urged three-year moving averages of world prices as a rough and ready estimator.

Are the World Bank's commodity projections a good choice for identifying future prices? Bertrand (1986, pp. 23-34) makes a convincing case that these projections are often far from accurate. Between 1974 and 1986 the projections were well above actual prices for grains. Bertrand postulates

that this was due to the food crisis mentality that started in the early 1970s. One is tempted to ask whether we are now likely to see a dozen years of underprojections based on the surplus mentality of the mid-1980s.

The argument for cereals protection to raise rice price levels above the trend of border parities and the argument for state-guaranteed minimum producer prices for cereals can be considered together. Both assert that producer prices, unprotected or "unguaranteed," will be too unstable and too low to encourage local production. We have already considered the macroeconomic dimensions. The main arguments against floor pricing, which refer primarily to coarse grains, are well-known:

- o Farmers in the Sahel don't believe that prices really will be supported since cereals boards have almost never been able to buy up bumper crops at "official" prices. To create credibility for this policy, which is essential if there are to be effects on producer responsiveness, commitment to price stability will be essential for at least a few years. This will be costly.
- o Since short-term demand is inelastic, supply varies mainly with rainfall, and marketed supply is more elastic than output, purchase of the crop at guaranteed prices in bumper years is exceedingly expensive.
- o Storage costs, including physical losses, are high. When ONCAD bought up the millet crop in Senegal in 1978-1979, it had to store over 100,000 tons, much of which later rotted.
- o Another problem for any tariff policy or, indeed, any price policy at all, is the permeability of borders. Uncontrolled, cross border trade is very large throughout the Sahel. The physical difficulties of controlling long borders with insufficient staff who are poorly paid and poorly provisioned are obvious. Furthermore, some major smugglers are said to be from politically powerful families and other groups. In the event, price supports can--and often do--end

up helping farmers in neighboring countries as much or more than domestic producers.

- o Given the fact that grain surplus producers, and those with marketed output, are relatively well off, the income distribution impacts are dubious.
- o The resources devoted to price supports can be used for needed infrastructure, research, and other investments.

The use of "cost of production" as a criterion for price setting is a sub-issue in the border parity incentive prices debate. Despite its deep roots in much thinking about price policy, and its long use in many parts of the world (e.g. India), the concept itself is analytically suspect. Timmer, drawing on his Asian experience, gives a nice summary of the problems.

Empirically, costs of production are hard to determine because they vary so much from year to year, region to region, and farmer to farmer. Allocating costs for non-market inputs, such as family labor, land, and irrigation water, are constant problems. Even if only cash costs are counted, yield variations due to weather can significantly change average costs per ton. Once farmers begin using largely quantities of purchased inputs, especially labor and fertilizer, a major analytical problem arises. The basic economic model of farm decision making shows inputs being used until their marginal revenue product is equal to the marginal revenue produced by using them. As output price rises, marginal revenue rises. Farmers find it profitable to use more inputs, until they push up marginal costs to the point of equality with the new marginal revenue (1987b, p. 42).

A cost-of-production-based producer price policy, therefore, cannot be justified on any "scientific" basis. It's not clear that it can provide anything more than a crude technical cover for use in political negotiations over price determination.

## 2. Consumer Price Policies

Governments favor low and stable consumer prices for cereals. Cereals boards in the Sahel have not generally had the resources to meet demand at

official prices, so low-price grain has typically been rationed. As for stability, reliance on imports has allowed the coastal countries to maintain relatively stable prices for rice, but for coarse grains and even for rice in the continental states, stability has proved an elusive goal.

As on the producer-price side, geography and budgetary considerations sharply constrain policy. Several simple principles seem widely applicable. First, departures from (trend) border prices should not be large or persistent and, second, cereals board spreads between buying costs and selling prices should be large enough to cover marketing and processing margins.

Many issues remain unaddressed in these policy prescriptions. Determination of food aid volumes, means of distribution, and selling prices have to be such as to minimize price-(incentive-)reducing impacts on producers. Issues of food security and protection of the poor also have to be faced. To reduce "transitory food insecurity" (losses in well being due to fluctuations in prices), buffer stock arrangements could be envisaged. The danger, of course--clearly borne out by experience--is that the authorities will seek to stabilize at below border parity or will allow too small a spread between procurement and selling prices.

To prevent an efficiency-oriented food policy from worsening the income distribution and hurting the poor, better targeting of food aid is essential.<sup>21</sup> Higher prices for imported and domestic cereals may severely depress the nutritional status of poor net buyers in rural and urban areas. The introduction of effectively targeted food aid programs would represent a departure from the past. In some countries, large-scale and free distribution of food to people "in need" has diffused benefits widely across income levels.

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21. Equity issues arise also on the producer side. As noted earlier, less than 50% of Sahelian farmers may be net sellers. Thus higher farmgate prices raise concerns about equity. While poor net buyers are clearly subjects of concern, it is also important to note that the net sales/purchase position of households is likely to change over the family life cycle. Thus there may be less tendency for stratification than is implied by the fact that many households are not net sellers.

Also, efforts to subsidize consumption have often helped relatively well off government employees who get priority access to low-priced food.

With the rising global concern for food security has come renewed interest in better targeting schemes. Many new proposals are afloat, which may or may not be suitable in the Sahel.<sup>22</sup> In any event, some kind of food aid for the poor needs to be considered as an integral part of price policy.

### 3. Input Subsidies

Input subsidies--especially for fertilizers--have been on the wane in the Sahel as elsewhere, the victim of budgetary austerity and a weakening economic rationale. Does the deterioration of rural credit institutions that occurred throughout the Sahel in the 1980s require a new stance?

Economists have always recognized that market failures such as imperfect knowledge or (highly) imperfect capital markets and risk-avoidance behavior could justify some subsidization of input use. But in the Sahel, a strong case has developed against fertilizer subsidies. It has the following arguments: subsidies have been in existence for twenty-five years or more and hence most farmers should know the benefits of fertilizer usage; economic profitability is not clearly established; recommended dosages are frequently wasteful; deliveries are usually late; rationing favors richer farmers; subsidies prevent the emergence of private distributors; higher producer prices provide more efficient (and probably more equitable) incentives; environmental effects may be had--dilution of incentives to search for soil-enriching and water-retaining techniques that don't require chemical fertilizers.

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22. Reutlinger (1988), for example, proposes a "food money" scheme aimed at overcoming this problem. Governments would distribute coupons to the poor who could use them to buy food. Food vendors would exchange these for cash at a commercial bank which, in turn, would be reimbursed by the government. Governments could raise the funds through open market sales of that amount of food aid needed for the population receiving the coupons. One cannot predict whether such a program would work in the Sahel.

It is possible to conceive of subsidization arrangements that do not obstruct private sector development. But even this would require a degree of faith in the competitiveness of markets which is not yet widespread. And the other disadvantages persist.

### C. STRUCTURAL POLICIES

Increased competitiveness requires a reduction in marketing and processing costs in the short run, and in the long run the development of more efficient rural institutions--a competitive, well-capitalized, specialized commercial class, for example, that can provide inputs, transport, storage, marketing services to rural households.

Marketing/processing margins are typically high in African countries-- higher, for example, than in Asia. This is so because of physical and economic conditions (long distances, poor roads, dispersed population, small-scale, unspecialized agents, etc.), and because of cost-increasing policy interventions such as panseasonal and panterritorial pricing, price regulation and movement controls that generate roadblocks and other harassment.

A wide array of policy changes and new projects are required here: new  
① transportation investments (particularly in the interior countries); better  
② organization and funding of road maintenance; cleaner and faster  
③ liberalization of marketing arrangements and elimination of obstacles to  
④ privatization of processing facilities; ⑤ elimination of cost-raising regulations on imports, exports and domestic transport. Poor regions concerned over competitiveness have little maneuverability. They have to use efficiently the few resources at their disposal. In all the Sahel states there remains much to be done on this score.

### D. IMPROVING TECHNOLOGY

The long-run competitiveness of Sahelian agriculture depends in large part on improvements in technology. The major international research center dealing with the Sahel, ICRISAT, at first attempted to transfer technologies

from India, but was not successful. Only recently has ICRISAT started devoting major resources to a Sahelian research base.

The national research systems in the Sahel are small and underfunded. Most lack sufficient trained personnel. All are short of recurrent cost budgets for research supplies, transportation, and related expenses. The national systems are a necessary complement to the international centers.

Strengthening the national systems will take a long time. International donors must therefore make a long-term commitment to support training and recurrent research costs. National governments must likewise provide greater and more consistent support for their agricultural research systems. Of course, this recommendation of greater research funding runs up against the budgetary stringency of structural adjustment programs. However, agricultural research must be given a high priority within those programs.

#### E. ENCOURAGING CREATIVE RESPONSES

One striking aspect of much of the recent literature is how small a place it leaves for innovation and entrepreneurship. It sees the future as a projection of the past, with some marginal changes. This is of course an understandable and defensible view. But it leaves too little room for creative responses, which common sense and history suggest can introduce profound changes. In fact, perhaps the most fundamental proposal for policymakers lies here - in the development of an open policy environment congenial to innovation and entrepreneurship.

Sahelians have already produced some important surprises. The case of niébé in Niger is well known (World Bank, 1986b). In the late 1960s or early 1970s, no development plan, no IMF report, no World Bank projection, no statement of agricultural strategy predicted that in the space of a few years groundnuts--Niger's principal export--would virtually disappear and be replaced by niébé. Nor could anybody envisage that this would be done in the face of uncongenial public policy, entirely by private actors and virtually entirely in the underground or parallel economy (by smuggling to Nigeria).

Recent developments in the Mauritanian rice sector make this point even more dramatically, and more importantly. Spurred primarily by a 1983 land tenure law which provides for private title, and by remunerative prices for paddy, new farmers, many of them traders and other businessmen without previous farming experience, have completely transformed Mauritania's agricultural prospects. This has come about in the space of three years. Things have happened so fast that little is yet known about the details of this extraordinary phenomenon. But this much is known. The farmers in question have taken title to land along the lower Senegal River--around M'Bout, Boghe and especially Rosso. The land is apparently being given away free, by local officials; it is regarded as empty land, though final title is not firm. Some 35,000 ha had been allocated by 1987, 40,000 by 1988. The new farmers put together generally rudimentary irrigation canals, buy a small diesel pump, bring in hired labor and produce paddy on holdings that seem to average around 20 ha, but which are often larger.

Paddy production began along these lines in 1984 and 1985. By 1986 some 1,650 ha were being cultivated; in 1987 the new private farmers had between 6-8,000 ha in paddy and, in 1988, 16,000 ha. The "traditional" irrigated rice sector, i.e., the large and small perimeters created under parastatal (SONADER) auspices, totalled 4,600 ha. In three years the private owners had succeeded in bringing into cultivation more acreage than the parastatal had done in fifteen years, and by 1988 were cultivating more than three times the area serviced by SONADER. In these three years production appears to have quadrupled--from about 20,000 tons of paddy in 1985 to approximately 80,000 tons in 1988.

These new developments bring problems of their own. Land tenure rights remain in dispute, the market for land is embryonic, land grabs by powerful individuals have to be modulated, and the existence of a large-scale rice producing sector creates new questions about income distribution and equity.

The point is not that problem-free solutions to Mauritania's food policy problem are at hand. There are, rather, two points to this story. The first

has to do with the unpredictability of the future. Nobody foresaw the possibilities of such a development even in late 1985, when donors and Sahelians debated at Mindelo. There is not a hint of it in the projections done by local and international agencies, nor in any of the many papers on agricultural strategies and prospects written before 1988. Even drafts of new Mauritania public investment program documents in 1988 continued to equate investment in SONADER with investment in the rice sector. Only in the last few months has it begun to sink in that the emergence of the large-scale private producers completely changes both production prospects and the nature of policy concerns.

The second point is even more fundamental. None of the calculations of domestic resource costs, nor any of the learned discussion about competitiveness under varied "states of nature" using different technologies, took account of the kind of low-cost production methods adopted by the new private growers. The land development costs of SONADER (as of similar agencies observed in the Sahel) are sometimes as high as 1 million UM/ha (\$14,000). In the new areas, a small sample of private growers say they pay 40-50,000 UM/ha or about \$700. In cases where the terrain is highly suitable they can clear and equip their fields for less than \$250 per ha; rarely do they pay more than \$1,500/ha. In other words, land is being cleared, pumps installed, and irrigation canals prepared at one-twentieth to one-tenth of SONADER costs.

The quality of the field preparation and irrigation network is of course much lower than that of SONADER. And there may be technical problems--salinity control, for example. But the private growers have in effect introduced a whole new technology and are experimenting with production methods using different levels of capital input. In all cases they can grow paddy much more cheaply than on SONADER perimeters, and profitably.

Interviews with farmers suggest that pay-back periods are often as short

as one crop year and rarely are more than three years.<sup>23</sup> Uncertainties, lower prices, declining land availability, and other factors may slow down the expansion of paddy production by these new entrepreneurs, but the extraordinary doubling of cultivated area in 1988 to 16,000 ha, and the subsequent 60% rise in rice output, suggest that this boom has not yet run its course. Self-sufficiency in rice--once a pipe dream for Mauritians--is now a distinct possibility, as is the penetration of the Senegalese market by Mauritanian rice--also unthinkable a few years ago.

A broad lesson emerges. The Sahel's future can only be perceived and shaped by government planners and their donor partners to a small extent. Individuals, groups of individuals, and various types of corporate entities, will discover opportunities now undreamt of. The task of government is to maintain policy conditions and create an institutional environment that will encourage and sustain innovations.

On a micro level, this means that policy preoccupations should be less focused on cereals, or even on crop production, and more on the household as a set of enterprises. The future of the region may lie less in crop production and more in livestock, in village industry, or in large-scale migration to forest zones.

On the macro level, nurturing of innovation means the development of more solid and predictable legal institutions--laws of contract and land tenure, for example. It means minimizing the regulatory obstacles to entrepreneurship, avoiding disincentives in the form of burdensome price controls or inappropriate heavy taxation. It means encouraging the growth of a class of capitalist intermediaries, transporters, traders, and progressive farmers who are sources of rural dynamism in all societies. It means the abolition of practices that discourage socially desirable economic behavior, for example, pan-cereals official pricing policies (uniform pricing for cereals of all qualities) that discourage attention to quality, pan-seasonal

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23. Peter Mueller, "The Private Sector in Mauritania," World Bank Consultants Report, July 1988.

pricing that discourages private storage of grain, and pan-territorial pricing that encourages antieconomic practices (such as inefficient production).

There are also all the policies and programs that enhance popular awareness, mobility, and power of choice: good education, better access to health care, and better roads. The populations of the Sahel have to be seen as the determinants of their region's competitiveness, not as passive victims of technical and economic constraints imposed by history and by nature. The principal task of governments and donors is not to try to figure out where the region's economic future lies. It is rather to better prepare the Sahelian people to capitalize on whatever options may emerge, or that they may discover, and to create an open, nurturing environment congenial to innovations.

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