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FOOD POLICIES IN DEVELOPING COUNTRIES

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A report prepared for the Agency for International Development by the International Economics Division, Economic Research Service, USDA and the Department of Agricultural and Applied Economics, University of Minnesota.

Foreword

This study of food policies in developing countries was prepared for the Agency for International Development (AID) by a team of economists from the International Economics Division of USDA's Economic Research Service (ERS) and the Department of Agricultural and Applied Economics of the University of Minnesota. The main purpose of the study was to contribute to the development of a project that would assist AID personnel in overseas missions to provide technical assistance in food and agricultural policy analysis.

Charles E. Hanrahan, Deputy Director of the International Economics Division, provided overall direction for ERS participation in the project. Shirley Pryor, Africa and Middle East Branch, was detailed to AID from ERS and served as project officer for the food policy project and liaison between AID, ERS, and the University of Minnesota. At an intermediate stage, Ray Nightingale, Agricultural Development Branch, made a valuable contribution to the project. Cathy Jabara, Trade Policy Branch, and Gary Ender, Asia Branch, prepared Chapter I, "A Framework for Assessing Food Policy in Developing Countries." Carol Goodloe and Ted Wilson, Trade Policy Branch, prepared Chapter II, "Survey of Policies and Policy Objectives of Selected Developing Countries." Their work was based in part on information supplied by country analysts and economists in the Africa and Middle East, Asia, and Latin America Branches of the International Economics Division.

G. Edward Schuh, Professor and Department Head, provided overall direction for the University of Minnesota's participation in the project. The case studies of food policy in Kenya, Tanzania, and Senegal were prepared by Terry Roe, Professor and Principal Investigator, Jerome Hammond, Professor, Benjamin Senauer, Associate Professor, and Duty Greene, graduate assistant.

Chapter IV, "Findings and Implications" was prepared jointly by ERS and the University of Minnesota.

Arthur Domlien, Africa and Middle East Branch, edited and prepared the final manuscript for publication. Mrs. Bernadine Holland, ERS, typed the manuscript and assisted in preparing the manuscript for publication.

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I. A FRAMEWORK FOR ASSESSING FOOD POLICY IN DEVELOPING COUNTRIES

Governments in developing countries intervene in their food economies in different ways and for various reasons. ^{1/} Government policies influence both the agricultural and other sectors of the economy. Intervention through tax, credit, trade, and exchange rate policies as well as direct agricultural price and control measures is used to redistribute benefits and incentives in ways which are politically acceptable. Because grains like wheat, rice, corn, barley, millet, and sorghum are the most important elements in the diets of people in developing countries, government food and agricultural policies have generally focused on the production, consumption, and trade of these grains.

Policymaking in developing countries has been described as a constrained maximization problem in which planners seek to achieve certain goals subject to political, legal, social, and economic constraints [46]. The purpose of government intervention is to alter the flow of resources in the economy in order to obtain a resource allocation which contributes to the stated objectives [44]. Intervention often takes the form of consumer or farm production programs, price controls, and concessional foreign trade. Different policies can be used to further a variety of objectives; the policy mix chosen, however, must be consistent with the constraints under which decisions are made.

^{1/} Intervention in grain markets is also common among developed countries; see Jabara [22].

A cross-country comparison of objectives and policies is of interest because of the importance of policies in determining the profitability of agricultural investments as well as the welfare of consumers, the allocation of resources, and the direction of trade. Different mixes of policies have different short-run and long-run impacts, and often affect consumers and producers in opposite ways. Another important problem for developing country policymakers is to find that mix of policies that minimizes short-term conflicts between objectives and at the same time leads to promising long-term results.

In this chapter the interaction of food policy objectives and the policies used by developing countries to achieve them are described and analyzed. The objectives of developing countries' policies, the policies used to further these objectives and the tradeoffs that are inherent in their use are described. In Chapter II, specific policies for groups of developing countries in Africa, Asia, and Latin America are examined in the context of stated food policy objectives. The extent of government intervention and the likely impacts of instruments on the production, consumption and trade of major grains and other staples are analyzed.

The rationale or "need" for government intervention in developing countries stems from planners' desires to achieve levels of production, consumption, or trade which would not otherwise be achieved by the private and public sector. Planners may perceive a divergence between the private profitability of a set of activities and its social profitability. 2/

2/ Social profitability refers to valuation of an activity in terms of the accounting or shadow prices associated with the activity.

Thus, governments intervene because 1) financial (market) prices often do not reflect true scarcity values (defined in an output maximizing sense) due to imperfections in product, input, or financial markets; and/or 2) governments have objectives different from that of the private sector, resulting in a social valuation of activities different from that reflected in private markets. ^{3/} In either case, government intervention can alter the free-market resource allocation toward one which is more "socially optimal."

Governments utilize a range of policies and programs to alter the allocation of resources to meet their objectives. These include consumer and producer programs that subsidize or tax selected activities, concessional foreign trade, direct tax and exchange rate policies, and price or physical controls. Different policies can be used to achieve the same objectives, subject to the political, economic and physical constraints under which the economy operates.

Food Policy Objectives

It is usually difficult to identify clearly the major objectives of LDC policymakers. Many countries vaguely specify objectives and governments seek to achieve several objectives at the same time. Some idea of government objectives can be ascertained from official plans or declarations of policy. Other objectives are tacit and must be deduced from the actual implementation of policies and programs.

^{3/} In this case, accounting prices are similar to the dual of a linear programming solution which derives implicit prices from the objective and constraints entered in the program.

The multiple objectives to which governments commit themselves can be mutually reinforcing or conflicting. According to Timmer [44], the dilemma of policy implementation is best conceptualized in terms of the tradeoff between objectives promoting consumer and producer interests. 4/ Low real producer prices in many developing countries reflect the dominance of government objectives to protect consumer interests and this conflicts directly with producer interests. As Timmer and others state, however, there are long-run policies that will actually improve the situation of both consumers and producers by increasing efficiency within the agricultural sector. In this case, the two objectives of increasing farm income and increasing consumer welfare do not necessarily conflict. A government could subsidize the adoption of improved agricultural technology, leading to both higher farm incomes and greater supplies (and lower prices) to consumers. Thus, whether objectives conflict depends on the time frame for their achievement and also on the types of policies used to achieve objectives. Objectives like food self-sufficiency and increased farm income are by their nature mutually reinforcing.

The objectives of policymakers and the emphasis placed on individual objectives change, sometimes frequently. Emphasis on selected goals will vary with the political climate within the country, the domestic agricultural situation, and international events. For instance, after the period of international grain price instability during 1973-75, many developing countries shifted the focus of their food policy objectives toward food self-sufficiency and domestic price stability. The objectives of food policy can also vary with the stage of economic

4/ Timmer's reference is to Asia, but his observation is generally valid.

development of the country. The most common food policy objectives of developing countries are discussed in more detail below.

Consumer Welfare: Cheap Food. Cheap food is an objective of many developing countries. Because grains constitute the bulk of food consumption in most developing countries and can therefore be considered wage goods ^{5/}, many governments concentrate their efforts to achieve low-cost food on commodities such as rice, wheat, corn, barley, sorghum, and millet. Previous studies of developing country grain policies [22, 25, 30] have shown that in the past developing countries have placed greater importance on this objective than developed countries. These studies show that government intervention in the grain sector has tended to subsidize consumption of grains via low output prices and consumer subsidies. In contrast, policies of developed countries have tended to support both higher producer and consumer prices.

Producer Welfare: Income Generation for Farmers. Some governments seek to increase the returns to agricultural production over what the returns would ordinarily be without government intervention. In the many developing countries which have emphasized the protection of consumers' welfare, incomes generated in the farm sector suffered. Since the period of high price instability in the early 1970's, however, many countries have emphasized increasing food production and improving the income and living conditions of rural people. Some countries have implemented policies designed to transfer resources back to the agricultural sector.

^{5/} Wage goods are those on which wage earners spend a significant portion of their income. The cost of these goods thus affects the cost of industrial production through wage demands.

Generation of Government Revenue. Governments sometimes try to raise revenue from the food sector via foreign exchange controls, direct taxation, or coercive procurement. This policy objective has often been implemented with respect to export crops because export taxes are an administratively easy way to raise revenue. Few governments attempt to generate revenue from food crops, because most developing countries are food importers. An exception is Thailand, which taxes exports of both rice and corn.

Generation/Conservation of Foreign Exchange. Developing countries often try to save foreign exchange by reducing expenditures on imported food grains. This objective may be accompanied by measures to increase production of the imported grain. Low-income countries also make use of concessional imports of food grains to reduce foreign exchange expenditures. Only a few developing countries, e.g., Thailand, Brazil (1978-79), and Egypt, export grains to generate foreign exchange earnings directly.

Food Self-Sufficiency. Many developing countries have declared it their objective to become self-sufficient in food. Many LDC's adopted this objective during the mid-seventies in response to the international price uncertainty prior to this period. The objective of food self-sufficiency is also common among developed countries (e.g. Japan, the European Community). Countries are often proclaimed self-sufficient in a commodity when they do not import it (in a given year) in spite of imports of fertilizer (to produce the crop) or the persistence of malnutrition. Reducing reliance on foreign markets almost always implies a domestic price structure for food that differs from world prices, and hence, countries can incur large welfare losses from pursuing a

self-sufficiency objective. The case studies in Chapter III focus on three countries which have proclaimed food self-sufficiency objectives, and are judged fairly typical.

Stable Domestic Food Prices. Stable prices can be a benefit to both consumers and producers. Poor consumers are most severely hurt by upward fluctuations in food prices. Conversely, production incentives and farm income suffer when prices drop below trend. Although prices in most countries move with world prices, one purpose of this objective may be to postpone the effects of price fluctuations.

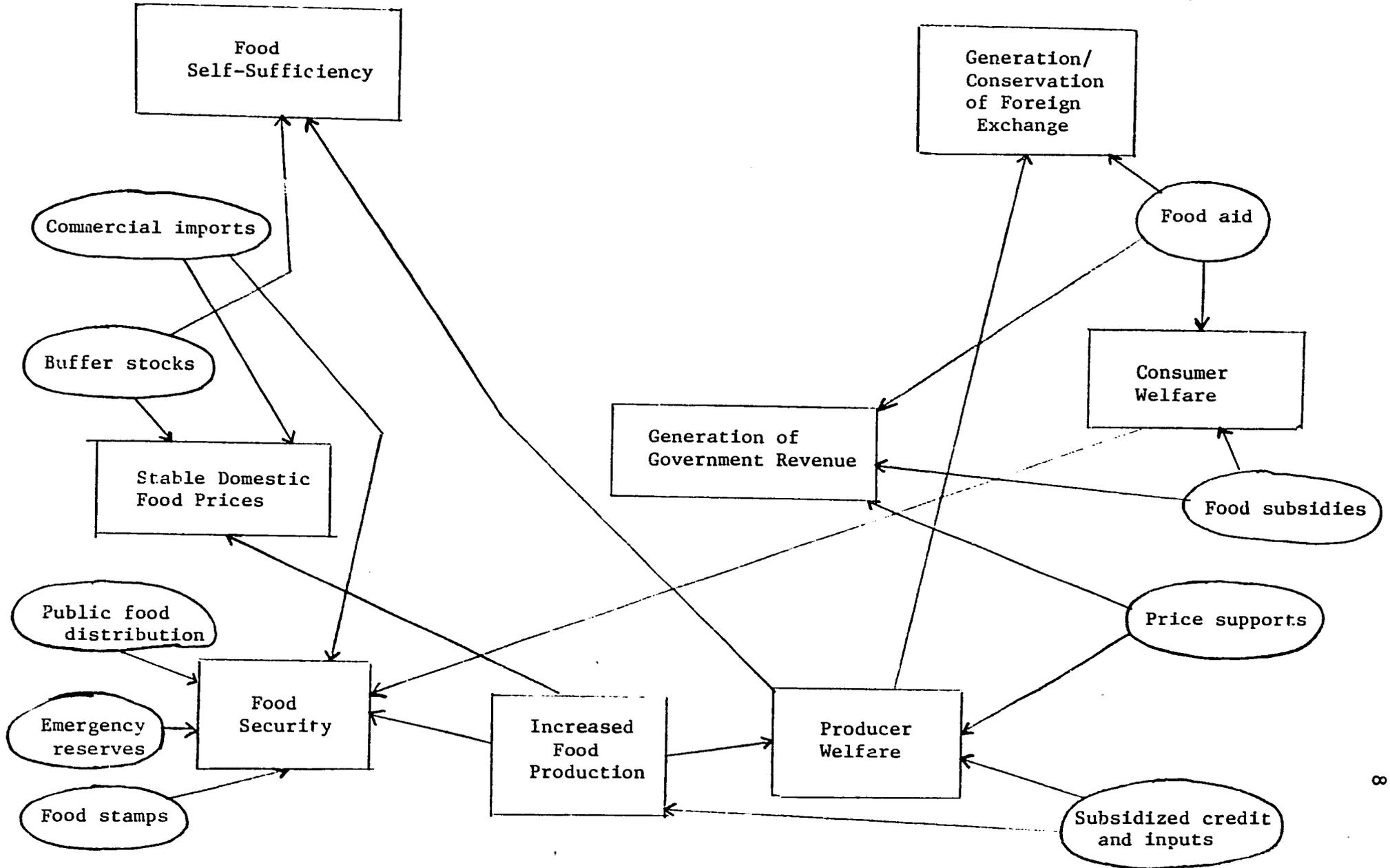
Food Security: Adequate and Stable Food Consumption. The most important, ultimate objective of food policy is usually the assurance of adequate caloric intake for the entire population. To achieve this governments often implement programs targeted at the malnourished. In developmental terms, a well-nourished populace is an intermediate objective which would in turn foster higher productivity; but in terms of food policy, adequate nutrition is an end in itself.

Increased Food Production. While it is often an objective intermediate to self-sufficiency, higher farm income, or generating/conserving foreign exchange increased food production can also be pursued independently of these.

Food Policy Instruments

The selection of policies is influenced by the physical, financial, and administrative resources available and the mix of objectives. A particular policy may further more than one objective and an objective may be furthered by more than one policy. The relationships among food policy objectives and policies are shown in Figure 1.

Figure 1--Food policy objectives and instruments
 (Rectangles represent objectives, circles instruments)



Domestic Policies

One set of policies can be conveniently grouped under the heading of government marketing interventions. This includes producer price supports, consumer subsidies, public food distribution, and buffer stock operations. This grouping is convenient for analysis because governments which employ one of the policies also tend, as demonstrated by the case studies, to become involved in some of the other activities. Perhaps the most common example of this is a price support program. To have a significant, positive and guaranteed, impact on the harvest price (and thereby on production), a government must be prepared to purchase a substantial amount of grain. This grain almost always moves into government storage. Once storage becomes a part of the government program, it is possible to operate a buffer stock for price stabilization or a ration scheme to bolster the consumption of a target group.

Conversely, a government seeking to ensure consumers adequate supplies may become involved in storage and distribution of grain, and this may ultimately require domestic procurement. In addition a consumer subsidy can be affected if the government includes less than its actual marketing costs in its release price. Support, subsidy, and storage programs are notable for their costs, which are often high and direct. (By contrast, the social cost of production lost due to prices depressed by food aid, particularly when there is demand creation, might be low and indirect.)

Producer price supports are generally used in an attempt to increase food production in order to meet farm income, foreign exchange, or food security objectives. While price support programs tend to achieve all of these objectives, the latter two have generally been more important to

policymakers in developing countries than has the farm income goal. Korean rice policy since 1970 is a variation on this theme, in that both self-sufficiency and urban-rural income distributional equity have been very important objectives.

Probably the most widespread form of government marketing intervention in developing countries is the consumer subsidy. The subsidy often has an urban bias, either by design or because of impediments to more extensive implementation in rural areas. The exception is Sri Lanka, which until recently had a ration/subsidy scheme reaching 95 percent of the population.

The distribution of food directly from the government to the consumer on a regular basis is one way of ensuring more consumers of adequate and stable food consumption. It is largely South Asian countries that use this policy instrument, although Indonesia is also a notable example. Distribution points are located predominantly in urban areas and the system sometimes relies more on informal than formal rationing. Under informal rationing certain disincentives (such as location in low-income neighborhoods and long queues) limit the participation of the less needy. In many African countries, procurement is limited by the small proportion of staple production that is marketed; the distribution of food at below-market prices often gives rise to black markets.

Another domestic policy that should be noted is movement restrictions. In several years in the past, India and Pakistan have forbidden the movement of foodgrains across state lines. This stopped movement of surplus supplies and allowed the government to procure at lower prices than might otherwise have been possible. Of course it also raises prices in deficit areas, some of which may not be served by the distribution program.

The operation of buffer stocks, as distinct from pipeline stocks for distribution or emergency reserves for disaster relief, are even more an Asian phenomenon. Prices can be stabilized by open market sales from the buffer stock supply. Self-sufficiency could be fostered by a government's adjustment of what it perceived to be a non-optimal carryover by the private sector, thereby reducing the country's reliance on the international market. Buffer stocks also improve a country's ability to meet consumption targets in the event of production shortfalls. For example, the government of Korea has sought to control rice prices and consumption within the marketing year with open market sales and across years by retaining a buffer stock. Mention should also be made of the ASEAN (Association of South East Asian Nations) rice reserve and its ultimate objective. While the operation of the reserve is currently quite loosely defined (and the stocks quite small), the long-run objective seems to be the establishment of a regional buffer stock.

A consumption-oriented instrument which falls outside the category of government marketing interventions is food stamps. Food stamps are unique in that they provide assistance to consumers without directly harming producer incentives. The use of this type of program has been restricted to higher-income countries like the United States because of its potentially high administrative costs. Continuing its commitment to low-income consumers, however, the government of Sri Lanka has eliminated the ration system but instituted a "food stamp" program covering several basic commodities (including kerosene). The recipients in this program have a substantial degree of flexibility in the disposal of their income-supplementing coupons, including the ability to put them in the bank.

The government marketing interventions discussed above are generally implemented to affect a situation which exists over a period of time. By contrast, emergency reserves might be held to support disaster relief. In theory one can distinguish between occasional natural or man-made disaster (and the reserves needed in these cases) and more frequent but more moderate shortfalls in production (and the stocks for them), although in practice this may be difficult. If separating the needs is difficult, separating the stocks is even harder since the same bags of grain and the same buildings are involved in many cases. Thus, countries which have pipeline and/or buffer stocks almost automatically have emergency reserves, although the ideal locations of these three types of stocks could be very different. Probably every country, and especially developing countries with high probability of disasters, would like to have an emergency reserve. In numerous countries the idea of an emergency reserve has become a declared policy but has never been implemented because of a variety of constraints. Regional cooperation is another good idea yet to be put into practice in places such as the Sahel.

The cost-effectiveness of stocks has been investigated through the use of a simulation model by Reutlinger [32]. He points out that the costs per ton of buffer stocks increase rapidly after the point when the probability of their use declines rapidly. Thus a storage program should generally not be designed to cover all possible contingencies, but rather some reasonable subset of them. Imports can often supplement stocks after a fairly predictable delay.

Another group of domestic policies focuses on increasing food production. These include investment in research, extension, irrigation, and expanded or subsidized credit. These instruments are highly

complementary. With the exception of subsidized credit, they are largely direct, tangible investments, as opposed to price-based instruments, which may involve significant expenditures but not the creation of public facilities.

Trade Policies

Regulations related to foreign trade are an essential part of all government efforts to achieve grain policy objectives because of the often close interrelationship of trade with domestic policies. For instance, government intervention in internal agricultural markets to support domestic objectives often results in internal prices that are different from world market prices. Trade restrictions are then required to preserve domestic price levels and to insure orderly marketing of imported and domestically produced commodities. The level of exports or imports depends upon factors such as the degree of protection given to producers, the commitment to provide adequate supplies and stable producer and consumer prices, and the balance of payments position.

Methods employed by governments to regulate the importation of grains include tariffs/taxes, licensing, importation by state trading agencies or government-authorized monopolies and exchange rate policies. In cases where grain is state-traded, tariffs and taxes are usually not applied. In some countries differences in world and internal prices result in a de facto variable levy on imports, and revenues (losses) are absorbed by the marketing agency. State trading is the most common form of government intervention among developing countries and is used by countries such as Senegal, Philippines, Sri Lanka, Indonesia, Bangladesh, Tanzania, Sudan,

Dominican Republic, Colombia, and Brazil. A notable exception is Nigeria which applies licensing procedures and tariffs to grain imports. 7/

According to Sen, Margolin, and Dasgupta, the policies of developing countries that work to restrict trade are symptomatic of an undervaluation of foreign currency in relation to domestic currency [41]. Overvaluation of the domestic currency, which acts as an implicit subsidy to imports and a tax on exports, is the result of domestic policies or an explicit trade policy. The former case is described by Scobie and Valdes for wheat in Egypt [40]. Their study illustrates that, due to domestic policies which subsidize consumption of an imported commodity, the demand for foreign exchange is increased above the free-market level. In the absence of exchange rate adjustments or reserve changes, some mechanism is required to allocate foreign exchange among competing uses. In this context, it is interesting to note that countries that allow private trade in some grains, like Nigeria, Colombia, and Peru, tariffs are applied to imports to raise revenue as well as to raise the cost of importation.

An example of a country which has explicitly used its exchange rate to affect trade is Brazil. During the 1950's and early 1960's, Brazil kept its exchange rate overvalued in an effort to discourage exports and promote imports of raw materials for its import substitution programs. This policy changed in late 1967 when the cruzeiro was devalued. The cruzeiro again became overvalued during the mid-seventies, when rising petroleum prices severely affected Brazil's balance of trade.

7/ In countries where governments subsidize food prices, it is usually not profitable for private companies to participate in trade. This is the case in Egypt where private traders are permitted to import wheat but the Ministry of Supply in actuality imports all wheat because of low consumer prices.

Most developing countries formulate import targets for food grains that may or may not be fulfilled in any year. The purpose of the targets is to plan for adequate imports, based upon expectations of domestic supplies. The level of the import target depends upon the importance of different policymakers' objectives. For instance, a low level of planned imports could save foreign exchange, or further self-sufficiency or farmer welfare objectives. An artificially low target for imports is a policy instrument which aids governments in increasing producer prices as an incentive to domestic production. The import target can be achieved by limiting the foreign exchange available to the state trading agency or by restricting import licenses.

Concessional food imports, when available, can serve as a policy instrument to save foreign exchange. However, the degree to which foreign exchange is saved depends upon whether or not commercial sales are displaced. Several country specific studies of the impacts of concessional sales of wheat [7, 19, 22] have shown that in some countries, e.g., Brazil and the Republic of Korea, food aid combined with low official prices has displaced commercial sales and thus saved current foreign exchange. For other countries, e.g., Egypt and Tunisia, concessional sales combined with low official prices created additional demand for the commodity and no commercial sales have been displaced. It is interesting to note that in both Tunisia and Egypt, consumption of staple foods is heavily subsidized, so concessional imports are used to fill the demand for wheat at subsidized prices. Concessional food imports play a particularly important role in enabling countries to implement subsidized consumption policies in Bangladesh, Egypt, Tanzania, and Indonesia.

Importing nontraditional grains furthers food policy objectives in a number of ways. Indonesia, the Philippines, Sri Lanka, Colombia, the Dominican Republic, and Senegal import nontraditional grains--wheat or rice--to ensure adequate food for urban consumers. A nontraditional grain (like wheat) may also be cheaper than the traditional grain (e.g. rice).

Constraints

In developing and implementing policies, policymakers must take into consideration various constraints that make implementation difficult. Among these factors are the government budget, administrative capacity, and physical infrastructure.

The Budget Constraint

Fiscal resources often limit the ability of a government agency to successfully implement food policies. If programs or projects have minimum feasible sizes, as is often the case, then the paucity of public resources results in policies which might have been complementary becoming mutually exclusive. To increase food production, ideally one might both expand irrigation and support the price of the crop (at least during the initial period). Each of these programs might require a substantial sum, however, especially when production does increase significantly and the price drops. Thus the policymaker might be constrained to the use of one or the other program, but not both.

Even if there is no minimum feasible size of a program it is clear that a lower level of funding (of, say, a buffer stock) will generally result in a less effective or less extensive program. The efficacy of food policy is thus constrained because food policy programs must compete with all other potential government programs for resources.

Administrative Capacity

Some researchers have hypothesized that administrative capacity--the ability to formulate and implement government programs--is one of the most important factors in the development process because government policies have an important influence on economic growth and development.

The appropriate level of government intervention should be determined at least to some extent by the domestic capacity to formulate and implement government policies. This capacity is a function of the availability of local human resources and capital. Policymaking capacity, for example, depends upon the quality and quantity of analysts available, constraints on their time, data availability and general supportive services such as secretarial help, computers, computer programmers, etc. Implementational capacity is also dependent upon quality and quantity of personnel as well as transportation and communication infrastructure.

To a certain extent, this administrative capacity is closely related to the level of development and results in a vicious circle: the poorer you are, the less likely you are to have the capacity to formulate and implement those policies which may pull you out of poverty.

Administrative capacity is certainly related to per capita income, but there are some indications that this is not the only factor. Despite its very low per capita income levels, India has sufficient capacity to develop and implement its agricultural and food policies. Most countries in Africa on the other hand are poor and also lack the capacity to formulate and implement policies.

This capacity both to formulate and implement policies varies from country to country and is likely to be a function of the number of people

educated past primary school--the pool of available people for such employment--as well as the size of the government's budget which indicates the ability to support these civil servants in their efforts to develop and implement policies.

Physical Infrastructure

The ability to implement food and agricultural policies is dependent upon the physical infrastructure. The most important element is likely the quality and extent of the road network. Storage, milling and processing facilities are also essential determinants of food availability.

The physical infrastructure varies from country to country. Simple indicators such as kilometers of roads per square kilometer are not a sufficient proxy for the adequacy of the infrastructure. The infrastructure in Africa in particular is inadequate. The kinds of achievements made in Asia in increasing agricultural yields with new varieties are presently impossible in Africa because, among other things, of an inadequate transportation system to aid in spreading the new varieties.

Policies and Trade-Offs among Objectives

Policymakers in pursuit of food policy objectives have a number of policies at their disposal. They range from commercial or concessional trade to various domestic marketing interventions. Any of these policies has more than one effect, i.e. more than one economic interest group is affected and the consequences may be different in the short and the long run.

Even if the best possible policy mix for a given set of objectives and conditions could be found and implemented, the conditions from which policymaking takes its cues are usually changing. Populations grow and

migrate; the level, variability, and pattern of production change; new technologies are perfected; trade becomes more or less open, etc. Thus the policymaker must be continually restriking the balances among competing interests and conflicting objectives.

Policymakers select policies to meet their objectives. These choices take into account trade-offs among objectives which are distinct and sometimes even inherently mutually exclusive: self-sufficiency and trade, for example.

Trade-offs between different objectives in the trade area involve policymakers' decisions to allocate foreign exchange between the agricultural sector and the nonagricultural sector, a free-market or government-controlled trade strategy, and expanding trade versus maintaining domestic supplies. The extent of dependence upon foreign trade for food supplies is of major concern to most developing countries. Foreign exchange is often scarce, and decisions must be made to allocate these holdings between food and nonfood imports. Foreign exchange can also be used to import modern inputs like fertilizer and machinery, which may help increase food production.

Decisions to allocate foreign exchange to food or nonfood uses must take into account the political cost of not meeting food consumption requirements [37]. Both imports and domestic production are risky, due to uncertainty about production at home and in the rest of the world. Thus the amount of foreign exchange allocated to food imports in any one period may prove to be inadequate, and if prices rise significantly, political and/or economic instability may result. In deciding how to use foreign exchange, policymakers must consider the impacts of their decisions on the achievement of various objectives, including adequate

food consumption, price stability, increased production, self-sufficiency, and saving foreign exchange, in addition to nonagricultural goals.

Some developing countries have chosen to build food grain reserves to meet food requirements in times of high prices or domestic production shortfalls. Foreign exchange is often required in the construction of centralized storage facilities. In addition, if domestic procurement is not possible, grain may have to be imported in order to build up reserves. A storage strategy, therefore, could be costly in terms of foreign exchange, especially if aid or other development assistance is not available. However, reserves allow a country to minimize the use of foreign exchange for food imports by meeting an unexpected shortfall from stocks.

The role of the private and public sectors in trade must also be defined. Domestic pricing policies can limit the scope of a free trade strategy because some control of trade must be maintained if internal prices are different from world prices. Other nonprice policies, like subsidies on inputs, nonprice consumer subsidies, or deficiency payments do not usually interfere with free trade. Policymakers must weigh the tighter control available to them from state trading against the lower (public) cost of private trading.

Policies used to achieve food self-sufficiency include product price supports, input subsidies and investments in infrastructure to increase agricultural production. As Barker and Hayami note, these policies have different short-run and long-run effects. Investments in infrastructure usually have long gestation periods, so there is a temptation for governments to adopt short-run policies such as product price supports

and input subsidies. Whether a short-run or long-run policy is implemented usually depends upon the types of constraints facing government officials. Investment in infrastructure may require large amounts of foreign exchange. In addition, governments may want to increase producer incomes in the short run, and thus decide on a product price support policy.

The choice of food policy instruments also involves tradeoffs between consumer and producer objectives. For instance, the use of a price support could result in higher prices to consumers, whereas an input subsidy will result in no increase in price to consumers in the short run and a possible fall in product prices in the long run. Timmer notes, moreover, that although high product prices will hurt consumers in the short run, in the long run they may benefit from increased supplies. The choice of policy instruments to achieve food self-sufficiency must be made over a particular time horizon and in the context of equity objectives for consumers.

Food aid is another instrument which policymakers can use to achieve their food policy objectives. It is similar to trade in that it supplements the domestic supply of food. On the other hand, it does not compete for foreign exchange to the same extent. The implications of food aid for government finance and production incentives may be quite complex, depending on how it is incorporated into the food system. While either commercial or concessional imports may reduce the incentive for domestic food production--and here incentives are relevant to agriculture ministry officials as well as farmers--commercial imports tend to necessitate the production of exportable goods, whereas food aid has been criticized because it may dampen production incentives without this other "positive" effect.

Whether food aid reduces prices and depresses incentives depends on how it is used [43]. If there is demand creation as well as augmentation of supply, then there may be little or no price-depressing effect. Demand creation entails distributing the food to such groups to add to total demand, rather than replacing previous purchases. Food-for-work and some targeted ration schemes may have this effect. Even if food aid is used in a way that avoids disincentives to production in the short run, its use over a long period may result in the accumulation of a considerable debt, which, even with a generous grace period, will come due and may require restructuring or forgiveness.

The most general type of tradeoff facing food policymakers is whether to intervene in the economy or to allow markets to function freely. Political pressure and other factors may lead governments to be biased toward intervention, or at least to prefer a quick and visible public sector response to a slower free market adjustment. If markets for goods or services function well, then resources are allocated efficiently by the price mechanism and it is difficult (usually impossible) for the public sector to outdo the private sector. On the other hand, if a government wishes to redistribute income (food purchasing power), then intervention may be necessary.

Another common argument for intervention is that markets are not functioning well and, therefore, that a good or service is not valued correctly; for example, the high price of food in the city is frequently ascribed by governments to hoarding or "excessive" profits by middlemen. If there is indeed a difference between the market price and the social

value of a good, there may be a genuine case for government action. In taking action, however, the government should (from an economic standpoint) seek to remedy the cause of the market imperfection as directly as possible. Thus if poor transportation facilities are keeping the price of food up, the government should optimally build roads rather than take over grain marketing, which merely results in a shift of the problem from the private to the public sector.

The disadvantages of government intervention in the food economy are discussed in a recent World Bank report. The following points are made:

- 1) Any resources used by government are diverted from other, possible uses.
- 2) The incidence of taxation may be detrimental. That is, a tax that is easy to administer, like a tax on agricultural exports, may create a production disincentive.
- 3) Government services are often inefficient. Grain marketing is a relevant example in many cases.
- 4) Protection of industries leads to high costs for consumers as well as expensive inputs for farmers and other industries.
- 5) The fiscal burden of price-setting has often led to incentive prices set too low to achieve their intended goals.

In the long run another danger of intervention is that it usually is a difficult process to reverse: governments have tended to intervene more over time, rather than less. This puts an increasing burden on those administering government programs and on those sectors of the economy providing resources to the government.

Factors Fostering Initiatives to Arrive at Successful Food Policies

In addition to the conflicts, constraints, and tradeoffs with which policymakers must contend, there are some factors which tend to promote the success of food policy programs.

The first is the rate of economic growth. As Timmer [45] has noted, a government seeking a redistribution of income--which is what many policies amount to--will have a much better chance if total income is growing. Otherwise, the policy problem is a zero-sum game: what one group gains must come from another group's losses. A growing "pie," on the other hand, gives the government more maneuverability.

Another important characteristic, the lack of reliance on one staple, also derives its importance from the flexibility it confers. In a country dependent on one staple for all or nearly all of its staple calories, policymakers will be constrained to manipulating the price or quantity of just that one crop. High prices will hurt poor consumers disproportionately, and low prices will benefit better-off consumers whether or not this benefit is intended. Production or import shortfalls will be particularly serious; a buffer stock, if held, would have to be larger and costlier than otherwise to yield a reasonable amount of nutritional protection.

Conversely, if there are a number of staple foods which are acceptable in a country, i.e. at least somewhat substitutable, then the possibilities for food policies are more numerous. Where there is an inferior and a superior staple, the policymaker may have scope to subsidize the consumption of the poor man's food and support the price of

the superior food. 8/ In this way poor consumers and producers are assisted and benefits tend not to flow to richer consumers. If the price support benefits richer producers too much, an acreage or other limitation can be added. On the other hand, if one staple is produced domestically and one is imported, the degree of policy flexibility is likely to be reduced.

8/ Unless all staples are perfect substitutes.

II. SURVEY OF POLICY OBJECTIVES AND INSTRUMENTS OF SELECTED DEVELOPING COUNTRIES

This section presents information by country on specific policy instruments in the context of the government's stated objectives of food and agricultural policies. 1/ This survey includes 21 countries in three geographic regions--Africa, Asia, and Latin America. We focus on the period following the 1973-74 "food crisis" through the early 1980's, because of the specific policy measures many countries instituted in response to that situation. We also attempt to highlight any recent changes that have occurred. We examine the major policies of each country to gauge: 1) the structure and extent of government intervention in the food and agricultural sector; and 2) the possible influence of policies on the production, consumption, and trade of food and agricultural commodities. We emphasize policies designed to affect foodgrains and other major staples, although policies directed toward agricultural export crops are discussed where appropriate. The primary policy instruments of interest are official producer and retail price controls, food subsidies, international trade restrictions, and credit and input subsidies. We also include some information about the constraints under which a policymaker must operate.

We assume there is a relationship between policy and performance in the food sector. However, it is beyond the scope of this survey to

1/ The information was derived largely from the World Bank, IMF, USDA, and FAO and was supplemented by a survey of country analysts in the International Economics Division of USDA's Economic Research Service.

establish a direct, causal link between a particular instrument and the achievement of a specific objective. Rather, we examine policy instruments to assess their appropriateness and potential for achieving a stated objective. In general, we attempt to answer two questions. 1) Have policies been implemented in a manner consistent with stated objectives? 2) Which objective (stated or unstated) has implicitly received priority?

Structure and Extent of Government Intervention

Table 1 lists stated food policy objectives of the 21 countries surveyed. The classification is based on the earlier description of various LDC objectives. The objectives cited are taken largely from official pronouncements of policy goals and therefore represent stated objectives.

Summary of Food Policy Objectives

Each African country cites self-sufficiency as a policy objective, although the goal is usually stated only in terms of grains and basic staples. The other objective cited most often is improving producer income (six countries). The two objectives are logically compatible. One way to achieve self-sufficiency is through greater food production, and increases in production can be encouraged by measures which will also improve farmers' incomes. In addition, several countries cite expanding agricultural exports as a means of easing the burden of large food import bills. Most African countries place emphasis, at least verbally, on equalizing the distribution of income between rural and urban areas and the achievement of social and economic equity for the population.

Table 1--Government food policy objectives for selected developing countries

Region/Country	Consumer Welfare	Producer Welfare	Government revenue	Foreign exchange	Self sufficiency	Stable Prices	Food security
AFRICA							
Botswana		X			X		X
Kenya		X		X			X
Mali		X					
Morocco					X	X	
Nigeria		X			X		
Senegal		X			X		
Sudan		X		X	X		
Tanzania					X		
ASIA							
Bangladesh	X	X		X	X	X	X
India	X	X			X	X	X
Indonesia	X	X			X	X	X
Philippines		X			X	X	X
Sri Lanka	X	X			X	X	
Thailand	X	X	X	X		X	
LATIN AMERICA							
Brazil	X						
Dominican Rep.	X			X	X		
Quatemala	X	X	X	X	X		
Haiti		X				X	
Jamaica		X				X	
Paraguay		X		X			
Peru	X	X					X

Sources: Country analysts in IED/ERS; selected country documents.

All six Asian countries cite increased producer welfare and income as a primary agricultural goal. Bangladesh, India, Indonesia, Philippines, and Sri Lanka have an explicit food self-sufficiency objective. There is a greater emphasis on consumer welfare and stable prices than in Africa. Thailand--the only traditional grain exporter--states earning foreign exchange and government revenue as agricultural policy goals. In 1981 Thailand also included producer welfare as a policy objective. Bangladesh, Philippines, Sri Lanka, and Indonesia have specific nutrition and consumption goals as part of a food security objective.

The Latin American countries have less explicit emphasis on food self-sufficiency. Haiti, Brazil, and Guatemala are the only countries that cite food self-sufficiency as an objective. Brazil, Dominican Republic, Guatemala, and Paraguay cite consumer welfare and enhancing (or saving) foreign exchange earnings as primary objectives. Each country except Brazil and the Dominican Republic expresses improving farmer income as an objective, although Brazil is concerned with eliminating regional inequities in the distribution of income. Brazil is the only country with an explicitly stated national nutrition plan.

In summarizing table 1, producer welfare and food self-sufficiency are the objectives cited most often. Indeed, most countries view these two objectives as different sides of the same coin. The food security objective is predominantly an Asian phenomenon. The objectives of consumer welfare and stable prices occur in tandem in many countries and are found almost exclusively in Asian and Latin American countries.

Summary of Instruments and Controls

Table 2 summarizes the direct production, marketing, and trade controls governments have instituted to achieve their stated objectives. This information allows one to draw general conclusions about the structure of direct government intervention in the food and agricultural sector. The information reflects government intentions, not the actual implementation or effectiveness of the controls.

The African countries apply production, marketing, and trade controls on a wide range of major grains and other basic staples (table 2). Tanzania, Mali, and Kenya employ controls on the greatest number of crops and attempt to influence the production and consumption of most basic staples. Intervention by Morocco, Senegal, and Nigeria is less pervasive, but is still significant and focuses on wheat, rice, and corn. The Sudan focuses controls on the production and trade of wheat. Botswana intervenes directly only for its two major crops, corn and sorghum, and is the only country without an import monopoly over grains. All other countries control imports of wheat, rice, and corn through government monopoly or licensing arrangements. Botswana, Kenya, Mali, and Tanzania also have government monopolies for the export of grains.

Asian governments intervene most often in the production, marketing, and trade of rice and wheat, the major foodgrains consumed in the region. Controls on other grains are less prevalent, although India maintains controls on all the major grains and pulses. The Philippines maintains controls on more items than do Sri Lanka, Bangladesh, and Thailand. Export controls are more prevalent than in Africa or Latin America, particularly for Thailand, a traditional grain exporter. Export controls are also important in India, an occasional exporter of grain.

Table 2--Structure of direct government intervention for major grains and staple

Region/Country	Production and Marketing Controls ¹						Trade Controls ²					
	Wheat	Rice	Corn	Sorghum	Millet	Other	Wheat	Rice	Corn	Sorghum	Millet	Other
Africa												
Botswana	⊗	○	◐	◑	○	○	○	○	◐	◑	○	◑
Kenya	◑	◑	◑	◑	◑	◑ ⁴	◑	◑	◑	○	○	○
Mali	⊗	●	◑	◑	◑	◑ ⁵	◑	◑	◑	◑	◑	○
Morocco	●	○	◑	◑	○	◑ ⁶	◑	◑	◑	◑	○	○
Nigeria	⊗	◑	◑	◑	◑	○	◑	◑	◑	○	○	◑
Senegal	◑	◑	○	⊗	◑	◑ ⁵	◑	◑	○	○	○	○
Sudan	◑	⊗	○	○	○	○	◑	○	○	○	○	○
Tanzania	●	●	●	◑	◑	◑ ⁴	◑	◑	◑	◑	◑	◑ ⁴
Asia												
Bangladesh	◑	◑	○	⊗	⊗	○	◑	◑	○	◑	○	○
India	◑	◑	◑	○	○	○	◑	◑	◑	◑	◑	◑ ⁸
Indonesia	●	●	◑	⊗	⊗	○	◑	◑	◑	○	○	◑ ⁴
Philippines	⊗	◑	◑	◑	⊗	◑ ⁴	◑	◑	◑	◑	◑	◑ ⁸
Sri Lanka	◑	●	○	⊗	○	○	◑	◑	○	○	○	○
Thailand	○	◑	○	○	⊗	○	○	◑	◑	◑	○	◑ ⁴
Latin America												
Brazil	◑	◑	◑	○	⊗	◑ ⁴	◑	○	○	○	○	○
Dominican Rep.	⊗	●	◑	○	⊗	◑ ⁹	◑	◑	◑	◑	○	○
Guatemala	◑	◑	◑	◑	⊗	○	◑	◑	◑	◑	○	○
Haiti	⊗	○	○	⊗	⊗	○	◑	◑	○	○	○	○
Jamaica	⊗	◑	○	⊗	⊗	○	◑	◑	◑	○	○	◑ ¹⁰
Paraguay	◑	○	○	⊗	⊗	○	◑	◑	◑	○	○	○
Peru	○	○	◑	◑	○	◑ ¹²	◑	◑	◑	◑	○	◑ ¹¹

Black areas represent government controls.

¹ procurement processing  storage transportation

 not grown or negligible amount

² export monopoly import license  export tax or quota import monopoly

³ Oilseeds and pulses. ⁴ Cassava. ⁵ Groundnuts. ⁶ Barley. ⁷ Fruits, vegetables, pulses, livestock. ⁸ Pulses.

⁹ Beans and sweet potatoes. ¹⁰ Oilseeds and sugar. ¹¹ Meat. ¹² Beans and potatoes.

Production and marketing controls are less widespread in the Latin American countries, although there is great diversity between countries. Brazil, Dominican Republic, Guatemala, and Peru have intervened more extensively than the other three countries. All countries regulate the importation of wheat and rice through a government monopoly or licenses and five of the seven countries also regulate corn imports. Export controls are not significant.

There is a broad spectrum of government intervention among the three regions, ranging from Tanzania, which attempts to control almost all aspects of the food and agricultural sector, to Paraguay, which has an explicit policy of minimal government involvement. The African and Asian countries rely more heavily on direct production, marketing, and trade controls than the Latin American countries. Wheat and rice are the primary commodities regulated in Asia and Latin America, whereas controls in Africa often extend to other commodities--corn, sorghum, millet, cassava, and groundnuts.

The data in table 3 provide an indication of the extent of government intervention in the individual countries. Basic commodities under direct government price controls, whether grown domestically or imported, are presented as a share of daily per capita caloric consumption (table 3).

2/ The data are not intended to provide a precise measure of the extent

2/ Data in table 3 are the latest available, but may not be fully up to date because of recent shifts in government policies. The data reflect the situation in the late 1970's and early 1980's.

Table 3--Share of consumption of major grains and staples
under direct price controls, 1980

Country	Wheat	Rice	Corn	Sorghum	Millet	Other <u>1/</u>	Total
<u>--Percentage of consumption--</u>							
<u>Africa</u>							
Botswana	--	--	27	--	20	--	47
Kenya	5	1	45	4	3	6	64
Mali	2	11	6	--	54	--	73
Morocco	63 <u>2/</u>	--	3	--	--	--	66
Nigeria	3	3	6	13	17	--	42
Senegal	10	24	--	--	24	5	63
Sudan	9	--	--	35	--	--	44
Tanzania	3	4	25	25	2	2	61
<u>Asia</u>							
Bangladesh	12	73	--	--	--	--	85
India	18	31	3	--	--	--	54
Indonesia	4	52	7	--	--	--	63
Philippines	5	40	13	--	--	--	58
Sri Lanka	18	42	--	--	--	--	60
Thailand	--	68 <u>3/</u>	--	--	--	--	68
<u>Latin America</u>							
Brazil	12	--	--	--	--	--	12
Dominican Rep.	11	20	4	--	3	9	47
Guatemala	7	2	47	--	--	--	56
Haiti	7	--	--	--	--	--	7
Jamaica	22	8	--	--	--	--	30
Paraguay	6	--	--	--	--	--	6
Peru	18	11	10	--	--	7	46

-- = Not applicable.

1/ Roots, tubers, and pulses.

2/ Includes 21 percent of barley.

3/ Prices indirectly influenced by government stock and export policies.

Source: 16.

of government intervention, but rather to show the relative importance in the diet of commodities whose prices are under direct government control. Although the African countries tend to have controls on a greater number of commodities than the other two regions, the predominance of rice in the diet of Asian countries results in greater government intervention, on average, in Asia than the other regions. An example is Bangladesh where two commodities, wheat and rice, account for 85 percent of consumption and Tanzania, where six commodities account for about 60 percent of consumption.

Government controls in most countries tend to operate with different degrees of effectiveness in urban and rural areas for different commodities. For example, in Kenya corn is the basic staple and accounts for 45 percent of daily per capita consumption. However, retail price controls are probably less effective on corn consumed in the rural areas than controls on wheat and rice--accounting for only five and one percent of consumption, respectively--consumed primarily in the urban areas. In addition, a wide variety of other food items are under direct price controls in most countries--sugar, vegetable oils, meats, and dairy products.

In general, the greater the importance of an item in total production and consumption, the more likely are marketing and production controls. Food imports that are important to the diet in urban areas--wheat and rice--are regulated more often by direct price controls than other grains.

Regional Assessment of Policies

This section examines by region some specific policies employed by individual country governments. We first describe each country's production and marketing controls, focusing on relative movements in government-controlled producer and retail prices for basic staples. The next section presents direct government-imposed restriction on international trade of food and agricultural products--licenses, state-owned monopolies, taxes, and exchange restrictions--as well as indirect government intervention through relative movements in exchange and inflation rates.

In addition, many governments have attempted to achieve food policy objectives through input and credit programs. The input programs can involve direct distribution at subsidized prices to producers through government parastatals, or subsidized credit to purchase inputs from the private sector. The three regions have been characterized by different approaches which are described in the third section. All governments face limitations in attempting to implement specific policies, particularly constraints imposed by the domestic and external financial situation. The next section presents information about the impact on the domestic budget and foreign exchange availability of government policies. Various indicators of performance in the agricultural sector are presented to illustrate the consistency of policies and stated objectives. The final section briefly reviews each region's stated food policy objectives in light of the specific policies to assess which objective has implicitly received priority.

Africa

Production and marketing controls--Most of the African countries are poor and have primarily agricultural economies (table 4). Nigeria is the major exception, with much of its economic activity centered on petroleum. During the 1970's economic growth was rapid in Botswana and Nigeria. The remaining countries had fair to good economic growth rates. Agricultural growth rates in the region were less impressive. Of the countries considered in this study, only Botswana, Kenya, and Tanzania reached a level of per capita food production in 1980 greater than the 1969-71 average level. Per capita food production in the 5 other countries was considerably below the level of the early 1970's.

Agriculture is the dominant sector in the African countries, contributing from one sixth to one half of GDP. Agriculture's share of export earnings is more diverse, ranging from only 8 percent in Nigeria to over 90 percent in Mali, Sudan, and Tanzania. The agricultural sector is the primary employer in each country, constituting one half to over three quarters of the labor force.

Tanzania intervenes extensively in the production and marketing of all basic food staples. Producer incentives were restructured after 1974 to favor food crops, with an emphasis on traditional, drought-resistant crops and corn. Pricing and procurement policies were redirected toward basic staples. In the mid-1970's the producer price for corn--the basic

Table 4--Basic economic indicators of selected African countries

Country	Per capita GNP, 1980	GNP growth rate, 1970-79	Agriculture growth rate, 1970-79	Agriculture's share of GDP, 1979	Agricultural share of ex- ports, 1978	Agricultural labor force, 1979	Per capita food production, 1980
	U.S. Dollars			Percent			1969-71 = 100
Botswana	910	11.8 ^{1/}	N.A	16	15 ^{2/}	81 ^{3/}	107
Kenya	420	6.5	5.4	34	67	78	117
Mali	190	5.0	4.2	42	99	88	80
Morocco	860	6.1	-0.3	19	36	52	84
Nigeria	1,010	7.5	-0.3	22	8	55	84
Senegal	450	2.5	3.6	29	80	76	63
Sudan	470	4.3	2.7	38	95	78	82
Tanzania	260	4.9	4.9	54	90	83	105

^{1/} 1972-1979.

^{2/} Average for 1978-80.

^{3/} Only 6 percent of the labor is formally in agriculture.

^{4/} FAO index.

Sources: 15, 50, 52, 54.

staple--was raised at a faster rate than the other grains and was one of the few items to keep up with inflation (table 5). Food crop prices, compared to both domestic inflation and world prices, were generally higher than export crop prices. Low producer prices and export taxes discouraged coffee and tea production and contributed to black market activity in some commodities. Between 1970-73 exports contributed 24 percent of GNP, but only 12 percent in 1981.

Official producer prices lagged behind the rate of inflation in the late 1970's except for corn and there has been a general shift away from marketed production of major cereal and export crops towards subsistence crop production, a reflection of both government policy and drought in 1977 and 1980. Between 1973-79 the subsistence sector increased at an average rate of 8.6 percent, while the commercial sector grew at an average rate of only 2.8 percent. Government procurement as a share of production is substantial for wheat, but less than a quarter of production for corn, rice, and sorghum (table 5). During the 1970's the volume of production marketed has declined for wheat, rice, and cotton, but increased for corn, millet, sorghum, and cassava. Until July 1981, food items were bought nationally for a single price, encouraging production in remote areas ill-suited for production.

Tanzania controls prices on almost all retail food items and has subsidized the price of many basic staple products. Maize and maize flour--staples for low-income people--are the most heavily subsidized items. Prices are also set for traditional food items--sorghum, millet,

Table 5--Changes in the CPI, world prices, and official producer prices for selected countries and commodities

Country/commodity	1975	1976	1977	1978	1979	1980	1981
<u>--Percentage change over previous year--</u>							
WORLD PRICE: <u>1/</u>							
Wheat	-13	-15	-22	16	26	15	4
Rice	-32	-32	7	29	-4	27	13
Corn	-7	-9	-14	2	23	14	3
Sorghum	-12	-6	-16	9	22	26	-3
AFRICA:							
<u>Kenya 2/ (CPI)</u>	<u>19</u>	<u>11</u>	<u>15</u>	<u>17</u>	<u>8</u>	<u>14</u>	<u>12</u>
Corn	52	10	16	0	-19	86	5
Rice (paddy)	76	32	-1	7	4	NA	NA
Wheat	31	14	11	0	8	NA	NA
<u>Mali (CPI)</u>	<u>23</u>	<u>9</u>	<u>16</u>	<u>18</u>	<u>21</u>	<u>NA</u>	<u>NA</u>
Millet/sorghum	60	0	0	13	11	25	40
Rice	60	0	0	13	11	20	25
Corn	60	0	0	13	11	25	40
<u>Morocco (CPI)</u>	<u>8</u>	<u>9</u>	<u>13</u>	<u>10</u>	<u>8</u>	<u>9</u>	<u>14</u>
Hard wheat	NA	0	35	0	24	0	NA
Soft wheat	NA	0	42	0	24	0	NA
Barley	NA	0	63	0	23	0	NA
Corn	NA	0	44	0	23	0	NA
<u>Senegal (CPI)</u>	<u>32</u>	<u>1</u>	<u>11</u>	<u>4</u>	<u>10</u>	<u>9</u>	<u>6</u>
Millet/sorghum	NA	0	17	0	14	0	0
Rice	NA	1	0	0	0	0	0
Corn	NA	0	0	43	25	0	0
<u>Tanzania (CPI)</u>	<u>26</u>	<u>7</u>	<u>12</u>	<u>11</u>	<u>14</u>	<u>30</u>	<u>NA</u>
Corn	52	50	0	6	0	18	0
Rice (paddy)	14	54	0	20	0	25	17
Wheat	35	30	20	4	0	8	22
Millet (finger)	NA	46	12	111	0	0	-25
ASIA:							
<u>Bangladesh 3/(CPI)</u>	<u>24</u>	<u>-10</u>	<u>10</u>	<u>13</u>	<u>13</u>	<u>13</u>	<u>13</u>
Rice (paddy)	65	0	0	9	0	23	8
Wheat	NA	NA	NA	9	4	20	10

--Continued

Table 5--Changes in the CPI, world prices, and official producer prices for selected countries and commodities--Continued

Country/commodity	1975	1976	1977	1978	1979	1980	1981
	<u>--Percentage change over previous year--</u>						
<u>India</u> ^{4/} (CPI)	6	-8	9	3	6	12	13
Rice (paddy)	NA	NA	0	4	10	12	10
Wheat	NA	NA	0	5	2	4	0
<u>Indonesia</u> ^{4/} (CPI)	19	20	11	8	22	19	12
Rice (paddy)	NA	11	2	9	32	11	19
Rice (milled)	NA	17	4	6	27	11	11
<u>Sri Lanka</u> (CPI)	7	1	1	12	11	26	18
Rice (paddy)	10	0	0	21	0	NA	NA
Corn	-15	-27	2	13	5	NA	NA
Sorghum	4	-40	18	-44	NA	NA	NA
LATIN AMERICA:							
<u>Brazil</u> ^{5/} (CPI)	29	42	44	39	53	83	105
Rice	54	25	41	40	53	76	106
Wheat	87	19	70	12	31	NA	NA
Beans	30	25	76	29	34	66	129
Corn	22	34	34	24	42	89	146
Sorghum	NA	NA	NA	NA	39	72	170
<u>Guatemala</u> ^{5/} (CPI)	13	11	13	8	12	11	11
Rice	NA	NA	-18	16	38	0	17
Wheat	NA	NA	0	0	0	0	0
Beans	NA	NA	-37	13	29	0	16
Corn	NA	NA	-26	12	18	0	16
Sorghum	NA	NA	-1	5	10	0	3

NA= Not available.

^{1/} Average change in prices for major exporters.

^{2/} Average price paid by marketing boards.

^{3/} Procurement prices.

^{4/} Support prices.

^{5/} Minimum support prices.

Source: Selected country documents from the IMF and World Bank.

cassava. Lack of storage and transportation facilities have limited the effectiveness of direct price intervention. The government has considered lowering prices of traditional foods to encourage consumption since imports of wheat, rice, and corn have been increasing to meet the growing demand.

Table 6--Share of production procured by official marketing boards for selected countries and commodities

Country	1975	1976	1977	1978	1979	1980
<u>--Percentage of production--</u>						
AFRICA:						
Kenya (corn)	26	26	19	13	18	15
Mali (cereals)	10	8	6	7	10	7
Morocco						
Soft wheat	58	13	14	3	32	NA
Hard wheat	6	2	7	4	9	10
Barley	3	1	4	1	4	3
Corn	7	5	29	6	18	17
Tanzania						
Corn	3	10	13	21	25	13
Rice(paddy)	15	7	6	10	14	NA
Wheat	26	42	77	92	92	NA
Sorghum	1	1	4	13	25	NA
ASIA:						
Bangladesh						
Wheat & rice	0	2	2	3	2	2
India						
Foodgrains ^{1/}	11	12	10	10	12	12
Indonesia						
Rice	4	3	3	2	5	2
Sri Lanka						
Rice	22	22	31	37	29	15
LATIN AMERICA						
Brazil						
Rice (paddy)	*	10	10	2	6	NA
Beans	2	0	*	3	*	NA
Corn	*	2	8	<u>3/12</u>	<u>3/10</u>	NA
Sorghum	*	6	18	3	*	NA

* -- less than one percent.

^{1/} Procurement as a share of marketed production.

^{2/} Acquired under the minimum price program.

^{3/} Includes imports.

Source: Selected country documents from IMF and World Bank.

Cereal imports have fluctuated in response to production shortfalls and in some years have been large relative to marketed cereal consumption (tables 8 and 9).

The results from the case study of Tanzania reported in the next section suggest that the government decision to raise the price of corn relative to other crops is, in part, a reaction to the large welfare costs that are incurred for a major staple when the domestic price diverges from the world price. They also doubled the retail price in July 1981.

Mali has just recently liberalized many controls over the production and trade of food. But prior to the 1981/82 crop year, the government was heavily involved in the food sector. Mali controlled producer prices for food and export crops. Grain prices were set low relative to world and regional prices and did not keep up with inflation (table 5). The government marketing board (OPAM) purchased less than ten percent of cereal production and extensive parallel markets existed for cereals. The government encouraged rice over millet and sorghum production and the producer price for rice increased faster than the official retail price. Production and marketing of groundnuts also declined during the 1970's, partly as a result of low producer prices and substantial export taxes. The percentage of output marketed fluctuated but has recently been about a third of production.

In contrast, cotton yields and production have fared much better. Although producer prices were low relative to other countries and taxes were high, cotton producers were organized into producer groups

and receive substantial government services, such as credit and fertilizer. Over 90 percent of cotton production is marketed through the official board.

Mali controlled retail pricing and marketing of major staples. Official retail prices for rice and millet have increased at a slower rate than the CPI (table 7). The retail price for rice has increased at a slower rate than millet, and rice prices were below comparable world prices. Despite the official price controls, parallel markets were widespread and prices were often three times as high as official prices. Cereal imports fluctuated depending on production levels and reached very high levels in 1973 (tables 8 and 9). As of the 1981/82 crop year, the government announced a liberalized marketing system, resulting in a much more limited role for OPAM. This new system applies to millet, sorghum, and corn, but not to rice. Private (licensed) traders will be allowed to buy and sell coarse grains. Floor and ceiling prices will be set, and OPAM will, in theory, intervene when producer prices fall below the floor price and retail prices rise above the ceiling price.

Kenya has focused producer price supports more on food than export crops, although marketing boards exist for both. Producer prices for wheat, corn, and rice have been set close to import parity levels since 1976. In the early and mid-1970's producer prices generally kept pace with inflation, but have recently lagged behind (table 5). The government markets almost all of the wheat, rice, sugar, coffee, and tea, but only about 15 percent of corn production, the basic staple (table 6). The marketing board has transported corn within the country to help

Table 7--Changes in the CPI and official retail prices for selected countries and commodities

Country/commodity	1975	1976	1977	1978	1979	1980	1981
	--Percentage change over previous year--						
AFRICA:							
<u>Mali (CPI)</u>	23	9	16	18	21	NA	NA
Millet	16	0	10	0	14	19	10
Rice (paddy)	32	0	0	22	10	20	-1
Corn	36	0	16	8	16	19	-NA
<u>Kenya 1/ (CPI)</u>	19	11	15	17	8	14	12
Maize flour	20	25	0	0	0	NA	NA
White bread	17	0	7	7	6	NA	NA
Wheat flour	25	0	8	4	4	NA	NA
Rice	46	29	0	0	0	NA	NA
<u>Morocco (CPI)</u>	8	9	13	10	8	9	14
Sugar	NA	0	0	0	16	33	21
Edible oil	NA	0	0	0	14	21	15
Butter	NA	NA	0	4	9	24	27
Wheat flour	NA	NA	NA	NA	NA	11	20
<u>Nigeria (CPI)</u>	34	24	19	19	11	10	23
Wheat bread	5	0	0	55	NA	NA	NA
<u>Senegal (CPI)</u>	32	1	11	4	10	9	6
Rice	NA	NA	0	0	0	0	0
ASIA:							
<u>Bangladesh 2/ (CPI)</u>	24	-10	13	13	13	13	13
Rice	53	50	0	6	8	19	17
Wheat	NA	NA	NA	7	9	13	20
<u>Sri Lanka (CPI)</u>	7	1	1	12	11	26	18
Rice	NA	NA	NA	0	62	17	NA
Wheat flour	NA	NA	NA	87	21	74	NA
LATIN AMERICA:							
<u>Brazil (CPI)</u>	28	42	44	39	53	83	105
Wheat 3/	-23	-9	11	-16	-24	NA	NA

--Continued

Table 7--Changes in the CPI and official retail prices for selected countries and commodities--Continued

Country/commodity	1975	1976	1977	1978	1979	1980	1981
	--Percentage change over previous year--						
Peru (CPI)	24	34	38	58	67	59	75
Rice	0	63	40	41	103	19	90
Yellow corn	74	20	26	76	84	44	48
Sorghum	73	19	33	67	84	48	44
Wheat flour	28	53	66	129	-12	4/	4/

NA = Not available.

1/ Prices in Nairobi.

2/ Average issue price at ration shops.

3/ Government price to millers.

4/ Price supervised but not controlled.

Source: Selected country documents from IMF and World Bank and IMF, International Financial Statistics, various issues.

stabilize supplies and prices, and has restricted private traders from transporting corn between regions. As a result, parallel markets for corn operate in the rural areas. Storage capacity has been inadequate to fulfill government objectives. After large corn harvests in 1977 and 1978, storage facilities were inadequate and the producer price was lowered for the 1979 season.

Kenya controls the retail price for basic staples. Food prices have risen more slowly than the CPI and official prices for milk, bread, rice, and beef have been set below import parity levels (table 7). During the 1970's the government purchase price for corn rose faster than the retail price. Although Kenya has traditionally been a net cereal exporter, cereal imports have been increasing. Cereal imports equalled ten percent of consumption in 1980 (tables 8 and 9).

The results from the case study of Kenya appearing in the next section show that intervention has altered the price structure of food grains produced for domestic consumption and export crops from what this price structure would have been under free trade. Even though Kenya and Tanzania have similar food policy objectives and employ virtually the same policy instruments to attain their objectives, the case studies show that prices are less distorted in Kenya than in Tanzania.

Table 8--Cereal imports as a percentage of total imports 1/

Country	Average: 1969-71:	1972:	1973:	1974:	1975:	1976:	1977:	1978:	1979:	1980
-- <u>Percent</u> --										
<u>AFRICA</u>										
Botswana	7	6	6	2	4	2	3	2	3	2
Kenya	1	1	2	*	1	*	*	1	*	4
Mali	4	10	23	29	19	4	3	6	4	4
Morocco	5	5	11	10	11	7	5	8	8	8
Nigeria	4	3	3	3	2	2	4	4	3	3
Senegal	14	10	19	19	9	12	10	10	8	NA
Sudan	4	5	6	4	2	4	2	2	5	5
Tanzania	2	3	1	14	14	2	5	3	2	8
<u>ASIA</u>										
Bangladesh	N.A.	29	43	35	35	29	7	17	7	25
India	15	4	16	16	24	24	3	2	1	*
Indonesia	19	13	17	12	8	9	12	10	10	8
Philippines	4	7	6	4	4	4	2	2	2	2
Sri Lanka	23	17	29	35	42	30	32	20	13	9
Thailand	*	*	*	*	*	*	*	*	*	*
<u>LATIN AMERICA</u>										
Brazil	5	3	6	4	3	4	2	5	6	6
Dominican Rep.	3	2	4	9	8	9	5	4	3	4
Guatemala	2	2	3	3	4	2	2	2	2	3
Haiti	9	6	13	15	13	13	18	10	18	16
Jamaica	13	5	7	8	7	9	6	8	5	9
Paraguay	5	5	3	6	2	4	2	1	2	2
Peru	8	8	11	10	11	8	8	7	10	11

* -- less than 1 percent.

1/ Includes food aid in cereal imports.

Sources: IMF and FAO.

Table 9--Net cereal imports as a percentage of cereal consumption 1/

Country	Average: 1969-71:	1972:	1973:	1974:	1975:	1976:	1977:	1978:	1979:	1980
-- <u>Percent</u> --										
<u>AFRICA</u>										
Botswana	57	48	85	47	42	6	17	17	91	18
Kenya	(-)*	-8	-4	3	-8	-2	2	(-)*	3	10
Mali	1	3	12	6	3	*	2	*	2	2
Morocco	8	11	25	20	26	18	35	25	30	30
Nigeria	4	5	5	4	6	10	15	18	16	17
Senegal	32	49	40	20	32	39	48	34	44	47
Sudan	6	4	8	2	-5	8	2	8	6	8
Tanzania	4	5	14	36	17	6	10	-2	7	22
<u>ASIA</u>										
Bangladesh	7	22	12	16	10	6	14	8	17	7
India	3	1	4	6	8	6	(-)*	1	-1	(-)*
Indonesia	6	7	12	8	7	11	14	13	13	14
Philippines	14	16	14	13	10	13	11	9	8	8
Sri Lanka	50	46	51	51	59	58	59	36	41	36
Thailand	-43	-24	-39	-35	-49	-56	-29	-50	-49	-49
<u>LATIN AMERICA</u>										
Brazil	4	13	5	4	8	4	19	20	18	18
Dominican Rep.	41	36	54	51	52	52	58	43	52	61
Guatemala	11	10	15	14	12	11	23	13	15	15
Haiti	6	14	16	19	31	36	23	19	22	28
Jamaica	98	99	99	100	97	99	98	96	97	95
Paraguay	14	9	16	4	9	16	18	14	14	21
Peru	36	45	43	45	50	45	42	40	50	63

* = Less than 1 percent.

1/ Includes feed use.

Source: USDA.

Senegal's government intervenes in the production and marketing of different food and export crops. Producer prices in Senegal have been below world prices and have not kept up with inflation (table 5). Corn and millet prices have been much higher relative to world prices than rice, and rice prices were not raised between 1977 and 1981. Producer prices for all major crops were raised for the 1981/82 season.

Cereal production fluctuated greatly during the 1970's with corn and millet faring slightly better than rice. Official marketing of cereals has only been 2-3 percent of production. Groundnut production has been even more disappointing. The absolute volume of marketed production and exports of groundnuts have declined drastically in recent years with poor weather a factor in the performance.

The government sets prices of most basic consumer items. Many prices were set below costs of production or import prices and entailed subsidies from the price stabilization fund. During the the early 1970's, the marketing board incurred losses on rice, wheat, millet, and corn, but made a profit on its groundnut operations. The major loss currently comes from rice subsidies. The official retail price for rice was unchanged between 1976-81, but was raised 31 percent in early 1982 (table 7). The subsidies have encouraged cereal imports, which are currently providing almost one half of cereal consumption (tables 8 and 9).

The financial position of government parastatals has recently forced the government to modify its policies. Some food items have been decontrolled and retail prices on bread, sugar, and groundnut oil have been increased. The marketing agency has been abolished and marketing of

food grains is now done by private traders. An analysis of Senegalese food policy with a focus on rice appears in the next section.

In the Sudan public corporations control large sectors of production for certain food and export crops--almost all wheat, sugar, cotton, and some sorghum, sesame, and groundnut production. Wheat and sugar producer prices have been higher relative to world prices than other crops. Wheat has been the primary food crop under government control. In the mid-1970's wheat area and production began expanding at the expense of cotton as government policies were biased against cotton producers. Cotton producers bore the input costs for all crops and faced delayed payments, export taxes, differential exchange rates, and lower profit margins. The decline in cotton production and exports has had a severe impact on the balance of payments and the financial position of the marketing boards. The government is attempting to restructure incentives toward cotton production as wheat production has fared poorly.

There has been little direct government intervention outside the publicly controlled areas. The government sets minimum prices for some crops, but private traders procure and market commodities.

The government administers prices of many basic consumer items. The government appears to try to pass along some increased costs to consumers. The retail price for sorghum has increased 20 percent annually over the last five years. However, the government has subsidized the retail price of wheat: the producer price has been above the retail price. Farmers do sell some wheat on parallel markets and official retail prices are not always observed. Sudan imports over half its wheat consumption, although total cereal imports have not been large

relative to total imports or cereal consumption (tables 8 and 9). The government is attempting to reduce the subsidy on wheat consumption and recently raised prices.

The government maintains the retail price for sugar well above the producer and import price to earn revenue. However, the price at which the government purchases the sugar from the Sugar Refining Corporation (SRC) has been too low to cover production costs, and the SRC has had to borrow money to cover its deficit. As part of an economic recovery program to meet IMF conditions, Sudan has a stand-by agreement that includes raising the price of sugar 62 percent, tea 43 percent, and vegetable oil 85 percent. In addition, government monopolies over the import and distribution of wheat and sugar have been recently eliminated.

Nigeria sets minimum procurement prices for the major staples, but these prices have been below domestic market prices and procurement by the various commodity boards has been low. Little grain has been procured for a planned strategic reserve. In general, support prices for food crops have not provided an incentive for production, although support prices for basic grains were raised substantially in 1980. Growth in production and yields for most crops has been slow or stagnant during the 1970's.

Producer prices for export crops have been adjusted more frequently than for food crops, but the performance has been worse than the food crop sector. Yields have been declining, as have marketing board purchases for cocoa, groundnuts, and cotton. Poor marketing and transportation have encouraged some producers to return to subsistence and away from cash crop production. The profitability of the

agricultural sector has declined relative to the burgeoning services and construction sectors in the wake of the oil boom.

Food crop marketing is unrestricted and generally takes place in small, local markets. Little competition among middle-men has resulted in wide price fluctuations in rural marketing channels. Higher incomes and government policies have encouraged cereal imports. Real bread prices have fallen as government-fixed prices have risen less than inflation (table 7). Cereal imports increased 850 percent between 1971 and 1977 and account for a growing share of consumption (tables 8 and 9). Sugar and dairy imports have also increased sharply.

Trade controls on cereals--licensing requirements, health regulations, and total bans--have been linked to urban food prices. The government has been willing to use trade restrictions to counter both inflation and short-term foreign exchange shortages. These restrictions have sometimes resulted in shortages and high prices, and the government has had to modify its policies in response to pressure from urban consumers.

Morocco maintains producer support prices for cereals, oilseeds, sugar, and several export crops. The support prices for cereals have been maintained at levels above world prices, but free market prices have been even higher as poor weather has seriously affected production and availability. The government has followed a pattern of raising producer prices substantially every other year (table 5). Official government procurement of durum wheat, barley, and corn is small relative to production--less than ten percent of durum, less than five percent of barley, and less than 20 percent of corn production. These levels

reflect transportation and marketing problems as well as higher free market prices. Procurement and marketing of soft wheat and corn has been more variable than for durum wheat and barley.

Export crops, such as fruits and vegetables, and import substitution crops, such as sugar, have fared much better than cereals. Until just recently agricultural policy emphasized irrigation projects and fruits, vegetable, and sugar producers were the primary beneficiaries. The government has a monopoly over the procurement and export of fruits and vegetables.

The government controls the retail price of basic food items and subsidizes the price of butter, milk, sugar, edible oil, meat, and wheat products. Food prices have been increased at a lower rate than the CPI, reflecting these government subsidies (table 7). Retail prices for major food items have also increased at a slower rate than producer prices. Sugar and edible oils have received the highest subsidies, averaging about 50 percent of the retail price for 1979 and 1980. The government has been trying to reduce the subsidies in recent years. Retail prices of subsidized commodities were raised in 1980 and 1981 although some price increases were reduced in 1981 in the wake of consumer protests. The combination of declining cereal production and subsidized prices has encouraged cereal imports. Cereal imports have been increasing as a share of total imports and consumption (tables 8 and 9).

Botswana created an agricultural marketing board (BAMB) in 1974 to provide a domestic outlet for surplus grain production and to discourage selling surplus grain to South Africa. Prices in Botswana are strongly influenced by developments in South Africa. The support price for the

basic grains--sorghum and corn--is essentially the South African price with some markup for transportation costs. Producer prices for the main cash crops--pulses and oilseeds--are maintained slightly below South African prices to encourage grain production. Producer prices for grains and cash crops have kept abreast of other cost-of-living increases and have contributed to real growth in average farm income.

BAMB's high procurement prices have resulted in larger government purchases, reaching 35 percent of domestic production in 1978/79. But BAMB does not have an official monopoly and the size of purchases varies considerably with weather conditions. By buying grain at different prices in surplus and deficit regions, BAMB has helped to stabilize prices. BAMB sells grain at retail prices below the procurement and the import price and thus requires a subsidy to cover the difference. In addition, private traders import grain below BAMB's price and BAMB has been forced to accumulate stocks.

Grain production is highly variable and grain imports are needed to meet demand. Although grain imports are small relative to total imports, grain imports often represent a large share of consumption, particularly in poor crop years like 1978/79 (tables 8 and 9).

Trade controls and exchange rates--In Tanzania government agencies or parastatals have monopoly rights for all food imports and exports. The composition and level of food imports in Tanzania are controlled through foreign exchange allocations. Prior to 1981/82 Mali's OPAM had a monopoly over all food imports. However, private traders may now legally import food in Mali. In Kenya imports of most cereals and other basic foodstuffs are a monopoly of the government marketing board. Exports of

corn and some other items are also a monopoly function of the board. Food imports in Nigeria are handled by either a government monopoly or licensed private traders. Nigeria has also regulated trade through quantitative restrictions, health and safety regulations, and total prohibitions. Imports of fruits, vegetables, pulses, and livestock have been banned or highly restricted to encourage production. Exports of many food items are also prohibited.

Nigeria has a 40 percent duty on wheat flour, but no duty on unmilled wheat to promote the domestic processing industry. Senegal, Sudan, and Morocco have focused trade controls more directly on cereal imports, particularly wheat and rice. Senegal exempts essential foodstuffs from import duties and Sudan has differential exchange rates for imports of wheat, milk, and sugar. Morocco exempts food imports from the advance import deposit required for all other imports. Botswana is the only country which allows private traders to import cereals, although cereal exports are regulated. Botswana also has a monopoly for exports of pulses and oilseeds.

In addition to direct trade controls, indirect price intervention occurs through relative movements in exchange and inflation rates. Most African countries have allowed their exchange and inflation rates to appreciate relative to domestic and world inflation rates (table 10). ^{3/} The overvalued exchange rates exacerbate the need to maintain restrictions on cereal imports.

^{3/} The exchange rate is said to have appreciated if a country's inflation rate is greater than world inflation, unless it devalues by more than the difference in the inflation rates.

Table 10--Relative movement in exchange rates ^{1/}

Country	1975	1976	1977	1978	1979	1980	1981
	--Percent--						
<u>AFRICA</u>							
Botswana	-16.1	4.2	5.2	-5.0	6.2	11.8	16.2
Kenya	-2.6	3.1	6.5	9.7	-1.2	1.9	-21.9
Mali	16.0	0.3	8.2	15.7	14.6	N.A.	N.A.
Morocco	6.9	-6.2	3.3	6.2	-1.9	-14.7	-8.1
Nigeria	25.4	16.1	3.5	5.3	16.1	4.8	19.4
Senegal	24.2	-17.2	3.9	-6.1	3.2	-11.9	-20.3
Sudan	17.4	-5.8	3.9	-6.1	0.7	16.8	71.6
Tanzania	-4.8	-1.4	3.1	4.2	-7.5	21.9	19.1
<u>ASIA</u>							
Bangladesh	-62.3	-18.0	-1.2	-6.3	-2.4	0.7	-13.2
India	-10.3	-14.7	3.5	-11.7	-0.5	2.5	-7.1
Indonesia	12.3	12.3	-1.9	-60.6	11.3	9.8	1.5
Philippines	-4.5	-0.4	-4.2	-6.9	7.9	6.7	-2.9
Sri Lanka	-14.6	-20.7	-91.4	-2.0	0.8	1.5	-8.5
Thailand	-1.5	-3.3	3.8	-6.5	-0.6	10.0	-3.9
<u>LATIN AMERICA</u>							
Brazil	1.2	1.4	-0.6	-8.3	-62.1	21.8	16.5
Dominican Rep.	7.7	-0.3	-0.1	-11.0	-1.1	7.9	-3.0
Guatemala	6.4	3.2	-0.4	-6.6	1.2	2.0	1.4
Haiti	10.1	-0.5	-6.5	-11.9	2.7	9.2	10.7
Jamaica	10.7	2.1	-1.6	-72.2	13.6	18.1	2.8
Paraguay	0	-3.0	-3.6	-3.8	17.9	13.8	3.0
Peru	7.1	-15.6	-16.2	-35.9	13.9	18.8	17.2

^{1/} Calculated as the difference between the world inflation rate (CPI for industrial countries) and domestic inflation rate plus or minus the change in the exchange rate (SDR rate). Negative sign denotes a depreciation in the exchange rate.

Source: 21.

Nigeria has had the highest inflation and has resorted to various trade restrictions to counter inflation and foreign exchange shortages. The system of overvalued exchange rates and import restrictions operates to varying degrees in most African countries, except Botswana and Mali. Mali has an undervalued exchange rate relative to neighboring countries. Mali's rate is set at 50 percent below other countries in the CFA franc zone. The undervalued rate has encouraged illegal exports of cereals to neighboring countries, despite restrictions on the import and export of cereals.

Most African countries rely heavily on import duties and export taxes for government revenues (table 11). Export taxes have not been as significant as import duties for revenue, but most major agricultural exports have been taxed to varying degrees to earn revenue. Revenue from export taxes has fluctuated or declined in Mali, Senegal, Tanzania, and Sudan, reflecting poor export performance. To counter this decline in exports, Tanzania, Sudan, and Senegal have lowered or eliminated some export taxes. In addition, Senegal has instituted direct groundnut subsidies to encourage exports.

Credit and input subsidies--Countries that intervened the most with direct producer pricing mechanisms also intervened the most in the supply and distribution of credit and inputs. In Tanzania, Mali, and Senegal, parastatals provide various inputs, both subsidized and nonsubsidized, directly to farmers--fertilizer, seed, chemicals, and farm equipment. Fertilizer has received the largest subsidy, reaching 90 percent in Tanzania. Different organizations serve farmers for food crops and

Table 11--Share of budget revenue from taxes on international trade

Region/Country	1975	1976	1977	1978	1979	1980
-- Percent of Total Revenue --						
AFRICA:						
<u>Botswana</u>	50.1	31.8	22.6	38.3	36.9	41.1
Import duties	49.3	31.2	21.9	37.8	36.5	37.8
Export taxes	0.8	0.6	0.7	0.5	0.4	0.3
<u>Kenya</u>	18.6	18.4	16.0	23.4	20.1	18.3
Import duties	18.6	18.4	16.0	21.7	19.6	17.5
Export taxes	0	0	0	1.7	0.5	0.8
<u>Mali</u>	41.8	38.4	39.4	36.0	34.9	37.1
Import duties	38.8	33.1	27.3	30.4	31.0	33.3
Export taxes	3.0	5.3	12.1	5.6	3.9	3.8
<u>Morocco</u>	30.2	34.6	37.0	34.1	29.9	30.3
Import duties	27.9	33.0	35.0	33.0	29.0	28.3
Export taxes	2.3	1.6	1.2	1.1	0.9	1.0
<u>Nigeria</u>	7.1	12.1	10.8	13.1	15.3	6.4
Import duties	7.1	12.1	10.8	13.1	15.3	6.4
Export taxes	0	0	0	0	0	0
<u>Senegal</u>	NA	43.1	44.7	48.8	46.0	44.0
Import duties	NA	38.8	40.1	42.5	44.1	43.2
Export taxes	NA	4.3	4.6	6.3	1.9	0.8
<u>Sudan</u>	41.9	43.4	37.6	43.2	37.5	33.6
Import duties	36.7	37.8	32.1	38.0	33.1	30.3
Export taxes	5.2	5.6	5.5	5.2	4.4	3.3
<u>Tanzania</u>	21.4	15.5	28.9	23.7	20.1	14.5
Import duties	14.0	11.5	13.0	14.7	13.4	8.9
Export taxes	7.4	4.0	15.9	9.0	6.7	5.6
ASIA:						
<u>Bangladesh</u>	23.4	35.6	30.3	33.1	35.6	36.6
Import duties	NA	NA	NA	NA	NA	NA
Export	NA	NA	NA	NA	NA	NA
<u>India</u>	NA	10.6	10.9	11.9	12.9	16.8
Import duties	NA	10.0	10.0	10.4	12.0	16.0
Export	NA	0.6	0.9	1.5	0.8	0.8
<u>Indonesia</u>	15.0	11.5	11.1	10.5	10.8	10.5
Import duties	11.5	9.2	8.9	8.2	6.9	4.7
Export taxes	3.5	2.3	2.2	2.3	3.9	5.8

See footnotes at end of table

(continued)

Table 11—Share of budget revenue from taxes on international trade

Region/Country	1975	1976	1977	1978	1979	1980
-- Percent of Total Revenue --						
<u>Philippines</u>	35.5	26.0	20.5	18.3	14.6	10.5
Import duties	27.8	23.8	18.5	17.5	13.6	9.6
Export taxes	7.7	2.2	2.0	0.8	1.0	0.9
<u>Sri Lanka</u>	16.9	22.1	54.8	56.6	58.6	50.7
Import duties	7.4	9.2	6.9	13.2	18.9	21.3
Export taxes	9.5	12.9	47.8	43.2	39.7	29.4
<u>Thailand</u>	26.0	27.7	32.6	27.6	27.8	25.8
Import duties	20.7	24.2	28.7	24.4	23.5	22.0
Export duties	5.3	3.5	3.9	3.2	4.1	3.8
LATIN AMERICA:						
<u>Brazil</u>	10.9	9.7	7.8	7.6	7.8	13.4
Import duties	9.5	8.8	6.8	6.5	5.8	7.1
Export taxes	1.4	0.9	1.0	1.1	2.0	6.3 ^{1/}
<u>Dominican Republic</u>	50.9	43.6	61.2	46.7	45.3	41.1
Import duties	27.4	32.0	35.7	39.3	36.4	32.6
Export taxes	23.5	11.6	25.5	7.4	8.9	8.5
<u>Guatemala</u>	27.9	29.2	42.1	39.9	36.3	345.8
Import duties	18.5	17.2	16.4	16.0	17.4	14.7
Export taxes	9.4	12.0	25.7	23.9	18.9	20.1
<u>Haiti</u>	57.0	45.2	46.9	55.8	41.5	58.3
Import duties	22.1	24.2	24.9	34.4	24.7	34.6
Export taxes	24.9	21.0	22.0	21.4	17.4	23.7
<u>Jamaica</u>	11.5	13.4	6.7	5.0	5.2	6.3
Import duties	11.2	13.1	6.5	4.8	4.8	5.9
Export taxes	0.3	0.3	0.2	0.2	0.4	0.4
<u>Paraguay</u>	29.9	27.5	30.8	30.6	32.0	29.7
Import duties	28.1	26.1	29.5	29.6	31.1	28.9
Export taxes	1.8	1.4	1.3	1.10	0.9	0.8
<u>Peru</u>	22.8	21.6	23.3	26.9	28.3	28.5
Import duties	20.7	16.1	12.8	14.8	12.3	15.7
Export taxes	2.1	5.5	10.5	12.1	16.0	13.3

NA = Not available.

^{1/} Includes coffee contribution quota.^{2/} Includes taxes on foreign exchange transactions.

Sources: IMF data and official data.

export crops. The parastatals have a record of inefficiency and delivery problems. Senegal abolished some parastatals in 1980 and set up a mixed public-private system for distributing inputs. Senegal eliminated its fertilizer subsidy in early 1982. Although there are now virtually no subsidized inputs, Mali's system has favored export crop producers, especially cotton, and food crop producers organized into producer groups to the detriment of subsistence food producers. The credit programs have also tended to benefit large, better-organized farmers over the small, subsistence farmer.

Nigeria and Botswana have programs to provide subsidized inputs to farmers. Government agencies distribute seed and fertilizer, and both the public and private sector distribute chemicals and other farm equipment to producers. Sudan provides a range of government services for crops grown in the publicly controlled areas, with government agencies responsible for supplying fertilizer and mixed public-private agencies distributing other inputs. Government involvement in the traditional agricultural sector has been very limited.

Kenya and Morocco have been less involved in directly supplying inputs. Morocco provides subsidized credit for the purchase of fertilizer and farm implements and has also maintained a large subsidy on fertilizer--equal to 45 percent of the retail price in 1979. Most inputs in Kenya are supplied by the private sector, although prices are controlled by the government. Kenya is the only country where the government does not subsidize fertilizer, although the government oversees the distribution of fertilizer.

Constraints to implementation--Each African country faces the following constraints: 1) lack of administrative capacity to implement

specific policies, 2) lack of physical infrastructure which limits the extent and effectiveness of government controls, particularly in the rural areas, and 3) budget constraint. In Kenya, Sudan, and Nigeria rural marketing at the farm level is generally private rather than public, but the absence of competition among middle-men results in farmers receiving low prices, often the government's minimum support price.

The domestic budget and the financial situation have been major constraints in some countries to implementing both producer price programs and subsidies on retail items, inputs, and credit. Marketing boards and trade agencies in Mali, Tanzania, Senegal, and Sudan have sold food grains and other staples at uniform, subsidized prices, creating large deficits which have been financed by government credit through price stabilization funds. The expansion in domestic credit through the banking system has contributed to inflationary pressures in the economies by increasing competition for the available credit. Mali and Senegal have financed their food subsidies partly through taxes on export crops, thus subsidizing food consumption at the expense of export crop production. Food subsidies in Morocco have also been considerable--equal to almost 15 percent of current government expenditure in 1980--although they have been reduced recently to ease the impact on the budget. Although other countries have subsidized the retail price of specific items--for example, wheat in Nigeria and corn in Kenya--the impact on the budget has not been as severe.

Kenya, Mali, Morocco, Senegal, Sudan, and Tanzania are highly dependent on agricultural exports for both foreign exchange and government revenue (tables 3 and 11). Efforts to expand food crop

production in Sudan and Tanzania have had the unintended consequence of discriminating against export crop production, with adverse consequences for the balance of payments and the budget. Tanzania's export performance has deteriorated recently and the relative contribution to the budget of taxes on international trade declined by 50 percent between 1977 and 1980. Nigeria and Botswana face less of a budget and foreign exchange constraint because they are less dependent on agricultural exports. The case studies of Kenya and Tanzania provide empirical estimates of the effect of government intervention on export market performance.

A lack of foreign exchange also acts as a constraint to food imports, because the necessity to import food reduces the amount of foreign exchange available for other imports. Table 14 shows the ratio of cereal imports to export earnings and provides an indication of the extent of the foreign exchange constraint. The ratios vary over time and were especially high for many countries during the "food crisis" years of 1973-75 and 1979-80. Mali, Senegal, Tanzania, and Morocco appear to have had the greatest constraint, and Nigeria, Kenya, and Botswana the least, although Morocco's and Kenya's balance of payments are currently under great pressure. These ratios have fluctuated considerably, reflecting both fluctuations in export earnings and cereal production. However, concessional cereal imports have been an important source of supply in certain years for each country except Nigeria (table 12). These imports may have helped lessen the foreign exchange constraint, but they also tend to fluctuate considerably reflecting donor supplies, world prices, and other factors.

Table 12--Concessional cereal imports as a percentage of total cereal imports

Country	1975	1976	1977	1978	1979	1980
-- Percent --						
<u>AFRICA</u>						
Botswana	45.0	24.3	56.7	14.7	8.6	N.A.
Kenya	2.6	75.7	24.2	10.7	30.0	33.2
Mali	45.7	1.2	78.1	68.0	33.7	55.8
Morocco	4.9	3.5	9.1	8.9	8.6	6.4
Nigeria	1.5	*	0	0	0	0
Senegal	12.9	5.6	7.3	38.9	14.9	11.8
Sudan	39.9	14.4	48.9	38.4	26.0	55.9
Tanzania	59.1	^{1/} 142.6	96.1	100.0	51.0	23.1
<u>ASIA</u>						
Bangladesh	92.9	76.6	82.3	78.5	83.1	82.5
India	14.4	18.6	64.8	85.4	94.5	N.A.
Indonesia	21.2	5.8	28.9	35.2	27.4	23.0
Philippines	10.8	7.0	6.8	10.9	13.1	9.6
Sri Lanka	23.3	47.2	42.7	26.6	25.5	20.2
Thailand	0	0	0	1.5	3.7	1.4
<u>LATIN AMERICA</u>						
Brazil	1.4	*	*	*	*	*
Dominican Republic	6.9	7.8	4.8	14.2	11.8	26.7
Guatemala	6.1	24.4	7.5	4.1	4.2	4.4
Haiti	28.4	32.3	37.1	37.9	34.9	28.6
Jamaica	*	1.7	4.1	29.2	21.0	26.3
Paraguay	39.8	*	34.3	8.6	27.0	9.5
Peru	3.2	2.9	1.9	3.4	14.1	6.9

^{1/} Due to discrepancies in the data.

* = Less than 1 percent.

N.A. = Not available.

Sources: USDA and FAO.

Summary--For many African countries government policy has not been implemented effectively or consistently with stated policy objectives. There has been a lack of movement towards achieving food self-sufficiency. It would appear that the objective of consumer welfare has implicitly received high priority. Producer prices have not kept pace with domestic inflation or followed world market prices. The retail price of basic cereals in most countries has been subsidized and cereal imports have increased as a share of consumption for many countries. Government procurement and marketing of grain in most of the African countries has been small relative to total production and not large enough to either effectively support the official price or to have a significant impact on production. The low level of grain production marketed through government boards indicates lack of profitability for the farmer and inefficient marketing arrangements. Although Sudan and Tanzania have adapted policies consistent with increasing food production--e.g., favorable relative prices--this policy has had the unintended consequence of contributing to a decline in export crop production that has exacerbated balance-of-payments problems. Export crops and import-substitution crops rather than basic grains appear to have received priority in Mali, Morocco, and possibly in Kenya.

All countries have subsidized consumption of various food items at times during the past decade to control inflation or maintain low prices. Official retail prices for major food items have lagged behind the rate of inflation in most countries. However, for some countries, by lowering food prices relative to other prices, subsidies have encouraged demand that has been met partly through cereal imports. Cereal imports as a share of consumption are substantial for Botswana, Morocco, Senegal,

Nigeria, and (occasionally) Tanzania and have been a drain on foreign exchange earnings for Mali, Morocco, Senegal, Tanzania, and Kenya.

Overvalued exchange rates, although not an explicitly stated policy, have also encouraged cereal imports. Thus, it does not appear that many of the African countries are moving toward their stated objective of food self-sufficiency.

In some countries objectives have been overly ambitious and resources have not been sufficient to achieve them. This situation shows up clearly in the domestic financial situation of Mali, Senegal, Tanzania, and Sudan. Mali and Tanzania, in particular, have attempted to control almost all aspects of the food and agricultural sector to achieve self-sufficiency, but in reality the public sector has been inefficient and substantial parallel markets exist. Higher income urban consumers in general have been the beneficiaries of subsidized food, despite the objective to help low-income or undernourished people. Thus the objective of consumer welfare has received implicit priority despite the explicitly stated objectives of emphasizing producer welfare and food self-sufficiency.

However, several countries--for example, Mali, Senegal, Morocco--have recently made significant changes in certain aspects of their food policies. These countries are attempting to reduce the extent of government intervention and have recently reduced food subsidies and increased producer prices. The role of government parastatals in food marketing is being evaluated with an eye towards limiting their role.

Asia

Production and marketing controls--The six Asian countries reviewed are quite poor, three with per capita GNP near or under \$200 (table 13). All six are economically very dependent upon agriculture. The agricultural sector contributes between a quarter and a third of GNP for every country except Bangladesh where the share is much higher. In the 1970's, economic growth was rapid--nearly eight percent--in Indonesia and Thailand, and nearly as good in the Philippines at 6.2 percent. The other three countries achieved growth rates between three and four percent per annum.

Indonesian economic growth has been sustained by the petroleum industry. The agricultural sector performed well with a growth rate of 3.6 percent annually. Thailand and the Philippines had much faster agricultural growth of around five percent annually. The three poorest countries--Sri Lanka, India, and Bangladesh--had slower growth rates in agriculture of two percent or less per year during the 1970's, although growth in food grain production in India was much higher and incorporating 1980 and 1981 gives Indian agriculture a growth rate of 2.5 percent.

Agriculture's share of export earnings varies widely among the Asian countries. Thailand, Sri Lanka, and the Philippines depend on agricultural exports for over 50 percent of export earnings. Agriculture employs over half the labor force in each country and almost three-quarters in Bangladesh and India.

Table 13--Basic economic indicators for selected Asian countries

Country	Per capita GNP, 1980	GNP growth rate, 1970-79	Agriculture growth rate, 1970-79	Agriculture's share of GDP, 1979	Agricultural share of ex- ports, 1978	Agricultural labor force, 1979	Per capita food production, 1980
	U.S. Dollars			Percent			1969-71 = 100
India	240	3.4	2.1	38	30	71	98
Indonesia	420	7.6	3.6	30	26	59	116
Philippines	720	6.2	4.9	24	52	47	105
Sri Lanka	270	3.8	2.6	27	81	54	111
Thailand	670	7.7	5.4	26	64	60	127

Sources: 15, 52, 54.

Bangladesh maintains low producer prices relative to world price for rice and wheat as a means to keep consumer prices low. Producer prices for paddy have fluctuated more than the CPI, and producer prices for rice and wheat lagged behind the CPI during the 1970's (table 5). Paddy production increased at a moderate rate during the 1970's and early 1980's. Wheat production, although insignificant compared to rice, showed marked expansion during the same time period, owing primarily to use of high-yielding varieties. The government has favored extensive fertilizer and inputs subsidies to provide incentives to farmers rather than maintain high producer prices.

Retail prices for rice and wheat are subsidized below world price levels through the public distribution system. Domestic procurement accounts for about 20-25 percent of the ration system, but this equals less than five percent of total foodgrain production (table 5). The government uses open market sales from its stocks of rice to stabilize prices although these sales have been small. About 60 percent of the government procurement goes to urban areas and about 40 percent to rural areas. About a quarter of the total population has access to the ration system. The subsidy averages about 30 percent, although prices have been

raised recently. The official retail price for wheat and rice did not keep pace with inflation during the late 1970's. The ration consisted of two parts wheat and one part rice, but was recently changed.

Concessional wheat imports have been an important component of the ration system which provides 1.5-2.0 million tons of foodgrains annually, about 11-13 percent of total consumption. Cereal imports have equalled a large share of both total imports and consumption (tables 8 and 9).

India intervenes extensively in both production and consumption of rice and wheat, the major foodgrains. India also maintains controls on other staple crops, although less effectively than wheat and rice. The government has traditionally had both a support and procurement price for foodgrains. However, the procurement price has in essence become the support price because the support price has been too low to be effective. Procurement prices have been increased annually in recent years, but generally at a slower rate than inflation.

A major policy instrument used in connection with procurement prices is zone restrictions. By restricting the movement of grain between zones, prices are artificially distorted between surplus and deficit regions. Thus, movement restrictions enable the government to procure successfully in surplus regions for distribution in deficit regions. Zone restrictions are no longer formally imposed by the government, but individual states still impose less formal restrictions on private movements during certain seasons to ensure meeting procurement targets. Movement restrictions have varied with the overall supply situation and have been more prevalent during periods of tight supplies.

The procurement process varies by commodity with different government agencies involved at both the producer and processing level. Government procurement represents about one tenth of the marketed surplus of foodgrains, with higher percentages for wheat and rice than for coarse grains (table 5). Procurement of pulses is nil as support prices have been well below actual prices. Staples are channeled into the fair price shops, where they are sold at subsidized prices. Most fair price shops are located in urban areas although there is now emphasis on expanding rural distribution. A recent trend has been to reduce the retail subsidy and provide a higher price to producers. Although stocks have dwindled in recent years, government policy has been to maintain stocks to provide adequate supplies for the public distribution system and food security in the event of a production shortfall.

Imports have been an important source of supply for the stocks and fair price shops, especially for wheat. Prior to 1977, cereal imports were a significant share of total imports and of the total distribution of cereals, although they were not large relative to total consumption. However, improved production in recent years and large stocks built up through imports have sharply reduced the level of imports (tables 8 and 9). India's stock policy allowed it to avoid large cereal purchases after drought in 1979 seriously affected production. India imported wheat in 1981 for the first time since 1977 after large drawdowns of stocks jeopardized both the public distribution system and food security.

Indonesia's food policy has focused on maintaining stable rice prices to protect both producer and consumer welfare. Two programs were begun

in the mid-1960's to provide inputs and technical assistance to farmers. In turn, the government set a floor price at which it would purchase the crop. These early programs focused on rice, but procurement amounted to only 2-5 percent of production during the 1970's (table 5). These policy instruments are now being extended to secondary food crops--corn, cassava, soybeans, peanuts, and sweet potatoes. Annual increases in floor prices began in 1973/74, and producer prices increased substantially in recent years as the government attempted to improve producer incentives (table 5). The programs ran into difficulties in the mid-1970's, and in 1979 the government began a new collective approach to improve management and debt responsibilities.

The government maintains a retail price ceiling for rice and wheat to keep prices within reach of low-income consumers. Stocks are released to retail markets during periods of high prices, such as immediately prior to harvest time. Also, the government marketing agency (BULOG) may sell foodstuffs directly to desired retail outlets. In recent years, government distribution has increased from over eight percent of rice consumption in 1974/75 to a peak of about 18 percent in 1977/78, but has since declined slightly. The retail price of wheat has been subsidized as part of Indonesia's policy to lessen dependence on rice and to provide a low-cost staple that satisfies nutritional requirements. BULOG has also attempted to control retail prices of sugar.

To supplement the low level of domestic procurement, cereal imports are necessary and account for 80-90 percent of cereals distributed by the government. Cereal imports have been increasing as a share of cereal consumption, but declining slightly as a share of total imports (tables 8 and 9). Rice imports declined sharply in 1981.

The Philippines intervenes to some extent in the production and marketing of basic grains although rice and corn are also marketed by private traders. The Philippines first achieved self-sufficiency in rice --that is, no imports--in 1977, reaching one of their primary agricultural objectives. Producer prices for basic grains were raised steadily between 1970-75 to stimulate production, although the rate of increase of prices has since declined. The government is now focusing its efforts on corn production to meet rising needs for food and feed. In 1978 a program was introduced to provide fiscal incentives to priority agricultural items--livestock, poultry, feedgrains, hybrid seeds, citrus fruits, and rubber. Export crops received price supports similar to foodgrains during the 1970's as the government pursued a policy of export promotion. Both food and export crop production has slowed in recent years, and some rice imports may again be necessary.

The government regulates prices on essential food items--rice, sugar, wheat flour, and edible oils. The government has acquired sizable rice stocks in recent years that have helped stabilize consumer prices as a result of effective price supports and increased production. The government is the sole importer of wheat and subsidizes sales to millers. Price controls were removed in June 1979 only to be reimposed in February 1980 as inflation accelerated. Retail food prices have generally increased at about the same rate as the CPI. Cereal imports have been declining relative to total imports and consumption. Imports have been used in the past to supplement domestic supplies and help maintain low consumer prices (tables 8 and 9).

Prior to 1977, Sri Lanka's food policy emphasized stable and adequate consumption for the population. The policy was implemented by an

extensive public distribution scheme that provided a free ration of rice and wheat to nearly the entire population. The government procured about one-third of the rice crops, but maintained low producer prices to keep procurement costs down (table 5). Producer prices were raised at a rate slower than the increase in the CPI.

Per capita food production declined steadily between 1970-1977. Faced with declining food production and increasing budget costs, in 1977 a new government radically altered the prevailing food policy. The government first adjusted retail prices for wheat and rice, raising wheat prices much higher than rice prices. Retail wheat prices rose twice as fast as the CPI (table 7). The public distribution system was changed in 1979 from a free ration system to a food stamp system with tightened eligibility requirements. The changes reduced public provision of foodgrains from over 50 percent of total consumption prior to 1977 to about 30 percent of total consumption in 1980. Government procurement of domestic rice has declined from 31 percent of production in 1977 to 15 percent in 1980, as private traders entered the market (table 6).

In conjunction with changes in the public distribution system, producer prices for rice were also increased--as much as 25 percent in 1980. Rice production has increased substantially since 1977, owing partly to higher retail prices and greater demand for rice stemming from the even greater increase in wheat prices. However, increases in secondary foodcrop production (corn and cassava) have leveled off since the early 1970's as rice has become the favored domestic crop. The government also procures a wide range of other crops at fixed prices, and the country has become self-sufficient in several non-staple food items. Government policies since 1977 have succeeded in reducing cereal imports

that have traditionally constituted a large share of both total imports and consumption (tables 8 and 9). However, the country is currently facing a severe drought and food imports are likely to rise. The new policies have also exacerbated inflation.

Thailand's food policies (especially for rice) stand out among Asian countries because Thailand is one of the world's few net food exporters. Since the late 1970s the government has tried to support producer prices for rice, sugarcane, corn, cassava, and other crops. However, there has been no comprehensive crop price policy, but rather several types of ad hoc government interventions that have varied from crop to crop and year to year. The interventions have generally failed to achieve their goal, with the exception of sugarcane, where the government has helped millers and producers negotiate fixed producer prices and made up losses that the millers subsequently incurred.

In the last two years, the government has increasingly tried to use the private sector to help support farm prices, and has increasingly considered letting the agricultural markets find their own price level, with government intervention restricted to exports and imports of farm goods. While no such decision has yet been reached, and domestic interventions by the government are currently going on, 1981 and 1982 have seen a series of significant changes in the heavy charges that the government has traditionally levied on farm exports, particularly rice.

The export duty on rice, used for general government revenues, has been maintained. However, the rice premium used by the government to pay for part of its farm price-support programs or to subsidize fertilizer payment payment, was sharply reduced in a series of steps in 1981 and 1982. And the rice reserve requirement, which involved sale of a certain

amount of rice at a low price to the government for permission to export given quantities, was first reduced and then completely lifted in May 1982. The total effect of the changes in export payments was to allow Thai private exporters to reduce their sales prices overseas, thus becoming more competitive, without suffering losses to themselves. It is expected that these changes will increase export demand and eventually producer prices. Thailand has served notice that it will use its export payments to influence volume and value of export more than in the past. The three export charges can be raised/reinstated if market conditions change.

The government has traditionally exhibited more concern over retail prices in Bangkok than over farm prices, and sold at low retail prices the rice that it received from the rice reserve requirement and other channels. Foreign exchange earnings, farm income, and producer prices have lately assumed greater importance to the government, and without the rice reserve requirement the cheap retail sales have become very expensive to the government; their future is in doubt.

Trade controls and exchange rates--Each country has a government monopoly over the import of wheat and rice except Thailand. This government intervention is an extension of the public food distribution system in Bangladesh, India, Sri Lanka, and Indonesia, since cereal imports are an important part of the distribution system. Most countries also maintain export controls on grains. Thailand regulates rice, corn, and cassava exports through a licensed quota system. Most other countries either maintain a government monopoly or require export licenses for grains and other staples.

Bangladesh, India, and the Philippines have had depreciating exchange rates compared to relative changes in domestic and international prices. Several countries have used devaluation as a policy tool to counter a shortage of foreign exchange. Indonesia devalued in 1978 to offset higher domestic inflation compared to world inflation. Bangladesh devalued in 1975 and Sri Lanka in 1977. Exchange rates in the higher-income-countries--Indonesia, Philippines, and Thailand--tended to appreciate in 1980.

The Asian countries rely on taxes on international trade for differing proportions of total revenue (table 11). The lower-income countries of Bangladesh and Sri Lanka depend on trade revenues for over one third and one half of budget revenue, respectively. The remaining countries receive about one-third or less of their budget revenue from trade revenues. The relative contribution of trade revenues in the Philippines has been steadily decreasing. Most countries receive a much larger share of revenue from import duties than export taxes. Only Sri Lanka, which depends on three commodities (tea, rubber, and coconuts) for 80 percent of export earnings, derives a large share of revenue from export taxes. However, this source has been declining since 1977, whereas the share of revenue from import duties has been increasing. Export taxes have been used in Thailand to restrict rice exports to maintain adequate domestic supplies and in Indonesia to maintain ample agricultural raw materials for domestic processing industries.

Credit and input subsidies--Each Asian country maintains a subsidy on fertilizer, but the extent of government intervention in procurement and

distribution of fertilizer varies by country. Sri Lanka and Bangladesh (until just recently) have maintained complete control over the import and distribution of fertilizer. Retail prices in both countries are heavily subsidized. Prices in Bangladesh have been 30-50 percent below cost and below those in both India and Pakistan. Low prices contributed to a doubling of fertilizer use per hectare between 1973/74 and 1979/80. Between 1977 and 1980, government expenditures in Bangladesh on the fertilizer subsidy were larger than for the foodgrain subsidy. However, prices of many subsidized grains were raised in 1979 and the government has just turned over retail fertilizer trade to the private sector to encourage wider distribution and reduce budgetary costs. Bangladesh has also maintained large subsidies on irrigation water, seeds, and pesticides. Sri Lanka has set retail prices of fertilizer 30-40 percent below import prices, but is considering reducing the subsidy in the face of higher prices. The fertilizer subsidy equalled over six percent of government revenue in 1980 and 1981.

Indonesia has had programs to provide credit, inputs, and technical assistance in connection with its price support program. The government has provided a large subsidy for fertilizer by maintaining the price at a favorable rate relative to the producer price for rice. Fertilizer prices have remained unchanged since 1977, whereas the rice support price has increased almost 95 percent. The subsidy is intended to provide an increase in real income and to encourage use to improve productivity.

India has both private and public distribution of fertilizer, although the government has a monopoly on fertilizer imports. Prices have been subsidized about 15 percent below costs. In Thailand almost all fertilizer is imported, but distribution is mostly in private hands.

Prior to 1980, the government subsidized about 20 percent of fertilizer consumption at prices 20-25 percent below market prices. The Philippines permits private participation in the distribution of fertilizer, but the government imports fertilizer whenever local production costs are higher than tax-free imports. Almost three-quarters of the Philippines annual fertilizer requirements are imported. The government also has programs to provide technical assistance, improved seeds, and subsidized credit. In late 1981, the president announced that the fertilizer subsidy begun in 1973 would be phased out for producers of rice, corn, and vegetables.

Constraints to implementation--The rural areas are generally not as well served by public distribution systems as are the urban areas. The high costs of the less centralized rural distribution and the lack of effective demand--even at subsidized prices--are constraints to expanded rural distribution. The one exception is Sri Lanka whose extensive distribution systems covers both urban and rural areas.

A second, more serious problem faced by most countries is the budget constraint imposed by the marketing system. The marketing system, designed to provide low-cost food for the (usually urban) poor, is expensive because the cost of procuring, storing, and transporting commodities is greater than the selling price. Thus, governments with public food distribution have had to subsidize these programs. The subsidies have also represented a large share of the government budget for some countries. Food subsidies in Bangladesh equalled about 25 percent of government expenditure in 1972/73. The share dropped to 11

percent in 1978/79, although actual expenditures increased nearly 70 percent. Expenditures on food stamps and food subsidies in Sri Lanka equalled about 20 percent of government revenue in 1978, although this share declined to an estimated 11 percent in 1981 as the government scaled down its activities.

Lack of foreign exchange with which to import either foodgrains or other needed imports has plagued the three poorer Asian nations (Bangladesh, India, Sri Lanka) over the past decade while presenting less of a problem for the higher-income countries (Indonesia, Thailand, the Philippines). The three lower-income countries showed a much higher proportion (20-30 percent or more) of export earnings spent on cereal imports than the higher income countries (generally seven percent or less) (table 14). Most countries exhibited sharply increased costs during the 1973-75 world grain shortages. India was forced to allocate 20-35 percent of its export revenue to grain imports during the 1973-75 shortfalls while Bangladesh and Sri Lanka spent even more. However, as production increased, India reduced its cereal imports in the closing years of the decade to the same level as that of the higher-income nations--less than 5 percent of export earnings. Indonesia achieved a similar reduction beginning in 1974 when petroleum export prices quadrupled, causing a sharp increase in export revenues.

Concessional cereal imports have been substantial relative to total cereal imports for Bangladesh, Indonesia, and Sri Lanka (table 12). Commercial cereal imports in India have been small in recent years. Indeed, India was a net exporter of wheat in 1978 and 1979. Food aid has been small relative to total cereal imports when cereal imports were

Table 14--Cereal imports as a percentage of total exports 1/

Country	Average: :1969-71:	1972:	1973:	1974:	1975:	1976:	1977:	1978:	1979:	1980
	--Percent--									
<u>AFRICA</u>										
Botswana	: 16	12	12	2	5	2	3	4	4	2
Kenya	: 1	1	2	1	2	*		* 2	1	6
Mali	: 7	22	47	81	64	7	4	16	9	10
Morocco	: 6	6	14	11	18	14	13	1	15	14
Nigeria	: 3	2	2	1	1	2	3	5	2	2
Senegal	: 21	12	35	24	11	15	13	17	18	20
Sudan	: 5	4	6	8	5	6	3	5	9	15
Tanzania	: 2	4	1	27	29	3	6	6	3	21
<u>ASIA</u>										
Bangladesh	: NA	62	104	111	150	67	18	47	20	82
India	: 17	3	17	21	34	24	3	2	*	*
Indonesia	: 17	12	14	6	6	6	7	6	5	4
Philippines	: 5	9	6	5	7	6	3	3	3	3
Sri Lanka	: 26	18	30	48	56	30	30	23	19	18
Thailand	: *	*	*	*	*	*	*	*	*	*
<u>LATIN AMERICA</u>										
Brazil	: 6	4	6	7	5	6	3	6	7	7
Dominican Rep.	: 3	2	4	11	8	12	6	6	4	7
Guatemala	: 2	2	3	4	4	2	1	2	2	3
Haiti	: 11	10	20	23	24	21	25	14	22	22
Jamaica	: 8	9	13	13	11	12	7	9	6	11
Paraguay	: 7	4	3	6	2	5	2	2	3	4
Peru	: 6	7	10	10	21	13	10	7	6	9

1/ Includes food aid in cereal imports.

* = Less than 1 percent.

Sources: IMF and FAO.

large (1975 and 1976) but food aid was large relative to total cereal imports when those imports were small, as during 1977-79. Thailand has received small amounts of food aid recently in connection with the large influx of refugees.

Summary--A major government priority for most Asian countries discussed here has been to maintain low cereal prices for consumers. The governments of these countries have subsidized the retail price of cereals, primarily rice and wheat, through public distribution programs. Thus the stated objectives receiving priority in the Asian countries appear to be consumer welfare and food security.

The most extensive food distribution programs appear in countries with the lowest per capita incomes--Bangladesh, India, and Sri Lanka. However, in India and Bangladesh, a disproportionate share of benefits of the programs have tended to go to urban rather than rural consumers. Prior to 1977, benefits were widely dispersed in Sri Lanka. The programs have contributed to increased consumption and improved nutrition, but at the cost of large government expenditure and increased food grain imports, particularly in Bangladesh and Sri Lanka.

The higher-income countries--Indonesia (\$300), Thailand (\$590) and Philippines (\$600)--also attempt to maintain low consumer prices. The emphasis has been on controlling prices indirectly through reserves and export policies rather than directly through large public distribution systems, although Indonesia and Thailand do have limited public distribution programs that target low-income consumers. The Philippines has no direct food distribution program, but implements price and trade controls to restrain food prices. The Philippines has undertaken a food sector strategy in conjunction with several international institutions to

improve the nutritional adequacy of diets of low-income populations.

Each Asian country stated increasing food production and farmer income as an objective of their food policies. However, increasing producer income did not receive priority for most countries as producer prices were set below import parity levels and price increases lagged behind increases in the CPI. Thailand, which only recently included producer welfare as an objective, taxed rice producers heavily during the 1970's and maintained consumer prices below export prices. Rather than directly supporting producer prices, governments preferred to use input subsidies as the means to improve producer welfare while restraining increases in retail food prices. The input subsidies have required large government expenditures. The Philippines, however, had an effective price support program for rice which contributed to increased production and stocks.

Several countries reoriented their production policies at the end of the 1970's in response to poor production and the growing cost of cereal imports and subsidies. Regular increases in producer prices were begun in Bangladesh and Sri Lanka. Sri Lanka and India have recently raised retail prices in an attempt to reduce the subsidy to consumers. As fertilizer prices rose following the oil price increases, governments were also forced to reduce subsidies on fertilizer and other inputs. Each country appears to place emphasis on direct production policies with recognition that gains in consumption cannot be made at the expenses of production.

Latin America

Production and marketing controls--Per capita GNP for the Latin American countries ranges from only \$270 in Haiti to over \$2,000 in Brazil. Economic and agricultural growth rates during the 1970's varied considerably among countries. Brazil, Paraguay, Guatemala, and the Dominican Republic had impressive growth rates in 1970-79, while Jamaica, Haiti, and Peru lagged far behind (table 14). This performance is also reflected in the level of per capita food production. In 1980, Jamaica, Haiti, and Peru were at a level below that achieved a decade earlier.

Agriculture's contribution to the economy shows up most clearly in export earnings. Agriculture's share of exports ranges from one half to three quarters of total exports for each country, except Jamaica and Peru. The agricultural sector is relatively less important to the total economy than in Africa, although agriculture contributes over one quarter of GNP in Guatemala, Haiti, and Paraguay. In addition, the agricultural sector employs at least half the workforce in four of seven countries.

In Peru the Ministry of Agriculture sets producer prices for most major commodities--wheat, rice, yellow corn, sorghum, and soybeans. Producer prices generally kept pace with inflation until the late 1970's, when official producer prices for major staples fell below world market prices--rice by 40 percent; corn and cotton by 10-15 percent; and beef by 30-40 percent. The agrarian reform program of the 1970's focused on institutional changes and providing support services and technical assistance. However, the agrarian reform was not successful and food output suffered from a deterioration of irrigation facilities, loss of personnel from the extension service, and a lack of credit for both small farmers and long-term investment.

Table 15--Basic economic indicators of selected Latin American countries

Country	Per capita GNP, 1980	GNP growth rate, 1970-79	Agriculture growth rate, 1970-79	Agriculture's share of GDP, 1979	Agricultural share of ex- ports, 1978	Agricultural labor force, 1979	Per capita food production, 1980
	<u>U.S. Dollars</u>			<u>Percent</u>			<u>1969-71 = 100</u>
Brazil	2,050	8.7	5.0	11	55	40	131
Dominican Rep.	1,140	7.5	3.3	19	75	50	103
Guatemala	1,110	5.9	5.1	26	26	78	176

Sources: 15, 52, 54.

Cash crop production also suffered during the 1970's, especially cotton and sugar. The agrarian reform program attempted to organize farmers into cooperatives. Labor/management disputes developed on the cash crop estates leading to a loss of skilled personnel. This development, along with inconsistent price and tax policies, contributed to declining yields and production. The requirement that a fixed percentage of cultivated land be planted in food crops displaced cash crops, especially cotton. Cotton production has begun to increase following increases in producer prices in 1977, but sugar production remains stagnant.

Peru has a history of government-administered retail prices. Prices for most basic foodstuffs are controlled. Prices of perishable food items sold in the Lima-Callas area were regulated by a municipal body created to control speculation. The Ministry of Agriculture has set prices based on its expectations about world inflation and its willingness or ability to subsidize consumption. Nominal food prices have been increased annually, but real food prices have fluctuated depending on the inflation rate (table 7). Real prices of basic staples--rice, soybeans, corn, sorghum, sugar--declined in 1980, but retail prices were increased substantially in 1981. Wheat and rice have been heavily subsidized and the subsidy has contributed to growing imports. Cereal imports have remained fairly constant as a percentage of total imports, but have been increasing as a share of consumption (tables 8 and 9).

The marketing agency, ENCI, handles domestic marketing of most imported foodstuffs, including dairy products and oilseeds. Marketing of domestically produced crops--potatoes, corn, and beans--is much smaller. ENCI procures, transports, and for corn, stores these commodities. ENCI

competes with the private sector in urban areas, but controls almost all marketing in the sparsely-populated jungle areas. ECASA, a subsidiary of ENCI, markets imported wheat and rice. Most domestic wheat is consumed by producers and is not marketed. A quasi-government agency handles sugar marketing and exports, although recently a private sugar cooperatives were given permission to market sugar directly.

A new government was elected in 1980 and has given its highest priority to improving the current food situation. The new government favors a more market-oriented approach for the agricultural sector than the previous government, although government intervention in the food economy remains strong. The new government is attempting to improve productivity in the agricultural sector through administrative and other reforms and to reduce its role in agricultural marketing.

The Dominican Republic sets producer price supports for all the major staples--rice, beans, corn, sugar, bananas, plantains, and potatoes--through the price stabilization institute (INESPRE). The level of price support for many commodities has not changed for several years, resulting in a decline in real producer prices. Storage facilities have been inadequate to allow meaningful intervention to support prices. Rice production has increased substantially during the 1970's, but corn and sorghum production has been stagnant.

INESPRE sets retail prices for all the basic staples--cereals, vegetable oils, legumes, and others. The amount of intervention varies by commodity. Rice mills have been required since 1970 to sell all rice production to INESPRE at controlled prices. INESPRE controls the retail price of rice because it has a monopoly position at both the wholesale and retail level. INESPRE also purchases corn to ensure the minimum

price for producers. However, very little corn is purchased--only about 3 percent of production in 1975. Wheat, which is not grown domestically, is imported by INESPRES under P.L. 480 and from private sources. The wheat is consigned to state-owned mills for storage, processing, and distribution to retail outlets. Selling P.L. 480 commodities below producer support prices may have depressed production of corn and sorghum.

Cereal imports have been increasing in relation to cereal consumption, although cereal imports have decreased relative to total imports (tables 8 and 9). This increase partly reflects greater imports by INESPRES in compliance with government objectives of securing adequate food supplies.

The Brazilian government employs a variety of production-oriented instruments, including minimum price supports for a wide range of crops--rice, beans, manioc, corn, soybeans, and sorghum. The minimum prices often lagged behind the rate of inflation in the mid-1970's, although the government raised prices considerably in 1980 and 1981 (table 4). The government uses two basic tools to support its minimum prices. The first is a loan which permits the producer to hold commodities off the market (either on the farm or in a government-designated warehouse) until prices improve. If market prices do not rise above the minimum price, the government is willing to acquire the commodities for the minimum price. Government procurement has generally been less than ten percent of production (table 6). Cost of production, anticipated world market prices, and domestic market requirements are important determinants in setting minimum prices.

The producer price system was reorganized in 1981 to ensure producers are paid at least their actual cost of production. New "basic" prices

were established with an allowance for increases in production costs as measured by changes in the CPI. The 1981/82 basic prices for 15 major commodities were raised an average of 60 percent over the 1980/81 prices. However, these increases were below the rate of inflation.

Wheat is a priority item for the government. The government announces a purchase price for wheat through the Bank of Brazil which buys all wheat production. Brazil maintains wheat support prices high enough to cover all costs and provide a good profit margin to the grower.

Brazil's agricultural performance during the last decade has been impressive, particularly for soybeans. However, there are several exceptions to the overall improvements in production. Climatic drawbacks appear to limit wheat production and the minimum price system has not focused sufficiently on beans and cassava. Production of these items has not kept pace with the overall rate of increase in population. To encourage greater production of beans and cassava, minimum prices have recently been increased well above the rate of inflation.

Brazil has maintained extensive price controls on most food items since 1967 to control inflation. State marketing arrangements exist for wheat, rice, corn, and cassava. The rice institute maintains stocks to curb speculation and to assure adequate supplies. Beef stocks are also maintained to prevent price fluctuations. The government buys beef at agreed prices during the slaughter season and sells it at controlled prices during the dry months.

The government began a policy of price liberalization in mid-1980. Many agricultural products were freed from price controls and consumption subsidies were reduced. Wheat has been heavily subsidized with wholesale prices declining in the face of rapid inflation (table 7). As of early

1981, only wheat, milk, and beef had subsidized prices. The wheat subsidy is gradually being reduced and is to be eliminated by December, 1982. Cereal imports increased substantially during the 1970's and represent a growing share of cereal consumption (tables 8 and 9).

In the early 1970's the Jamaican government began a guaranteed minimum price program for basic food crops. A government-owned corporation (AMC) purchased food crops from farmers at market prices for distribution to retail stores and large public institutions. The AMC was also obligated to buy surplus products at a minimum price. However, shortages of food imports, which helped raise prices for food crops relative to export crops, probably contributed more to higher prices than government programs. The new government is currently examining the role of the AMC as part of its agricultural policy review.

The government is also heavily involved in export agriculture. Commodity marketing boards guarantee minimum prices for sugar and bananas--the two major agricultural exports. However, export agriculture has not fared as well as the domestic sector. Sugar production and exports have declined as a result of a lack of capital investment and inadequate incentives for producers. Subsidized retail sugar prices have tended to keep producer and export prices below costs of production.

There are direct price controls on basic food items--bread products, rice, sugar, dairy products, and meats. Government-designated agencies set prices at both the wholesale and retail level and ration supplies to regional distributors. Price controls were increased in 1975 from 45 to 100 products and the government began to subsidize many food items. However, to reduce government expenditure and improve marketing efficiency, in 1978 the government raised prices of basic food items and

reduced food subsidies. The new government decontrolled many prices in mid-1981, but retained price controls on the basic staples. Food subsidies were maintained at their nominal level for 1980/81 which resulted in a decline in the real level of subsidization. Jamaica is dependent on cereal imports for almost all its consumption needs, but cereal imports have equalled less than ten percent of total imports (tables 8 and 9).

Guatemala's state marketing agency, INDECA, was created in 1971. INDECA is responsible for supporting producer prices of basic staples. INDECA sets support prices at different levels throughout the country as part of its program to stabilize prices in the capital city. The average support price for corn and wheat has been considerably above the world price, whereas the rice price has been set much lower than the world price. Producer prices for basic staples were reduced in 1976, but were raised for most crops in 1977, 1978, 1980, and 1981 (table 5). However, the support price for wheat has been unchanged since 1974. Between 1975 and 1980, producer prices generally were increased at a slower rate than inflation. The government has had obligatory planting regulations for basic staples, but INDECA's price support program appears to have had little effect on production, partly because of inadequate storage facilities.

There is little direct government intervention in export crops, apart from market stabilization measures of a temporary nature. The government set producer prices and marketing quotas, but marketing and exporting are generally in the hands of the private sector.

Guatemala has a history of retail price controls, and they were intensified in 1976 following a devastating earthquake. Price controls

were extended to about 50 items and more than half of these were food products. Controls were loosened in 1977, but were retained for the basic staples--grains, oils, flour, meat, and milk.

INDECA controls retail pricing and marketing of basic grains through the use of reserves and imports to assure supplies. INDECA subsidizes the retail prices of certain items distributed through government stores to target low-income consumers. For example, in 1976 the ratio of the INDECA price to the average retail price was 42 percent for corn, 46 percent for beans, and 50 percent for milled rice. Cereal imports have been low relative to total imports and have averaged about 15 percent of cereal consumption (tables 8 and 9).

The price controls have created distortions in some markets. Sugar millers claim fixed prices are too low and they are losing money. Low controlled prices for cottonseed and cottonseed oil have discouraged competition from other oilseeds. Imports have been necessary to meet local demand because prices have been too low to induce enough crushings.

In Haiti there is no direct government intervention in the production and marketing of food crops. Government intervention has been confined to individual projects. Farmers sell directly to local traders who truck the produce into the major cities.

Marketing of cash crops is also handled by private traders. Producers have received low prices from middlemen, and the government has attempted to improve returns to export crop producers by regulating profit margins. For example, in 1970 coffee producers received about one third of the f.o.b. price, whereas farmers currently receive about 50 percent of the f.o.b. price.

Despite attempts to improve returns to cash crop producers, farmgate prices have changed in favor of food crops. Export taxes and oligopsonistic marketing have discouraged cash crop production, particularly sugar. Sugar prices are set at all levels of production and processing to maintain low retail prices. The low producer prices have encouraged farmers to switch to other more profitable crops such as corn, red beans, and tobacco.

The government does not control retail prices of basic grains. Prices tend to be high compared to world levels, although it appears that retailers rather than producers have received the benefit of high prices. Lack of storage results in both seasonal price fluctuations and large regional price differentials.

The government controls the retail price of sugar, flour, and cooking oil and earns significant revenue from taxes on these items. In FY 1979/80 the effective tax rate on these three items was 15 percent and the taxes contributed ten percent of total government revenue.

In Paraguay direct production and marketing controls have been very limited. Price policies have been almost impossible to implement because of limited financial resources, vulnerability of the economy to price movements in Argentina and Brazil, and the difficulty of controlling trade across borders. The government does maintain minimum "reference" prices for cotton, sugarcane, and soybeans, but for all practical purposes commodities are free of government controls.

Wheat is the one commodity the government has encouraged through direct price intervention. In the mid-1960's the government initiated the National Wheat Program to achieve self-sufficiency. Producer prices were set above the world price and in 1981 equalled 153 percent of the world price. A special financial facility was created to provide

immediate payment for delivery of wheat. Despite these incentives, Paraguay does not have a comparative advantage in wheat, and production and yields have been declining.

Crop production has fared better than livestock production in recent years, but export crop production--particularly cotton and soybeans--has increased at a faster rate than food crop production. The share of export crops to total value added in agriculture increased from 14 percent in 1972 to 28 percent in 1979, while the share of domestic crops decreased from 50 to 38 percent during the same time. Much of this shift is explained by high world prices for cotton and soybeans.

Price controls are maintained on only a few items. Official policy proscribes passing along increased costs to the consumer. Beef prices are kept low to encourage consumption. Food prices are affected by the supply of domestic foodstuffs as well as the rate of inflation in neighboring countries. Recently food prices have tended to increase faster than prices in general.

Trade controls and exchange rates--Most governments control imports of cereals through state trade agencies or licensing requirements. Two agencies in Peru have a monopoly over imports of most food items--wheat, potatoes, fats and oils, rice, milk, soybeans, and sugar. In mid-1981 private traders were allowed to import corn and sorghum, but were required to pay a 40 percent duty. State-run agencies in Jamaica have been monopoly importers of basic foods since 1978, although the government is attempting to reduce the role of the marketing agencies in trade. Guatemala's grain marketing agency also has a monopoly over grain imports. All food imports require a license. The Dominican Republic maintains a monopoly over imports of wheat and rice and requires an

import license for other grains. Brazil requires an import license for wheat and corn and Paraguay for wheat and rice.

Other exchange and trade controls have been used to regulate food imports. These restrictions have often followed in the wake of an appreciating exchange rate to counter a foreign exchange shortages. Controls were instituted in Jamaica (1977) and Haiti (1980) following several years in which the exchange rate appreciated (table 12). Foreign exchange in Haiti is allocated according to a list of government priorities--petroleum, wheat, oilseeds, sugar, and rice. Paraguay, Jamaica, and the Dominican Republic have maintained dual exchange rates at different times that have resulted in implicit subsidies to food imports as well as discouraging exports. Inflationary pressures led Brazil to reduce many export incentives--tax credits, credit subsidies, etc.--in late 1979, but these changes were followed by a large devaluation to lower the price of exports abroad.

Most countries maintain export controls on some food and agricultural products. Jamaica, Guatemala, Dominican Republic, and Brazil require export licenses or prohibit the export of certain food items. The restrictions are generally for the purpose of maintaining adequate domestic supplies at reasonable prices.

The Latin American countries, with the exception of Brazil and Jamaica, receive a substantial share of government revenue from taxes on international trade (table 11). The smaller share for Brazil and Jamaica is consistent with their higher per capita GNP. Export taxes are particularly important for Guatemala, Dominican Republic, Haiti, and Peru, and are generally higher than for most of the African countries. Exports taxes in Peru have been increasing as a result of administrative

changes in the rate structure. Export taxes have fluctuated considerably in Dominican Republic and Guatemala, reflecting their reliance on agricultural exports. High export taxes in Haiti and Dominican Republic have acted as a disincentive to production.

Subsidized credit and inputs--Government-supported credit programs are more predominant in Latin American than in African and Asian countries, whereas subsidized inputs have been used less frequently. The new governments in Peru and Jamaica are emphasizing credit to small farmers to improve productivity through higher input use. Subsidized credit has been an important component of Brazil's agricultural policy. Credit has been provided at low, or even negative, interest rates for crop financing, investment, and fertilizer purchases. However, policy changes in late 1980 and early 1981 focused on reducing the subsidy in agricultural credit and increasing the role of commercial banks in providing rural credit. Credit from public institutions has also been an important policy tool in Paraguay, but private banks have played only a minor role in agricultural finance.

Guatemala and Paraguay have operated land settlement and rural development programs to develop unutilized land. The governments have provided technical assistance, transportation, and other services to farmers. Guatemala's research program has focused on improving seed and developing high-yielding varieties for basic staples. Guatemala subsidized the cost of fertilizer in 1974 when prices rose sharply, but removed the subsidy after prices fell.

Peru and the Dominican Republic have recently emphasized improving productivity through better research and extension services. Peru has also instituted new tax incentives to encourage investment, particularly

in the undeveloped jungle areas. Government support services in Haiti have been very weak, especially field services. Input use is low, and this is reflected in the low yields for most crops.

Constraints to implementation--Each country has faced a domestic budget constraint in implementing pricing and credit policies. Marketing boards in Peru, Dominican Republic, Jamaica, Guatemala, and Haiti have sold food grains and other staples at subsidized prices, resulting in occasional deficits that have been financed by government credit. For example, food subsidies in Peru in 1980 were \$300 million, about eight percent of current expenditure. In Jamaica subsidies on basic consumer items--of which food is the largest component--equalled about 11 percent of government revenue to 1977. Budgetary constraints forced the government to reduce these subsidies in 1981 to \$22 million, or 2.5 percent of government expenditure. In Haiti the state-owned flour mill has lost money since 1978 and has been forced to borrow from the domestic banking system to cover both costs of operations and of wheat imports. Brazil's subsidized credit and other direct subsidies have contributed to inflationary pressures in the country and are being reduced. Subsidized credit programs for agriculture equalled six percent of GDP in 1980 and other direct subsidies to wheat, soybean, and sugar producers equalled two percent of GDP.

Cereal imports have not represented a large share of export earnings for most Latin American countries, despite the large share of cereal imports in cereal consumption. Haiti is the major exception, where cereal imports have equalled almost 25 percent of export earnings, although concessional imports have represented a substantial share of cereal imports (table 12). In the Dominican Republic, Jamaica, and Peru

cereal imports have occasionally reached ten percent or more of export earnings. However, the relative share of food aid in cereal imports has been growing in Jamaica and the Dominican Republic since 1978. Food aid has occasionally been large relative to cereal imports in Paraguay, although the total quantities are small.

Summary--Government intervention in the food economy in Latin America has been extensive in Peru, Dominican Republic, Brazil, Jamaica, and Guatemala for the primary purpose of protecting consumer welfare through adequate supplies and stable prices. Intervention in Peru and Jamaica flowed from a strong emphasis on redistributing income and achieving social equity. Policy instruments such as food subsidies and government regulation of cereal imports have been used to maintain stable prices and supplies in Dominican Republic, Peru, Jamaica, Guatemala, and Brazil. Retail prices, especially for wheat and rice, have not kept pace with inflation and government subsidies for consumers have been substantial. Since each of these countries, except Jamaica, states consumer welfare as a policy objective, policy instruments have generally been consistent with this objective.

Although most Latin American governments set some sort of producer price for the basic cereals and staples, government procurement of cereals through parastatals or marketing boards is not as important as in Africa or Asia. Producer prices for some commodities have been below world market prices in Peru (rice and corn) Dominican Republic, Guatemala (wheat and rice), and Jamaica. Food production has lagged in Peru, Jamaica, and Dominican Republic.

Brazil and Paraguay have tried to encourage wheat production by setting producer prices above world levels and maintaining a government

monopoly over procurement. Efforts to achieve self-sufficiency in wheat have not been successful, partly due to climatic factors. Brazil and Paraguay have been successful in implementing policies to expand agricultural exports that have in turn, enhanced producer income and increased foreign exchange earnings.

Overvalued exchange and other policies that encourage food imports have hurt producers of export crops in Haiti, Jamaica, Dominican Republic and Peru. Haiti faces the most severe physical constraints of any country but the two stated objectives of producer welfare and self-sufficiency are not being pursued. Haiti has taxed food consumption to earn government revenues. Peru and Jamaica, despite a poor record in food production and a heavy reliance on cereal imports, have recently elected new governments that are committed to redressing the current poor food situation.

III. CASE STUDIES IN AGRICULTURAL POLICY

In the previous chapter we compared the food policy objectives and the policy instruments employed by twenty-one countries to intervene in domestic and foreign trade markets for agricultural commodities. The performance of the agricultural sectors in these countries were also compared. While links were made between objectives and policies, inferences have not been drawn with regard to the effect of intervention on the performance of agricultural markets.

In this chapter, three countries, Kenya, Tanzania, and Senegal were selected for further study in order to provide additional insights into (a) the extent to which announced objectives actually serve as a guide to the employment of policy instruments; (b) the extent to which the structure of demand and supply of selected food crops in a country affects, in the case of Kenya and Tanzania, the government's intervention strategy over the course of 10 to 15 years; (c) whether annual contingencies, such as weather, foreign exchange shortages, and other unpredictable factors, affect the government's choice of policy instruments on a year-to-year basis, and, more importantly, (d) the effect of intervention on the performance of the agricultural sector for selected crops. In the case of (d), we address the issue of the degree to which these governments actually attained their objectives and estimate the level of tax or subsidy on domestic and foreign markets implied by intervention. For Kenya and Tanzania, estimates were made as to how the agricultural sector would have performed if these governments had followed a free trade policy.

The key policies in the case of Kenya and Tanzania are the announcement of producer and consumer prices and then, the manipulation

of imports and stocks so that markets clear at approximately the announced prices. The key policy instruments in Senegal include the control of exports of peanuts and imports of food grains. The government also attempts to set domestic prices for food grains but this control appears less effective than in the case of the other two countries due to the operation of parallel markets.

In the case of all three countries, governments were found to intervene, i.e. select and implement policies in a manner generally consistent with their announced objectives of food self-sufficiency but with an urban bias. However, Senegal appears to face a somewhat more perplexing problem, given its choice of policies, because its objective of food grain self-sufficiency is directly competitive with objective of increasing peanut production for export to increase foreign exchange earnings.

Kenya and Tanzania responded to annual contingencies by adjustments in food grain imports and stocks. When foreign exchange was below long term trend, these countries responded by decreasing imports, and either drawing on stocks or increasing announced prices depending on whether stocks were above or below long-term trend. Senegal's choice of rice and wheat import levels was responsive to world market rice and wheat prices, government revenues and government held stocks.

The structure of domestic demand and supply for the commodities studied did affect intervention strategies in the long-run. For instance, Kenya and Tanzania taxed those commodities which they have a comparative advantage to produce and subsidized the production of wheat which could be obtained more cheaply from the world market. While

intervention would have resulted in increased exports of rice and maize, and increased imports of wheat in the case of Kenya and Tanzania. The effect of intervention on performance is not as clear in the case of Senegal.

Kenya

The general purpose of the Kenya case study is to determine the government's policy objectives, to describe the specific interventions designed to meet these objectives, and to discuss some consequences of these interventions. This is accomplished by formulating and estimating an econometric commodity model of the food grain sector in Kenya that comprises--in addition to the usual demand and supply equations-- equations describing government behavior. The commodities covered are maize, wheat, and rice. The analysis is based on data for the period from 1964 to 1979. 1/

Domestic self-sufficiency in food grains is a declared objective of the government of Kenya. It permeates development plans, agricultural sector strategies, and public discussions of food price policy. Perhaps the most concise statement is found in the FAO publication, National Grain Policies: "The main policy objective of the Kenya Government is to achieve self-sufficiency in grain production with any excess exported without loss to the government" [14]. Additional objectives that would seem to be particularly important are the stabilization of domestic prices of food grains and the welfare protection of consumers, by maintaining prices lower than the world level. The approach taken here

1/ For discussion of recent weather disturbances that appear to have induced policy changes, see Chapter II.

is to infer from the analysis of the empirical data, what the actual government objectives appear to be. 2/

Background

Kenya is a predominantly rural society: about 80 percent of its population of 16 million (1980) lives in rural areas. Not surprisingly, agriculture dominates the economy, accounting for roughly 30 percent of GDP and 60 percent of merchandise exports. The diet of the average Kenyan is dominated by cereal grains. Based on FAO statistics, these accounted for 57 percent of calories consumed between 1972 and 1974 [16]. Maize is the staple grain, alone accounting for 44 percent of total calories consumed and 77 percent of calories consumed in the form of grain. Roughly 80 percent of production occurs on small farms of less than 8 hectares. Wheat is the next most important grain, accounting for 8 percent of calories consumed in the form of grain. Lastly, and far behind maize and wheat, is rice, accounting for only 1.2 percent of calories consumed in the form of grain. Like wheat, rice is consumed primarily in urban areas.

Between 1964 and 1978, Kenya was a small net exporter of the three food grains; domestic production averaged about 9 percent more than domestic consumption. But this average picture hides dramatic year-to-year fluctuations in international trade. It also hides some significant shifts in the composition of trade, with net exports of maize generally increasing and net exports of wheat declining. While population was growing by 3.5 percent per annum, and real GDP by 6.4 percent, domestic consumption of maize was growing by only 2.0 percent, consumption of wheat by 7.3 percent and consumption of rice by 11.7 percent. On

2/ This case study draws heavily on (18).

the face of it, this suggests that the income elasticity of demand for wheat and rice is large and positive, while that for maize is negative.

Kenya inherited a system of government controls over the marketing of food grains from the colonial period. Today, the relevant marketing board is the National Cereals and Produce Board (NCPB), formed by a merger of the Maize and Produce Board and the Wheat Board in 1979. It maintains a statutory monopoly over the marketing of grains, including imports and exports, that enter "national markets," by which is meant, grains that cross the boundaries of the administrative district in which they are grown. At least once a year, but sometimes more frequently, the Government of Kenya announces a new set of domestic producer and consumer prices. Producer prices are now uniform throughout the country, while consumer prices include an element of transportation costs. The NCPB is responsible for guaranteeing prices at the producer level; the Price Control Department in the Ministry of Finance for enforcing them at the consumer level. The NCPB also holds stocks of grain in order to maintain a regular flow of supplies into consumption and to meet production shortfalls. It is further required by law to maintain a "strategic reserve" of maize to meet emergency situations. The NCPB enforces the domestic price controls by making the necessary adjustments in its own stocks or in international trade in order to equilibrate demand and supply at the set prices.

The Analytical Model

The essential dynamics of the model arise from government policy interventions. 3/ At the beginning of each time period, the government

3/ The most significant piece of preceding work in the field is [1].

announces a net set of producer and consumer prices that prevail throughout the entire period. Domestic producers and consumers respond to these prices. Then the government makes the necessary accommodating adjustments in its own stocks or in international trade in order to clear domestic markets at the ruling prices. While government interventions are exogenous to producers and consumers, they are endogenous to the model and influenced in a systematic way by the state of the world as viewed by government. This state of the world includes world prices, government-held stocks and foreign exchange reserves inherited from previous periods, P.L. 480 imports, and unanticipated supply and demand disturbances as each year unfolds, all of which are exogenous variables to the government.

The model's supply and demand equations and the social accounting identity are conventional. The supply equation is a Nerlove partial adjustment model. The supply shifters are the producer price of export crops (coffee and tea), and a time trend as a proxy for technological change. Demand is a function of prices and private consumption expenditure. All nominal variables are deflated, by the Consumer Price Index in the demand equation, and by the producer price of fertilizer (as an index of the cost of production) in the supply equation. In addition, there are the government or policy instrument equations. They are constructed, first, from possible long-term government objectives underlying its interventions in food grain markets, and second, from short-term constraints that impinge on the immediate achievement of long-term goals.

As a first step towards a model of government behavior, it is postulated that the government has a long run target producer price for

each food grain. From previous arguments, it seems reasonable to represent this as a function of the domestic autarky of self-sufficiency prices, SSP_t , and the world price, WP_t . This formulation allows both the autarky price and the world price to influence the long run target producer price PP_t , so that the latter may vary from year to year. It is further postulated that the government has a long run target consumer price, CP_t , in relation to the target producer price. Next, the government holds stocks, in order to maintain a regular flow of supplies to consumption and to meet production shortfalls at the ruling prices. Therefore, it is postulated that the government has a long run target level of carryover stocks. This target will bear some relationship to the magnitude of random disturbances in the demand and supply curves. Finally, because the government is the only holder of carryover stocks in this model, the government's long run pricing and stockholding decisions imply a long run target level of imports (or exports as the case may be).

In addition, there are short-term constraints on government behavior. If there were no such constraints, the government could be presumed to simply set prices, stocks, and net imports at the long run target levels. These government variables will diverge from the long run targets because of short-term constraints.

The model incorporates four constraints. First, government-held stocks inherited from the previous time period may be historically low and below the long run objective. In this case, the government may desire to build stocks in the present time period either by increasing the producer price, the consumer price, or net imports above the long run target level. Second, the government may be facing a foreign exchange constraint. In this case, the government may desire to save foreign

exchange by reducing imports of food grains below the long run target level.

Third, the government may receive some foreign assistance in kind, such as PL 480 imports, which represents a below market price source of the commodity. This may induce the government to lower domestic consumer prices, and ceteris paribus bring about a higher level of total imports than would otherwise have been the case. Fourth, there are unavoidable and impossible to anticipate disturbances in the supply and demand equations as each year unfolds. The government accommodates these disturbances, not by modifying prices because these are already fixed for each time period, but by changing the level of stocks or by engaging in international trade.

The variables, the model equations, and the empirical results are provided in Appendix A.

Results of the Analysis

In the long run, government-announced producer prices are primarily a function of the world price in the case of maize, both the world and autarky prices in the case of wheat, and only the autarky price in the case of rice (the estimated coefficient on the world price being negative in this case). Hence, both prices appear to play a role, but the more important the commodity to domestic consumption of food grains, the more significant the commodity to consumption, the greater will be both the social cost to the country and the direct cost to the government treasury of maintaining domestic prices that diverge from world prices.

The estimated elasticity of net imports to the expected world price is -9.717 in the case of maize, and -9.450 for wheat. This says that small changes in world prices can transform Kenya from a net importer to

a net exporter, or vice versa, which is reasonable because Kenya's external trade in both grains has been very "thin". The response of net imports and government-held stocks to actual world prices in the current period are inelastic for all three grains. These findings are consistent with the importance attached to domestic price stability in the short run whatever the cost to the government.

In the long run, consumer prices of all three grains have moved more or less in tandem with producer prices. But the margin between the two has been increasing significantly over time in the case of maize and decreasing significantly over time in the case of wheat and rice. Considering that maize is consumed throughout Kenya, while wheat and rice are consumed primarily in urban areas, this divergent pattern suggests that the government has been subsidizing urban consumers more and more over time through the consumer-producer price margin, either as a deliberate act of policy or in response to the political pressures of urban consumer groups.

When stocks are below trend, the government builds them up in the next two periods. For both maize and wheat, stocks are accumulated primarily by increasing imports rather than by increasing domestic prices. There is also a significant net import response to foreign exchange reserves in all three models. When reserves are below trend, the government imports less (or exports more) in future periods, by increasing producer prices in the case of maize, both producer and consumer prices in the case of wheat, and consumer prices in the case of rice.

The government's response to (positive) unanticipated demand and supply disturbances is equally to import more grain (53 percent of the

response) and to reduce stocks (47 percent) in the case of maize, and only to reduce stocks in the case of wheat. This seemingly different behavior probably arises because government-held stocks of wheat have historically been much larger relative to total consumption (about 75 percent) than stocks of maize (about 20 percent). Therefore, in the case of wheat, it has been possible to accommodate excess demand stocks at the prevailing prices solely by reducing government-held stocks.

Conclusions

An analysis of long run government pricing policies shows that the margin between consumer and producer prices that has been maintained by the government has been very large for all three grains, although not very different from margins maintained on average throughout several other countries in East Africa. Margins are larger for rice and wheat than for maize since more of the produce is lost in processing.

In view of these large margins, either the National Cereals and Produce Board is providing an inefficient service, or the cost of providing marketing services in Kenya is very high. Per-ton transport costs are often very high in most African countries because of poor infrastructure and the high mileage relative to the volume of trade. Still, it seems hard to argue that consumers have been subsidized on average through the margin. It seems more likely that they have been taxed compared to the margin that might have prevailed under a freer marketing system.

Second, the consumer-producer price margin has been increasing significantly over time for maize, but declining for wheat and rice. It suggests that government policy has tended to increasingly favor urban consumers during the period 1964 to 1978.

Third, at the official exchange rate, the average rate of taxation on export crops in relation to the world price has been about 5 percent in Kenya, which is much lower than in most African countries [5]. It is evident that the main form of taxation on the export sector is the over-valued exchange rate, which Scott, MacArthur, and Newberry have estimated to be about 25 percent [26].

Fourth, maize production has been taxed in relation to the world price on average by 13 percent, wheat production has been subsidized by 8 percent, and rice production taxed by 35 percent. In all cases, the rate of taxation has been increasing over time, but significantly so only in the case of maize. Consequently, the rate of subsidy on wheat production dropped to zero in about 1977. Because the rate of taxation on export crops has been roughly constant over the time period, food grains have been taxed more and more relative to export crops over time.

At first glance it may seem inconsistent to tax the production of two food grains and subsidize the third, but this inconsistency diminishes when viewed in terms of the government's declared self-sufficiency objective. A degree of self-sufficiency in food grain production has genuinely been a major objective. While the rate of taxation on the three crops varies considerably, the degree of self-sufficiency maintained--given the rate of taxation on export crops and the consumer-producer price margins maintained by the government--varies much less, from 91 percent in the case of rice to 107 percent for wheat and 115 percent for maize. Rice production has been taxed the most because Kenya is a low-cost producer.

The overall results paint a very consistent picture. Government interventions in food grain markets are urban-biased. The National

Cereals and Produce Board provides food security more to urban consumers than to rural farmers, stocks of wheat being higher in relation to total domestic consumption than stocks of maize. ^{4/} Furthermore, government-maintained margins between producer and consumer prices have been uniformly decreasing in the case of wheat and rice, but increasing in the case of maize.

But most significant of all, the Government of Kenya taxes its agricultural sector, both export crops and food grains, on net in relation to the world price, especially at a realistic exchange rate. Within this general policy, specific government policy with regard to food grains seeks to maintain a degree of self-sufficiency in food grain production, which therefore limits the degree of taxation that the government can consistently impose on the food grain sector. Given the rate of taxation of export crops and the margins maintained between consumer and producer prices of food grains, the taxation observed on food grain production has been close to the maximum possible consistent with the self-sufficiency objective. Government interventions in domestic food grain markets, designed in the colonial period to protect the interests of producers, are now being used primarily to benefit urban consumers.

Kenya has been a low-cost producer of maize and rice in relation to the world price and a high-cost producer of wheat. Under "free trade" the country would have exported maize in every single year, exported rice in every year but 1977, and imported wheat in every year but 1975 and

^{4/} Una Lele and Wilfred Candler, "Food Security: Some East African Considerations," in Alberto Valdes, ed., Food Security for Developing Countries (Boulder, Colorado: Westview Press) 1981. They make the same point that national "food security" policies in East Africa represent food security for the urban areas, not for the country as a whole.

1976. By taxing maize and rice production, Kenya became a less significant exporter of maize and a net importer of rice. By subsidizing wheat production, it became a net exporter of wheat. On average over the 15-year period, the government's policy of self-sufficiency in food grain production reduced Kenya's participation in international trade from net exports of 499.0 to 70.5 thousand metric tons of maize; from net imports of 45.1 to net exports of 7.1 thousand metric tons of wheat; and from net exports of 8.1 to net imports of 1.4 thousand metric tons of rice. The changes would be even larger if world prices were converted at a more realistic exchange rate, rather than the official rate.

Government food grain policy has clearly involved a cost in terms of commodities. It has also caused a once-and-for-all real income loss according to the static theory of comparative advantage. Even so, government interventions in domestic food grain markets are entrenched and show little sign of changing in the foreseeable future. Arising from the political process, they presumably bring benefits of a political nature to the government that cannot be measured in dollars and cents. Kenya has been a stable country by world standards, and developing relatively rapidly. While the government's food grain policy has not been costless, it has probably contributed successfully to domestic political stability, which in turn has contributed to overall economic development. Certainly, policy is urban-biased, for this is where political power disproportionately resides. But the rate of taxation on the agricultural sector has not been as excessive as in many African countries, and government investment in agriculture has been sufficiently large to maintain relative low-cost production of major staples.

Tanzania

Tanzanian development efforts are exemplary of the deep involvement of governments in the agricultural sector, and particularly in the food grain sector. The general objective of this study is to gain insights into this involvement by the government of Tanzania, as one case study, and to measure the impact of this involvement on external trade in food grains.

Background

Approximately 90 percent of Tanzania's total population of about 17 million reside in rural areas, comprising in the neighborhood of 2.3 million families and about 8,000 villages. Agriculture dominates the Tanzanian economy, accounting for an average of 40 percent of GDP and an average of about 70 percent of merchandise exports. The annual average rate of growth of the agricultural sector for the period 1968-1978 was less than the rate of growth in GDP. While GDP and GDP per capita grew at an annual average rate of 5 percent and 2.2 percent respectively, total agricultural production advanced at an annual average rate of only 1.9 percent. Agricultural production per capita actually decreased at an annual average rate of .9 percent. The main food crops are maize, cassava, sorghum, millet and rice. Accordingly, the diets of the rural population are dominated by cereals, roots and tubers.

Maize production has nearly equaled maize consumption on a per annum basis during this period, while imports of wheat and rice have been necessary to satisfy the annual excess demand for these grains. Annual growth in imports of these three grains has ranged from 2.5 percent of wheat to about 8.2 percent for maize. Imports of maize were particularly important during the drought which occurred in 1973-75.

Public intervention in economic activity is derived from Tanzania's objectives for social and economic development which are outlined in the Arusha Declaration of 1967. Extensive public intervention has meant the control of commodity prices at both the farm and retail level. Over 100 parastatal processing and retailing firms and crop authorities control the marketing of most agricultural commodities from the farm gate to the retail store. Food prices are administered through various government entities. The National Milling Corporation (NMC) is the parastatal responsible for purchasing farm level supplies of cereal crops. It is virtually the sole buyer of wheat. The marketing of export crops is the responsibility of the respective crop authorities, e.g., the cotton authority, tea authority, and coffee authority, etc. Retail markets for food, are for the most part, also nationalized, except for fruits and vegetables, and sales occur through government operated retail outlets.

Transportation of agricultural inputs and commodities is also controlled by the public ownership of transport facilities, equipment and through licensing of private vehicles. Tanzanian pan-territorial pricing policy requires that official prices are applied in a uniform manner throughout the entire country and/or a single price is charged for an agricultural input regardless of location. They are now in the process of changing that policy. The government's willingness to purchase and supply food grains from stocks or imports throughout the year at prevailing announced prices has led to substantial deficits on the accounts of many parastatal firms, particularly the accounts of the National Milling Corporation [47].

Econometric Results

The model of Tanzanian government intervention in food grain markets is structurally identical to that of Kenya. The hypothesis maintained is that government intervenes to maintain its announced prices in the markets for maize, wheat and rice. The government has four long-run targets regarding each crop's producer price, consumer price, government held stocks and net imports. Given announced prices, the government expects its forecasts of consumption and production levels to clear markets through planned adjustments in stocks and imports. In the short run however, various factors can disrupt these plans. As in the Kenyan case, these factors include foreign exchange shortages, world market prices, unanticipated supply and demand stocks and consequently unanticipated stock shortages. Also, PL 480 imports are unlikely to be known in advance of the announcement of prices. These factors, or short-run constraints on government behavior can cause actual announced prices, observed stocks and imports to diverge in any given year from the long-run target level.

Viewing government intervention in this manner gives rise to six equations in six endogenous variables for each of the crops, maize, wheat and rice. Two of the six equations are a demand and supply function which characterize the behavior of the private sector. The remaining four equations explain the levels of government announced consumer and producer prices and levels of government stock and imports. The equations and the definition of variables appear in Appendix table 7.

Demand and supply equations. Results from fitting the per capita demand functions for maize, wheat, and rice appear in Appendix Table A-9. Since the critical chi-square value for three degrees of freedom is 7.82, the restrictions imposed by the Slutsky conditions are not rejected at the .05 level of significance.

The demand functions fit the data remarkably well. All signs are correct except the cross-price effects between maize and rice, although, they are not significantly different from zero in either case. All direct price and income expenditure effects are significant.

Both the direct price and expenditure effects are the largest for wheat followed by rice and maize respectively. This ranking suggests that wheat is a prestige food grain relative to the other grains while rice is preferred relative to maize. The expenditure effect for maize is also large, suggesting that it is preferred to roots and tubers. As income increases, demand for wheat and rice will increase relative to maize, or conversely, differential changes in income, say between rural and urban areas, will cause differential rates of growth in food grain demand. Unfortunately, Tanzania is not a low cost producer of wheat. Hence, rising incomes, especially in urban areas, will likely increase the import demand for wheat.

Results from fitting the total and marketed production equation for maize, wheat, and rice to the data appear in Appendix Table A-10. The equations provide a reasonably good fit to the data with significant direct price effects and expected signs obtained in all cases.

In the case of the total production equations, the results suggest fairly rapid adjustment in the quantities of maize and rice produced to price changes. Wheat, which is produced almost exclusively on government

farms, appears to respond the slowest of the three crops to price changes. The annual rate of growth in wheat production also lags behind the rate of growth in the production of the other crops, with rice showing the most rapid growth rate. The results also suggest that maize competes for resources used in the production of export crops; a one-percent increase in the price index of export crops results in an average of about a .2 percent decrease in the production of maize. The results also suggest that maize competes for resources with both wheat and rice.

Also consistent with expectations are the relatively large direct price elasticities associated with the marketed production of maize and rice. Since the majority of maize and rice is produced on small farm plots, these results suggest that those plots yielding a surplus over household consumption needs, and perhaps sales in unofficial markets are responsive to the relative terms of trade between food and export crops. Indeed, virtually no lag exists in their supply adjustment response to price changes from year to year. Also revealing is the virtually zero annual growth rate in marketed production of maize and rice. Since marketed production corresponds to purchase by NMC, this result suggests either that the marketed surplus of maize and rice over farm household needs has been stagnant or that marketed production has been bypassing official channels.

Policy Instruments. The estimated government behavioral equations are presented in Appendix Tables A-11, A-12, and A-13, one table for maize, wheat, and rice, respectively. The actual equations estimated, with the cross-equation restrictions imposed, are shown in the bottom half of each table and the estimated elasticities, calculated at the means, in the top half.

The results do provide important insights into government interventions; namely, that the government has intervened in the markets for maize, wheat, and rice by announcing prices and inducing markets to clear at these prices through adjustments in government held stocks and imports. Furthermore, the results suggest that short run constraints caused deviations from long-run targets.

In the case of maize (Appendix Table A-11), the government-announced producer price has been equally a function of the expected autarky and world prices. The estimated effect of net imports to the expected world price implies that small changes in the world price can transform Tanzania from a net importer to a net exporter, or vice versa. When stocks of maize are low at the end of one period, the primary response of the government is to import more in the next period to build up stock, and the secondary response is to raise consumer prices. When foreign exchange reserves are low, the government will generally reduce imports by increasing producer prices, but this response is not significant.

The government's response to P.L. 480 imports is to lower consumer prices and to increase imports. In this instance, food aid is demand-creating; it does not simply substitute one-for-one with commercial imports. The government's response to unanticipated positive demand and supply shocks is primarily to import (78 percent of the response), and secondarily to reduce stocks (22 percent). This is exemplary of a government that uses international trade as a buffer stock in order to moderate domestic price changes. The government has not been able to use stocks alone to accommodate demand and supply shocks because the average level of stocks over the period (50.3 thousand metric tons) has been less than the average demand and supply shocks (85.1 thousand metric tons). Production has been very unstable from year to year.

In the case of wheat (Appendix Table A-12), the government-announced producer price has been primarily a function of the expected autarky price. When stocks of wheat are low, the government builds up stocks equally by importing in the next period, and by raising consumer prices. When foreign exchange reserves are low, the government imports significantly less in the next period, primarily by increasing consumer prices and secondarily by increasing producer prices. Unlike the case of maize, the government's response to P.L. 480 imports is insignificant, but similar to maize, the overwhelming response to unanticipated demand and supply shocks is to import more.

In the case of rice (Appendix Table A-13), the government-announced producer price has been primarily a function of the autarky price. When stocks are low, the government responds primarily by importing more in the next period, and secondarily by increasing consumer and producer prices. When foreign exchange reserves are low, the government imports less in the next period by reducing stocks and by increasing both consumer and producer prices. The response of total net imports to P.L. 480 imports is positive but insignificant from zero. Unlike the case of maize, P.L. 480 imports do not appear to be demand-creating because the major response to such food aid is to build up domestic stocks. As in the case of both maize and wheat, the major response of the government to unanticipated demand and supply shocks is to import more (79 percent of the response) and secondarily to reduce government stocks (21 percent).

In summary, the models have succeeded in isolating four major constraints that impinge upon government behavior--government-held stocks, foreign exchange reserves, P.L. 480 imports, and unanticipated demand and supply shocks. Some of these responses are very consistent

for all three commodities. The general response to low levels of stocks is to import more in the next period; to foreign exchange reserves, to adjust domestic prices; and to unanticipated demand and supply shocks, to equilibrate domestic demand and supply by engaging in international trade. The only significant response to total net imports to P.L. 480 imports occurs in the maize model.

Most importantly, the models have succeeded in separating long-term government pricing behavior from selected short-term constraints. Over the long run, by which is meant the underlying policy of the government over the entire period in question, domestic consumer and producer prices have moved more or less in tandem, although there has been some tendency to reduce the margin between consumer and producer prices in the case of wheat and rice. Also, the major determinant of domestic producer prices has been the expected autarky price. World prices have had a secondary influence. It is not regarded as a coincidence that the more important the crop to domestic consumption, the more important has been the influence of world prices, since in this case, deviations of domestic prices from world prices place a heavier burden on foreign exchange.

The Impact of Government Intervention

The next step is to obtain insights into whether the governments intervention policies have been a tax or subsidy to the producers and consumers of these crops. The results appear in Table A-14.

The first feature of government policy that emerges from the table is that the margin between consumer and producer prices differs little from

margins maintained on average in four other countries in East Africa. 5/ Margins are larger for rice and wheat than for maize since more of the product is lost in processing (35 percent in the case of rice, 25 percent for wheat, and 10 percent for maize). It has been observed that the National Milling Corporation has been running a persistent deficit in recent years. 6/. This would seem to imply that the NMC is subsidizing the margin by not covering the cost of transport, milling, etc., from retail sales.

The impact of long-run pricing policy on producer prices is shown in part b of the table. Even at the official exchange rate, which is almost surely overvalued, the rate of taxation on the producers of export crops has been large (about 32 percent over the period) and it has been increasing over time. In 1977, the margin was estimated to be about 47 percent. Given a more realistic exchange rate for the Tanzanian shilling, this estimate would be even greater. Maize production has been taxed on average over the period by about 24 percent, once again at the official exchange rate; wheat production has been subsidized by about 15 percent; and rice production taxed by about 36 percent. However, in the

5/ One of the authors has estimated the equivalent consumer-producer price margins for our countries in East Africa--Kenya, Zambia, and Malawi in addition to Tanzania--as part of his Ph.D. research. The overall mean for the four countries comprises one country (Zambia) in which the margin is subsidized very heavily, another country (Malawi) in which it is taxed in order to generate development resources, and two countries (Kenya and Tanzania) where the situation is intermediate.

6/ At the end of 1980, the NMC had a bank overdraft of \$US 350 million (at the official exchange rate), which represented 40 percent of all Bank of Tanzania loans. Africa Research Bulletin: Economic Financial, and Technical Series 17 (Exeter, England: African Research Ltd., 1980,) p. 5739.

cases of these grains, the rate of taxation has been decreasing over time. If observed trends have continued to the present, the rate of taxation on maize production would drop to zero in 1981.

These results clearly suggest that government policies have had the effect of subsidizing the urban sector at the expense of a tax on the rural sector. Since wheat is grown on government farms, the selling of wheat below cost is also a subsidy to urban consumers. Results obtained below suggest that the decline in taxation reflects the ever tightening constraints on the government capacity to intervene in these markets because of rising production costs.

While at first glance it may seem inconsistent to tax the production of two food grains and subsidize the third, this is not so inconsistent when viewed in terms of a self-sufficiency objective. Our empirical results provide strong evidence that a degree of self-sufficiency in food grain production is indeed a major government objective. While the rate of taxation on the three crops varies considerably, the degree of self-sufficiency maintained varies much less, from 84 percent in the case of wheat to 95 percent in the case of maize. Rice production has been taxed the most because Tanzania is a low-cost producer in relation to the world price, and wheat production has been subsidized because Tanzania is a high-cost producer. As a general statement of government policy in Tanzania, we conclude that producer prices have been maintained by the National Milling Corporation. Therefore the rate of taxation on production has been higher, the lower the cost of producing the crop domestically. This conclusion supports that of Part III that government-announced producer prices have been influenced more by the autarky price than by the world price.

The final question to address is whether intervention has affected the production and price levels of these crops. Insights into this question are obtained by performing two simulations for each crop. The first simulation (1) involved solving the estimated supply and demand functions as if the country followed a free world trade policy at official exchange rates. The second simulation (2) involved solving the system of estimated equations based on the government's pricing targets. These results appear in Appendix Table A-14.

The simulations suggest that Tanzania has been a low-cost producer of maize and rice in relation to the world price--the ratio, WP_t/SSP_t has been greater than unity--and a high-cost producer of wheat. These results are hardly surprising considering that wheat is a temperate crop, while maize and rice are sub-tropical. However, the cost of producing all three crops has been increasing over time and in the case of maize, Tanzania became an average cost producer of maize (with $WP_t/SSP_t =$ unity) roughly in 1976. Rising production costs for maize and rice imply that the government is forced to reduce the level of taxation if it is to maintain or increase the domestic supplies of these crops.

A comparison of simulation 1 with simulation 2 indicates that government intervention did indeed have a significant impact on supply and price levels. If domestic prices had been at world market prices over the period, Tanzania would have been a net exporter of maize and rice and a net importer of wheat. In all three cases, net exports would have declined (or net imports increased) over time. Instead, by taxing maize and rice production, Tanzania became a net importer of both, and by subsidizing wheat production, it became a less significant net importer of wheat. The picture does not change dramatically when the impact of

government consumer prices is added. Not surprisingly, the government's policy of self-sufficiency in food grain production has reduced Tanzania's participation in international trade from net exports of 126.3 thousand metric tons to net imports of 47.9 thousand metric tons in the case of maize; from net imports of 89.0 to 31.5 thousand metric tons of wheat; and from net exports of 80.5 thousand metric tons to net imports of 2.16 thousand metric tons of rice. In the case of maize, policy has also reversed the trend from one of increasing net imports by 21.1 thousand metric tons a year to one of decreasing net imports by 26.3 thousand metric tons.

Conclusions

It has been shown that government market intervention in Tanzania has had the effect of subsidizing the urban sector at the expense of the rural sector. Intervention has effectively divorced the domestic market for food grains from the international market and this has had a significant impact on external trade in food grains. In Tanzania, within a general policy of import substitution-industrialization that has taxed on net the agricultural sector, specific government policy with regard to food grains can be characterized as one that seeks to maintain a degree of self-sufficiency in food grain production, and that therefore limits the degree of taxation that the government can consistently impose on the food grain sector. External trade in food grains has been very unstable from year to year owing to the operation of short-term constraints and the government's response to them. Over the long run, Tanzania is becoming a higher cost producer of all three food grains in relation to the world price, and therefore in order to maintain its policy of self-sufficiency, taxes on food grains have become lower and lower over time in relation to taxes on export crops.

Senegal

Current food and agricultural policies of the Government of Senegal (GOS) include relatively effective monopolies on the marketing of imported food grains, official (but somewhat less effective) control of the procurement and marketing of domestically produced food grains and peanuts, the imposition of producer and consumer prices for food grains and peanuts, and subsidies on farm inputs. ^{7/} Average per capita cereal consumption in Senegal is 210 kg/year [20]. Of the five major food grains consumed, Senegal imports nearly 100 percent of its wheat, roughly 77 percent of its rice, about 6 percent of the millet and sorghum, and no maize [11]. Of the domestic production of rice, millet, sorghum, and maize, the greatest share (as high as 99 percent of some grains in some years) is either consumed by the producers themselves or directly marketed by them on the parallel market [11, 12].

From 1972 to 1977, peanuts averaged 43.3 percent of Senegal's total exports, by value. It has been argued that, for various reasons, the GOS is both economically and politically dependent on peanut export revenues [11, 53]. In practice, it appears committed to maintaining them at high levels.

At the same time, the GOS espouses a policy goal of greater food self-sufficiency. Between 1973 and 1977, imports averaged 34 percent of Senegal's total cereal consumption. The GOS has substantiated its commitment to greater food self-sufficiency principally through investments and policies to expand rice production and by efforts to shift consumer demand from rice to other domestically produced grains, principally millet [11, 12].

^{7/} Again, the reader is referred to Chapter II for a discussion of recent policy changes.

These two goals, high peanut export levels and greater domestic food production, have led to a number of apparent policy conflicts. One problem is that of setting relative producer prices for peanuts and food grains to simultaneously stimulate increased production of both. Another is that of setting consumer prices for food grains to increase substitution of domestically produced grains for imports in consumption. These problems are complicated by cross-price and substitution effects both in producer supply response (e.g., between peanuts and food grains) and in consumer demand (for imported rice and wheat versus domestically produced rice, millet, and sorghum).

Background

The evidence for Senegal demonstrates that the government-controlled, monopoly marketing system (comprised of ONCAD, the Caisse de Prevoyance et Stabilisation des Prix and the cooperatives) served very effectively to tax the agricultural sector by "buying cheap and selling dear" on the world market, whenever possible, and at times to subsidize urban food grain consumption through its simultaneous ability to manipulate access to domestic production and imports.

In spite of the GOS's de jure monopoly over the marketing of both peanuts and domestically produced food grains through its agency ONCAD, it has not succeeded in prohibiting significant sales on the parallel markets. There are few estimates of the magnitude of such sales, however. Apparently, government prices tend to serve as support prices for these markets. Ross [35] reported that in a survey of representative, millet producing households in three rural villages the marketed surplus averaged 25 percent of total production in 1977 (23 percent in 1976). These households disposed of their surplus in a total

of 173 sales of which only four (2 percent) were to ONCAD. The majority, 77 percent, were to local stores or traders and 21 percent of the sales were direct to neighbors or in local markets. Ross further found that, over a year, in every case the mean sale price exceeded ONCAD's official price, with margins ranging from 1 percent to 31 percent (including the cost of transport to the ONCAD buying station.

The CILSS study [11] found that official marketing accounted for only 65-75 percent of total estimated production of peanuts, with the rest going to illegal sales (through the Gambia), home use and seed stock (see Appendix Table A-15). Producers are heavily involved in officially illegal, but de facto ignored private marketing of food grains. While much of the food production is subsistence, a sizeable portion of it feeds the rural, non-producing and the urban populations through private marketing. Some of the production moves across borders, especially to Mali and Mauritania.

An important issue in the analysis of Senegalese policy and progress with respect to its agricultural exports and food grain imports is the impact of an overvalued exchange rate (OVX) on trade. It is generally argued that for a "small" country (one facing world prices for its traded goods) an overvalued currency taxes exports and subsidizes imports. If Senegal is a small country with an OVX, such an exchange rate policy is in direct conflict with its principal, stated agricultural policy goals; reduced import dependence through increased food grain self-sufficiency and maximizing peanut export revenues. Senegal would be inhibiting agricultural export sales and subsidizing food grain imports. On the other hand, a country that is a major world exporter of a particular commodity (as Senegal has been with peanuts) may not be a "small" country

in the strictest sense, even if it faces prices on its imports. It may be able to pass on part of the OVX to buyers of its exports rather than obliging its domestic producers to absorb it all.

Several problems complicate the exchange rate and price policy issues in the case of Senegal. In the first place, its national currency, the CFA franc, is shared in common with ten other African countries. Monetary policy for the West African CFA zone countries is directly influenced by one, common, central banking authority. Since there is little intrazone trade and little intrazone coordination of domestic economic policies, each country can experience a different level of over or under-valuation vis-a-vis other world currencies. Secondly, because of the existence of parallel market systems for peanuts through the Gambia and for food grains both domestically and through the Gambia, Mali, Guinea, and Mauritania (each with their own national currencies), production and trade are influenced to a greater or lesser degree by more than just the CFA franc-based terms of trade and GOS official prices. Finally, because of its monopoly over legal peanut exports and apparent desire to set prices paid to peanut producers relative to world prices received so as to stabilize GOS earnings, it is not immediately clear to what extent the OVX tax is borne by the producers and how much is absorbed by the government.

One of the fundamental issues of debate in analyses of Senegalese agricultural policy revolves around the question of pursuit of apparent comparative advantage (roughly peanut export/food grain imports) versus diversification (for economic stability or food security). As was summarized earlier, this has led to differing and even conflicting advice. Much of this analysis has focused on the central issue of optimal

allocation of resources between peanut and food grain production. Most studies approach this issue from a relatively narrow comparative advantage point of view, ignoring the fundamental political, economic and historical context from which such policies are derived. In its 1974 country study of Senegal, the World Bank argued that, in the face of marked fluctuations in world peanut prices, Senegal's agricultural strategy should focus on encouraging greater diversification [53].

Aside from the World Bank country study, two other relatively broad analyses of Senegalese food grain policies have been conducted recently. The Center for Research on Economic Development of the University of Michigan conducted a survey of marketing, price policy and storage of food grains [11]. This study noted several important policy conflicts that derived from the GOS's simultaneous pursuit of greater food self-sufficiency and high levels of peanut exports. It concluded that any shift away from the comparative advantage position of reliance on peanut exports and food grain imports could be achieved only at the cost of a decline in national income [11].

A second study, conducted jointly by the Stanford University Food Research Institute and the West Africa Rice Development Association focused on the potential for greater food self-sufficiency through increased rice production [29]. It found that given Senegal's high costs of production and historically wide year-to-year variation in yields (due principally to weather), there is at present no economic justification for the GOS's policy of import substitution for rice.

Results of an Econometric Model for Rice

Rice, both in production and consumption, is clearly a major preoccupation of Senegalese food and agricultural policy. Government

intervention in domestic rice production is long-standing and has focused on attempting to influence the producer price, subsidization of inputs, and investments in infrastructure, research, and extension. However, during the 1970's, in spite of the increased emphasis in policy statements on rice self-sufficiency following the Sahel drought, the official producer price of rice was generally permitted to decline relative to peanuts and cotton (the major nonfood crops). The real producer price of rice (deflated by the consumer price index) fell throughout the last two decades.

An econometric model of the rice sector of the agricultural economy was developed to investigate the impacts of certain GOS agricultural and food policies. The model is divided into three sections: production, consumption, and imports.

Craven and Tuluy [12] argue that year-to-year fluctuations in rice yields were one of the principal arguments against increased reliance on domestic rice production to improve the country's overall food security situation. The principal source of these variations in yields over time appear to be annual fluctuations in rainfall. In order to segregate the influences of government interventions on rice production from other exogenous events (ie., weather), separate regression equations were developed for changes in cultivated rice area and average rice yields.

It was found that the amount of land devoted to rice each year was strongly influenced by the real producer price of rice. At the margin, a 1 percent increase (decrease) in the real producer price resulted in a nearly 3 percent increase (decrease) in rice hectarage. Thus, if the government should choose to reverse the steady decline in the real producer price of rice, ceteris paribus, a significant increase in the

amount of land planted in rice would be expected. However, the supply of land suitable for expansion of rice production is not unlimited. In particular, this study found that changes in rice hectareage were negatively correlated with the amount of land cultivated in peanuts.

As was expected, rice yields were found to be strongly influenced by rainfall. With respect to government interventions, several influences were found to be important. The ratio of fertilizer prices to the producer price of rice proved to be an important determinant of yields; the lower the price of fertilizer (which is subsidized by the government) relative to the rice price, the higher the yield. The amount of rice hectareage planted in a given year positively influences the rice yield that year. This finding lends support to the notion that increases in the amount of land devoted to rice have tended to involve better quality land.

The model was also used to explain changes in total national rice consumption over time. Consumption was measured as apparent disappearance (milled domestic production from the last harvest plus imports minus changes in rice stocks). It was found that Senegalese consumers respond strongly to the consumer price of rice relative to the urban food price index. When rice is relatively cheap compared to an index of all food prices, consumers increase consumption of rice. Similarly, it was found that Senegalese rice consumers varied their consumption as their incomes varied (per capita gross domestic products). These points establish the economic responsiveness of consumers, in spite of the observation by some researchers that rice, at least in urban diets, appeared inflexible with respect to economic variables [29].

It has often been argued that for Senegal, as for much of West Africa, increased rice consumption has been driven by the food consumption habits of rapidly growing urban populations [13]. In the present study, however, it was found that there has been a significant negative relationship between increasing urban population in Senegal and total national rice consumption. For the country as a whole, total rice consumption has been increasing, though. This finding is consistent with observations of changing rural diets and the replacement of semi-subsistence food farming (principally millet and sorghum) with cash crop production over time resulting in increased dependence of rural populations on purchased food grains.

The import model was designed to investigate GOS behavior as the agent responsible for importing rice. It was assumed that the GOS bases its decisions to import rice on the world price of rice, its own ability to pay (government income), perceived consumer demand, and the general availability of food within the country.

The GOS has one important alternative to rice when food imports are required: wheat for bread, noodles and cous-cous. Many LDC's appear to arbitrage between rice and wheat, based on their relative prices, when meeting food import needs. The model used here found that the ratio of the world price of rice to the world price of wheat was an important determinant of rice imports. The model showed a significant, positive relationship between one year's gross domestic product and the following year's rice imports. Higher national income generally leads to higher rice imports.

The relationship between rice imports and overall food availability is somewhat mixed. The model clearly shows the government's awareness

and concern regarding rice stocks on hand. It was found that the amount of rice stocks carried into each year negatively affected rice imports; low stock levels were met with increased imports, and vice versa. No significant relationship was found between concessional food aid shipments and rice imports, indicating that such food aid apparently does not replace or reduce significantly the need for food imports.

Conclusions

In spite of the generally poor data available for analysis, the economic model used offers several insights from which tentative conclusions can be drawn. These relate to both the narrower issues of the behavior of the rice sector and the consequences of government interventions in food grain production and consumption, as well as the broader concerns of food self-sufficiency and economic growth.

Relative prices have clearly played an important role in determining the levels of rice production in Senegal. Farmers responded to both relative crop prices in determining which crops to plant and to input prices in increasing yields. The other side of this coin, however, is the demonstration of the fact that no important crop can be analyzed in isolation from the complex interactions between cash cropping and food cropping (both for market and for home consumption). Changes in the relative profitability of crops appear to have important consequences for the overall crop production mix, with the most apparent tradeoffs being peanut vs. food grain production, and, within food grain production, between production for home consumption and production for the market.

The price responsiveness of consumers has also been established, with similar conclusions vis-a-vis the potential for and requirements for effective, consumer-oriented price policy. From a narrow point of view,

an effective means of reducing dependence on rice imports might appear to be to raise consumer rice prices (for example, by means of a variable levy on imports) with a consequent shift in consumer demand to other food grains. But, to the extent that the market transmits this price increase back to farmers, the subsequent increase in production of rice and other food grains for which prices increase could have important negative consequences for national income if export crop revenues are reduced. It is unclear whether revenues from an import duty on rice could compensate for the decline in peanut export earnings.

Another issue is food consumption patterns in rural and urban households. Apparently, urban rice consumption is not entirely the source of growth in rice demand it was once thought to be. Increases in rural rice consumption are evidently also important. Thus, increased economic development of rural Senegal may have important consequences for food grain markets. Higher rural incomes, especially those from cash crop production, will lead to greater demand for food grains.

The ultimate competitiveness of Senegalese rice production versus Asian imports will lie both in events in food grain markets external to Senegal and in the rate of reduction of production costs domestically through technical change. As Jabara and Thompson (1980) point out, international price risk strengthens the case for increased Senegalese food grain self-sufficiency. Historically, world rice prices have been subject to greater uncertainty than wheat prices due to the "thinness" of international trade in rice. ^{8/} This relative instability is unlikely

^{8/} This thinness relates to the small percentage traded internationally relative to the total amount consumed--an average of 5 percent annually for rice from 1976 to 1980 compared to 18 percent for wheat over the same period.

to diminish in the near future. Given the demonstrated responsiveness of Senegalese production to improved technology and its sensitivity to weather, continued investment in yield stabilizing and yield increasing technologies may be a better strategy than artificially high prices to reduce import dependence.

IV. FINDINGS AND IMPLICATIONS

What makes a policy appropriate or inappropriate? Economic analysis uses free market prices as a basis on which to determine economic costs (implicit costs) of food policies. An inappropriate policy is thus one with high explicit (financial) and high implicit (economic) costs. A free market solution would have no implicit costs. An alternative means of determining the appropriateness of policies is by evaluating their effectiveness in achieving government objectives. This alternative assumes that the free market does not always have the "best" distribution of economy's wealth and income. We have chosen a combination of these methods.

There is some controversy over whether policies employed by governments are consistent with espoused objectives. Robert Bates shows that in Africa this is not generally the case [5]. Our survey shows that the evidence is not conclusive while our case studies show that in at least some cases the policies and objectives are consistent.

There is also considerable controversy over the importance of policy in achieving economic development. Economic analysis in general and this study in particular assume that policy makes a difference. This study does not prove or disprove that policy matters. There is evidence in the survey work that there is some relationship between policy and the agricultural and food situations in the various countries. There is also evidence in the Senegalese case study that farmers responded to price changes in rice. Previous studies have shown that people in all continents are responsive to economic incentives. There still remain questions about the role of infrastructure and weather, and the international economy as major determinants of the aggregate agricultural

situations in many developing countries. We assert that economically sound policy is a necessary although not sufficient condition for development. Furthermore, domestic policy is one of the few variables that can be controlled by developing countries.

Policy intervention matters but the existence of a policy does not seem to matter as much as the extent of intervention. For example, the case studies show that although Tanzania and Kenya in general use the same policies, there is more distortion from what would be free market prices--and therefore more economic costs--to Tanzania's policies.

This review and analyses of food policies in LDC's included (1) a survey of policy objectives and policies in 21 developing countries and (2) case studies for three countries for more indepth analysis of food policies. It is also difficult measuring the impact of particular policies. As we have shown, the relationships are very complex. Policy analysis provides some valuable guidance to decisionmakers but it is not the only important variable.

There are difficulties in measuring the extent of intervention. Descriptions of institutions which have been developed to intervene in the market are not sufficiently quantitative to facilitate cross country comparisons. Quantitative measures of price controls, etc. on the other hand, do not measure the ability of the government to implement their policies. Thus country comparison tend to be partial and/or subjective.

The survey of food policies on 21 developing countries provided a regional overview of the structure and extent of government intervention in the food economy as observed through stated government objectives and

several specific government policies--official producer and consumer prices, international trade restrictions, and credit and input subsidies.

Increasing producer welfare and achieving food self-sufficiency were the two objectives cited most often by governments. These objectives were followed by consumer welfare, stable prices, foreign exchange, and food security. On a regional basis, the African countries emphasized self-sufficiency and producer welfare, almost to the exclusion of other objectives. The Asian countries also cited these two objectives frequently, but had a broader range of objectives, including consumer welfare, stable prices, and food security. Producer welfare was also the most important objective for the Latin American countries. There was less emphasis on food self-sufficiency than in the other two regions. The objectives of consumer welfare and enhancing (or saving) foreign exchange were cited the second most often.

Governments employ a wide range of policies to achieve their stated objectives. We focus on a few specific policies that lend themselves to a general comparison--relative movements in official producer and retail prices, share of government procurement or marketing of grain, and movements in exchange and inflation rates.

African countries apply production and marketing controls on the widest range of grains and other staples, although even here there is great diversity. Tanzania maintains control on practically all commodities produced in the country. In contrast, Botswana controls only corn and sorghum. Asian countries focus production and marketing controls almost exclusively on wheat and rice. In Latin America controls

are distributed fairly evenly between wheat, rice, and corn.

Although Asian countries tend to emphasize controls on only wheat and rice, these commodities account for a large share of consumption--over 50 percent of daily per capita caloric intake for each country. Government controls in Africa cover a wider range of commodities than in Asia, but these commodities' share of daily consumption varies between 40 and 70 percent. The extent of government controls in Latin America is more variable than in the other two regions, ranging from less than ten percent of consumption in Haiti and Paraguay to around 50 percent in the Dominican Republic, Guatemala, and Peru.

Although in general each region employs many of the same type of policies, the relative importance of or emphasis on a particular policy varied by region. African governments have tended to establish government monopolies through parastatals that are responsible for procurement and marketing of cereals and distribution of inputs. Government agencies in Asia also have these functions, but the Asian countries have especially emphasized large public food distribution programs designed to target low-income consumers. The Latin American regions shows more variability by country. Brazil and Paraguay have subsidized credit to influence production, whereas the other countries, with the exception of Haiti, have relied primarily on official producer prices.

There are fewer differences between regions when comparing government controls on international trade. Practically all countries maintain government control over cereal imports, particularly wheat and rice, and

to some extent corn. This partly reflects the growing importance of wheat and rice in urban diets in response to increasing incomes.

Practically all countries in each region have controlled retail prices of basic staples to maintain low and stable prices, particularly wheat and rice--whether grown domestically or imported. The consumer subsidy thus appears to be the most pervasive policy instrument among these countries.

Several general conclusions can be drawn from this cross-regional comparison of objectives and policies. Government policy appears to be an important factor in the performance of the food and agricultural sector. Although the broad overview presented does not allow us to make a direct link between policy and performance, there are instances where governments have made definite policy adjustments and performance has changed accordingly--for example, Sri Lanka after 1977. It also appears that policies are not always effective. The effectiveness of a policy instrument is enhanced or constrained by other domestic and international events--physical infrastructure, weather, international economic factors. For example, attempts to increase wheat production in Brazil and Paraguay have not been as successful as envisioned because of climatic factors, even though producer prices have been maintained well above world prices.

Other recent developments highlight the importance of policy to performance and illustrate that many developing countries realize the important role policy can play. Many countries are in the process of evaluating their policies and assessing the role and impact of government

intervention. The role of government parastatals is being examined in Mali, Senegal, Sudan, Tanzania, and Kenya. The impact of low producer prices is being evaluated in many African and Asian countries. Food subsidies have been a primary instrument of government policy in many countries in all three regions, but are being evaluated reduced or eliminated in several countries--for example, Brazil, Morocco, Senegal, Sudan, India, Jamaica, and Peru, Sri Lanka. There is a general tendency in many countries towards providing greater returns to producers through higher prices and reducing the subsidy on consumers by raising food prices.

For many countries there has been a difference between government intentions and effectiveness in actual implementation. One of the greatest constraints governments in all regions have faced is the lack of domestic financial resources--i.e., the budget constraint. This situation has prevailed in low-income countries like Mali as well as middle-income countries like Brazil. This domestic budget constraint has been a major factor in forcing many African and Asian countries to re-evaluate their extensive government intervention.

Policies have often had unintended consequences inconsistent with stated objectives. For example, efforts to improve food production in Sudan and Tanzania discriminated against export crop production and had adverse effects on the balance of payment's situation. This situation again points out the impact policy can have on performance, but demonstrates that this impact can be positive or negative depending on a variety of other factors.

While similarities exist among countries in stated food policy objectives, differences exist in the policies employed to attain objectives and still further differences are surely to exist among countries in the extent to which prices are distorted. Furthermore, a positive correspondence does not necessarily exist between the number of policy interventions employed and the economic impact on the economy. The case studies of Kenya and Tanzania reveal that while both countries have common objectives and policies, the distortion of commodity market prices is far greater in Tanzania than in Kenya.

The three case study countries, Kenya, Tanzania, and Senegal, were selected for further study in order to provide additional insights. These case studies included results of econometric analyses of the food grain sectors of these countries. Two major shortcomings of the case study analyses should be noted. (1) They are cast in a partial equilibrium context (e.g., the income effects of policies in the agricultural other sectors are not considered) and (2) the distortions induced by generally overvalued exchange rates have been ignored. Overvalued exchange rates are expected to discriminate against agriculture and to induce food imports. To the extent that our analyses suggest that agricultural production is being taxed, the income effect in agriculture is likely to decrease savings and investment and decrease the consumption of preferred foods (wheat, meat) relative to less preferred foods (cassava, maize), among other effects.

For all three countries, governments were found to intervene, i.e., select and implement policies in a manner generally consistent with their

announced objectives of food self-sufficiency but with an urban bias. The pursuit of a self-sufficiency objective for Kenya and Tanzania is perhaps better defined as an effort to insulate the domestic food grain market from the world market for food grains. However, Senegal appears to face a somewhat more perplexing problem, given its choice of policies, because its objective of food grains self-sufficiency is directly competitive with the objective of increasing peanut production for export.

The degree to which the self-sufficiency objective was accomplished differed among the countries as did the choice of policies used to attain these objectives. Differences were also found in the "extent" of intervention, i.e., the extent to which the price structure of the agricultural commodities was distorted relative to the price structure that would prevail without intervention.

The key policies in Kenya and Tanzania are the announcement of producer and consumer prices and then, the manipulation of imports and stocks so that markets clear at approximately the announced prices. Both countries subsidize production. The key policies in Senegal include the control of exports and imports of food grains and peanuts. The government also attempts to set domestic prices for food grains but this control appears less effective than for the other two countries due to the operation of parallel markets.

The Senegalese government's determination of rice import levels seems to take into consideration both the situations prevailing in the domestic and foreign market. The level of imports was found to be negatively related to the world price, positively related to the overall level of

government revenues, and, when rice stocks were low, the government tended to import more rice to build up stocks. Furthermore, the government seemed sensitive to the cost of rice imports relative to the cost of wheat imports. As the price of rice relative to the price of wheat increased, the government imported less rice and more wheat.

The short run response to foreign exchange shortages Kenya and Tanzania was generally to reduce imports and to drawdown stocks of maize, rice and wheat. Tanzania's government also appeared to adjust consumer and producer prices to save foreign exchange expenditures on imports. Unpredictable disturbances in supply and demand (such as weather, migration, etc.) was handled almost equally through adjustments in imports and stocks and not through price changes.

All three countries regulated wheat price and imports to influence rice consumption and to encourage domestic markets for other food grains to clear at announced prices.

Domestic policies were marginally influenced by PL 480 shipments. PL 480 maize shipments to Tanzania induced the government to lower the price of maize to consumers. Thus, PL 480 imports expanded consumption in this case. In virtually all other cases, PL 480 imports had the effect of increasing government stocks. No particular relationship between the level of commercial imports and PL 480 imports were observable.

Evidence suggests that in the case of Senegal, the government subsidization of fertilizer price has had the effect of increasing rice yields.

The demand for rice in Senegal appears to be growing faster in rural

areas than in urban areas. In addition to the effect on rice consumption of rising rural incomes, this trend in rice consumption can be explained by an increasing substitution of wheat for rice in urban markets relative to rural markets.

Domestic demand and supply conditions (measured by what the domestic price for food grains would be in the absence of intervention and world trade) Kenya and Tanzania tended to have a more substantial effect on the levels at which prices were announced than did the world market prices for the commodities studied. However, the more important the crop to domestic consumption, e.g., rice in Kenya and maize in Tanzania, the more important was the world price in determining the level of announced prices. This suggests that these governments are aware of the fact that welfare costs of price distortions increase as the share of the crop of domestic market increases.

The effect of intervention on the performance of the agricultural sector was estimated for both Kenya and Tanzania. At official exchange rates, intervention policies in Kenya over the period 1964 to 1978 amount to a 13 percent tax on the production of maize, a 35 percent tax on the production of rice, and a 8percent subsidy on the production of wheat, a crop for which Kenya is a high cost producer relative to world prices. The implicit tax imposed on export crops is a mere 5 percent. However, all taxes and subsidies have a slight upward trend over the period studied.

In Tanzania intervention caused greater price distortions than in Kenya. In Tanzania, the production of maize is taxed at a 24 percent

level, rice at 36 percent level while wheat production is subsidized by about 15 percent. Furthermore, the production of export crops are taxed at a 32 percent level. Since production prices for these crops are reflected in related prices in both countries production taxes (subsidies) amount to consumer subsidies (taxes). In fact marketing functions may also be subsidized so that the consumer subsidy is larger than indicated by producer prices.

Impacts of effective intervention on the performance of the agricultural sector were shown for these two countries by estimating the foreign trade levels that would be expected if these countries had followed a free trade-nonintervention policy. Kenya, by taxing maize and rice production has become a less significant exporter of maize and a net importer of rice. By subsidizing wheat, it became a net exporter of wheat. Kenyan government's policy of self-sufficiency in food grain production reduced the country's participation in international trade for those commodities for which it has a comparative advantage in production. On the average, over a 15 year period the average annual maize exports under nonintervention would have been approximately 480,000 tons per year as opposed to the observed average of 70,000 tons per year. Under nonintervention, an estimated 8,000 tons of rice would have been exported as opposed to the observed average annual exports of 1,000 tons of rice. Wheat imports would have averaged an estimated 48,000 tons annually as opposed to the observed imports of 7,000 metric tons.

Again effective intervention, in Tanzania caused greater market distortions than in the case of Kenya. Had Tanzania followed a free trade policy (at official exchange rates) it would have been a net

exporter of maize and rice, 183,000 tons of exports per year and 69,000 tons of exports per year respectively, instead of a net importer averaging 47,000 tons per year and 21,000 tons per year of maize and rice respectively. It would have imported on average an estimated 84,000 thousand tons of wheat per year instead of the observed average of 31,000 tons per year.

Hence, in the pursuit of a food grain self-sufficiency objective Kenya and Tanzania has insulated the domestic market from the world market for food and grains. It means that these countries have imposed an explicit tax on producers of those commodities that can be produced at a lower costs than they could otherwise obtain from the world market. These taxes and subsidies have had the effect of "pushing" resources out of the production of those crops for which the countries have a comparative advantage to produce and "pulled" resources into those crops (wheat) for which the countries do not enjoy a comparative advantage to produce. These distortions have also decreased the scarce foreign reserves available to these countries.

In the short run benefits have accrued to consumers in the form of lower consumer prices. In the partial equilibrium context of our analysis, the gain to consumers is more than offset by the loss to producers. In the long run, it can be conjectured that consumers also suffer because the lower income earned in the agricultural sector becomes a constraint on the sector's capacity (which comprises the majority of the population) to purchase goods and services. Furthermore, the slower growth in the agricultural sector implies that prices could eventually increase beyond levels that they would be under free trade unless other sectors of the economy are sufficiently productive in earning foreign exchange to offset the foreign exchange costs of importing food.

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APPENDIX A

Appendix table A-1--Definition of variables

QUANTITIES	
$*QP_{it}$	Total quantity produced of commodity i in time period t
MPQ_{it}	Marketed production of commodity i in time period t
$*QD_{it}$	Total quantity demanded of commodity i in time period t
$PCQD_{it}$	Per capita quantity demanded of commodity i in time period t
$*M_{it}$	Net imports of commodity i in time period t
$PL480_t$	Concessional imports (food aid) of commodity i in time period t under the U.S. PL480 program
$*S_{it}$	Government-held stocks of commodity i at the end of period t
UD_{it}	Unanticipated demand for commodity i in period t

PRICES	
$*PP_{it}$	Government-announced producer price for quantities of commodity i delivered to government marketing boards in period t
$*CP_{it}$	Government-controlled consumer price for commodity i in period t
WP_{it}	World price of commodity i in period t , converted to units of domestic currency at the official exchange rate
SSP_{it}	Self-sufficiency price of commodity i in period t : a market-determined price at the producer level that would result under autarky

OTHER VARIABLES	
PPF_t	Producer price of fertilizer for production occurring in period t
PPE_t	An index of the producer price of export crops in period t (1971=100)
CPI_t	Consumer price index in period t (1971=100)
WPI_t	World price index in period t : World Bank "c.i.f." index of U.S. dollar prices of manufactured exports to developing countries (1971=100)
Y_t	Private consumption expenditure in period t
PCY_t	Per capita private consumption expenditure in period t
POP_t	Total population in period t
FXF_t	Foreign exchange flows (exports plus foreign capital imports) in period t
FXR_t	Government-held foreign exchange reserves at the end of period t

Appendix table A-2--Complete model for a single commodity: Summary

a. Supply and demand equations												
	Constant	PP_t/PPF_t	CP_t/CPI_t	PPE_{t-1}/PPF_t	t	Y_t/CPI_t	QP_{t-1}	Error term				
QP_t	b_0	b_1	-	$-b_4$	c	-	d	v_t				
QD_t	a_0	-	a_1	-	-	e	-	u_t				
b. Social accounting identity												
M_t	QD_t	-	QP_t	+	S_t	-	S_{t-1}					
c. Policy instrument equations												
	Constant	$t \cdot E_{t-2} SSP_t$	$t \cdot E_{t-2} WP_{t-1}$	$t \cdot WP_t$	$Y_t \cdot PP_t$	$(S_t - S_{t-1})$	$(S_t - S_{t-2})$	$(FXR_t - FXR_{t-1})$	$(FXR_t - FXR_{t-2})$	PL480 _t	UD _t	Error term
$t \cdot PP_t$	n	a	B	-	-	-	v_2	-	f_2	-	-	w_{1t}
$Y_t \cdot CP_t$	k	-	-	-	u	v_1	-	1	-	-	-	w_{2t}
$(S_t - S_{t-1})$	δ	-	-	$-o$	-	0_1	0_2	$-t_1$	$-t_2$	-	-	w_{3t}
M_t	v	$(1-a)$	$-B$	$-o$	-	$(0_1 - 1)$	$(0_2 - 2)$	$-(t_1 - 1)$	$-(t_2 + 2)$	$(+w)$	$(1-d)$	$(w_{3t} - w_{1t} - w_{2t})$

Note: The variables, t and y_t , are scaling factors that convert nominal producer and consumer prices, respectively, into metric tons of grain in each year. They are defined as follows.

$$t = n_1 \cdot u / CPI_t + b_1 / PPF_t, \quad \text{and} \quad Y_t = a_1 / CPI_t$$

They are also price deflators that depend on the level of prices in each year as represented by CPI_t and PPF_t .

Appendix Table A-3--Short run supply elasticities, Kenya, 1964 to 1979

	<u>Producer prices</u>				Annual growth rate (percent)	Partial adjustment coefficient (1-d)	R ²
	Maize	Wheat	Rice	Export crops			
TOTAL PRODUCTION							
Maize	.534 (3.75)	--	--	-.348 (-4.41)	1.44 (2.33)	.194 (1.07)	.857
Wheat	-.980 (-3.95)	1.506 (5.67)	--	-.287 (-2.34)	1.21 (1.58)	.633 (5.16)	.874
Rice	--	--	.484 (-4.40)	-.331 (2.87)	4.74 (3.36)	.645 (3.36)	.970
MARKETED PRODUCTION							
Maize	1.149 (2.15)	--	--	-1.126 (-3.50)	10.04 (3.56)	1.213 (4.54)	.737

Notes:

1. The actual equations estimated were linear; the elasticities have been calculated at the mean. T-statistics are shown in parentheses below the elasticities.
2. The maize and wheat prices that appear as independent variables in the equations are government-announced prices prior to planting in each year. Rice prices are actual prices received by producers (because announced prices were not available). The price of export crops is a Paasche index of actual prices paid to producers for coffee and tea, lagged 1-1/2 periods in the maize and rice equations and 1/2 period in the wheat equation.
3. Marketed production of maize and total production of wheat and rice correspond to purchases by the National cereals and Produce Board in each year. In the case of maize, the total and marketed production equations were estimated simultaneously, for improved efficiency, using Zellner's seemingly unrelated regression technique.

Appendix Table A-4--Per capita demand elasticities, Kenya, 1964 to 1978

	<u>Producer prices</u>			Private consumption expenditure	Expenditure proportion	R ²
	Maize meal	Wheat bread	Milled rice			
Maize	-.3364 (-2.09)	.0570 (1.93)	.0262 (1.57)	-1.5761 (-3.81)	.1332	.530
Wheat	.0483 (0.31)	-1.3039 (-5.68)	-.0317 (-0.26)	.6105 (1.31)	.0224	.814
Rice	.2961 (0.59)	-.1088 (-0.32)	-.6724 (-1.20)	2.4182 (1.64)	.0042	.623

The likelihood ratio statistic for the cross-equation restrictions imposed by the Slutsky relationship is 1.82 on 3 degrees of freedom, which represents a probability of greater than 50 percent.

Notes:

1. The actual equations estimated were linear; the elasticities have been calculated at the mean. T-statistics are shown in parentheses below the elasticities.
2. The consumer prices that appear as independent variables in the equations are generally those reported by the Central Bureau of Statistics that were used in the calculation of the consumer price index for Nairobi. There is a large element of control over these prices as the government generally enforces maximum retail prices for staple grains.
3. The three equations were estimated simultaneously using Zellner's seemingly unrelated regression technique, while at the same time imposing the cross-equation restrictions derived from the Slutsky relationship.

Appendix table A-5--Policy instrument equations, Kenya, Maize model, 1964-1977

Elasticities, calculated at the mean										
	$E_{t-2}^{SSP_t}$	$E_{t-2}^{WP_{t-1}}$	WP_t	PP_t	$(S_t - S_{t-1})$	$(S_t - S_{t-2})$	$(FXR_t - FXR_{t-1})$	$(FXR_t - FXR_{t-2})$	$PL480_t$	UD_t
PP_t	.041	.496**	-	-	-	.037	-	.090**	..	-
CP_t	-	-	-	1.197**	.031	-	-.012	-	.011	-
$(S_t - S_{t-1})$	-	-	-.261	-	1.045**	.135	.058	.721##	.072	-.745**
M_t	16.292**	-9.717**	-.375	-	1.280**	-.530#	.172	-.723**	.027	1.197**

Notes: See table A-11.

Appendix table A-6--Policy instrument equations, Kenya, Wheat model, 1964-1977

Elasticities, calculated at the mean										
	$E_{t-2}^{SSP_t}$	$E_{t-2}^{WP_{t-1}}$	WP_t	PP_t	$(S_t - S_{t-1})$	$(S_t - S_{t-2})$	$(FXR_t - FXR_{t-1})$	$(FXR_t - FXR_{t-2})$	$PL480_t$	UD_t
PP_t	.587**	.197**	-	-	-	-.025##	-	.015*	-	-
CP_t	-	-	-	.699**	-.048##	-	.040##	-	-.009	-
$(S_t - S_{t-1})$	-	-	-.133	-	.178	.397*	.091	-.207	-.108	-.377**
M_t	18.580**	-9.450**	-.641	-	2.058**	3.096**	-.567	-1.734**	-.289	-.122

Notes: See table A-11.

Appendix table A-7--Policy instrument equations, Kenya, Rice model, 1964-1978

Elasticities, calculated at the mean

	$E_{t-2}^{SSP_t}$	$E_{t-2}^{WP_{t-1}}$	WP_t	PP_t	$(FXR_t - FXR_{t-1})$	$(FXR_t - FXR_{t-2})$	UD_t
PP_t	1.151 ^{**}	-.244 ^{##}	-	-	-	-.008	-
CP_t	-	-	-	.696 ^{**}	.098 ^{**}	-	-
M_t	-.509	2.672 ^{##}	.512 ^{##}	-	-.776 ^{**}	.084	2.334 ^{**}

Notes: See table A-1.

Appendix Table A-8--Description of government pricing policies,
Tanzania, 1964 to 1977

a. Consumer prices, \$ per metric ton				
Commodity	Ratio	Mean	Linear trend	Overall mean of four countries
Maize	CP_t/PP_t	2.5987	-.0002	2.4092
Wheat	CP_t/PP_t	2.914	-.035	2.937
Rice	CP/PP	3.498	-.020	3.580
b. Producer prices, \$ per metric ton				
Commodity	Ratio	Mean	Linear trend	t-statistic for trend
Export crops	$r_t^{2/}$.683	-.024	(-5.14)
Maize	PP_t/SSP_t	.946	.018	(2.91)
	PP_t/WP_t	.760	.023	(8.07)
	$PP_t/(r_t \cdot WP_t)$	1.180	.089	(6.54)
Wheat	PP_t/SSP_t	.8363	.0001	(0.05)
	PP_t/WP_t	1.152	.015	(1.15)
	$PP_t/(r_t \cdot WP_t)$	1.761	.100	(3.47)
Rice	PP_t/SSP_t	.881	-.001	(-0.94)
	PP_t/WP_t	.638	.010	(1.41)
	$PP_t/(r_t \cdot WP_t)$.981	.060	(3.17)

Notes:

1/ Simple average of the mean ratios for Kenya, Tanzania, Zambia, and Malawi.

2/ The variable r_t is the ratio of producer prices of export crops to their world prices, f.o.b. Dar-es-Salaam, weighted by quantities produced, as follows:

$$r_t = \left(\sum_{i=1}^2 PP_{it} \cdot QP_{it} \right) / \left(\sum_{i=1}^2 WP_{it} \cdot QP_{it} \right), \text{ where } i = 1, 2, \text{ refer to coffee and cotton.}$$

Appendix Table A-9--Per capita demand elasticities, Tanzania, 1964 to 1977

	<u>Consumer prices</u>			Private consumption expen- diture	Expen- diture proportion	R ²
	Maize meal	Wheat bread	Milled rice			
Maize	-.8978 (-5.88)	.0299 (0.52)	-.0396 (-0.50)	.8478 (3.42)	.0924	.76
Wheat	.1765 (0.37)	-2.6043 (-5.32)	.6363 (1.51)	1.4637 (2.52)	.0118	.76
Rice	-.1367 (0.59)	.2378 (-0.32)	-1.0453 (-1.20)	1.0990 (1.64)	.0332	.70

The likelihood ratio statistic for the cross-equation restrictions imposed by the Slutsky relationship is 5.78 on 3 degrees of freedom, which represents a probability of greater than 10 percent.

Notes:

1. The actual equations estimated were linear; the elasticities have been calculated at the mean. T-statistics are shown in parentheses below the elasticities.
2. The consumer prices that appear as independent variables in the equations are generally those reported by the Central Bureau of Statistics that were used in the calculation of the consumer price index for Dar-es-Salaam. There is a large element of control over these prices as the government generally enforces maximum retail prices for staple grains.
3. The three equations were estimated simultaneously using Zellner's seemingly unrelated regression technique, while at the same time imposing the cross-price restrictions derived from the Slutsky relationship.

Appendix Table A-10--Short run supply elasticities, Tanzania, 1964 to 1978

	<u>Producer prices</u>				Annual growth rate (percent)	Partial adjustment coefficient (1-d)	R ²
	Maize	Wheat	Rice	Export crops			
TOTAL PRODUCTION							
Maize	.359 (3.75)	--	--	-.199 (-4.41)	2.91 (2.33)	.849 (1.07)	.737
Wheat	-.650 (-1.16)	.989 (1.97)	--	--	1.03 (0.40)	.673 (2.90)	.562
Rice	-.328 -1.55	--	.426 (2.39)	-.027 (-0.10)	5.12 (5.07)	1.177 (8.76)	.804
MARKETED PRODUCTION							
Maize	2.290 (3.26)	--	--	-1.571 (-2.79)	-1.78 (-0.63)	.918 (5.38)	.530
Rice	-.954 (-1.77)	--	2.290 (6.11)	-.803 (-1.58)	0.83 (0.46)	1.077 (7.00)	.818

Note

1. The actual equations estimated were linear; the elasticities have been calculated at the mean. T-statistics are shown in parentheses below the elasticities.
2. The maize and wheat prices that appear as independent variables in the equations are government-announced prices prior to planting in each year. The price of export crops is a Paasche index of government-announced producer prices for coffee and cotton.
3. Marketed production of maize and rice total production of wheat correspond to purchases by the National Milling Corporation in each year. In the case of maize and rice, the total and marketed production equations were estimated simultaneously, for improved efficiency, using Zellner's seemingly unrelated regression technique.

Appendix table A-11—Policy instrument equations, Tanzania, Maize model, 1964-1977

Elasticities, calculated at the mean										
	$E_{t-2}^{SSP_t}$	$E_{t-2}^{WP_{t-1}}$	WP_t	PP_t	$(S_t - S_{t-1})$	$(S_t - S_{t-2})$	$(FXR_t - FXR_{t-1})$	$(FXR_t - FXR_{t-2})$	$PL480_t$	UD_t
PP_t	.680**	.671**	-	-	-	-0.34	-	.057*	-	-
CP_t	-	-	-	.999**	.011	-	.003	-	-.078**	-
$(S_t - S_{t-1})$	-	-	1.853#	-	.579**	-.043	.218	.730##	-.445##	-.533**
M_t	5.833	-11.448**	1.238	-	.253	.548	.113	-.484	.678**	1.340**

Notes:

1. See Appendix to Kenyon study for definition of the variables.
2. The elasticities corresponding to $(S_t - S_{t-1})$, $(S_t - S_{t-2})$, $(FXR_t - FXR_{t-1})$, $(FXR_t - FXR_{t-2})$ and UD_t have been calculated at the mean of the absolute value because the actual means, as deviations from trend, are zero.
3. A single asterisk * indicates a coefficient of the right sign and significant at the 5 percent level, and a double asterisk ** at the 1 percent level. The symbol # indicates a coefficient of the wrong sign and significant at the 5 percent level, and the symbols ## at the 1 percent level.

Appendix table A-12--Policy instrument equations, Tanzania, Wheat model, 1964-1977

Elasticities, calculated at the mean										
	$E_{t-2}^{SSP_t}$	$E_{t-2}^{WP_{t-1}}$	WP_t	PP_t	$(S_t - S_{t-1})$	$(S_t - S_{t-2})$	$(FXR_t - FXR_{t-1})$	$(FXR_t - FXR_{t-2})$	$PL480_t$	UD_t
PP_t	1.267**	-.306##	-	-	-	-.001	-	.020	-	-
CP_t	-	-	-	.856**	.046	-	.129**	-	.019	-
$(S_t - S_{t-1})$	-	-	.312	-	1.858**	-.316	1.306##	.240	.302*	.199##
M_t	-.322	1.449##	.073	-	.219**	-.070	-.299**	-.040	-.020	.364**

Notes: See table A-11.

Appendix table A-13--Policy instrument equations, Tanzania, Rice model, 1964-1977

Elasticities, calculated at the mean										
	$E_{t-2}^{SSP_t}$	$E_{t-2}^{WP_{t-1}}$	WP_t	PP_t	$(S_t - S_{t-1})$	$(S_t - S_{t-2})$	$(FXR_t - FXR_{t-1})$	$(FXR_t - FXR_{t-2})$	$PL480_t$	UD_t
PP_t	.885**	.114	-	-	-	.015	-	.020	-	-
CP_t	-	-	-	.916**	.016	-	.050	-	.002	-
$(S_t - S_{t-1})$	-	-	-.219	-	.450**	.629**	.068	-.308*	.251**	-.309**
M_t	1.601	-.725##	-.125	-	.174	.265*	-.220	-.301**	.136	.678**

Notes: See table A-11.

Appendix Table A-14--The impact of government pricing policies
on external trade in food grains, Tanzania, 1964 to 1977

Commodity	Variable	Simulation number */	Mean	Linear trend	t-statistic for trend
dollar/metric ton					
Maize	WP_t/SSP_t	1	1.133	-.025	(-3.02)
	M_t	1	-183.7	22.1	(2.61)
	M_t	2	47.9	-16.3	(-2.76)
Wheat	WP_t/SSP_t	1	.668	-.006	(-1.29)
	M_t	1	84.6	3.9	(5.71)
	M_t	2	31.5	3.6	(4.09)
Rice	WP_t/SSP_t	1	1.412	-.015	(-0.92)
	M_t	1	-69.9	2.7	(0.80)
	M_t	2	21.6	1.1	(-1.21)

M_e : Net imports, WP_t : World price, SSP_t : autarky price.

*/ See text.

Appendix Table A-15--Total production and share marketed through ONCAD of
major food grains, Senegal, 1973-77

	1973	1974	1975	1976	1977
Millet/Sorghum					
Production (tons)	322,900	510,800	77,000	715,000	554,000
Quantity Marketed by ONCAD (tons)	21	29,969	35,969	12,125	10,000
Percent Marketed by ONCAD	0%	6%	5%	2%	2%
Rice					
Production (tons)	43,600	64,300	117,000	140,000	112,400
Quantity Marketed by ONCAD (tons)	0	1,006	3,612	NA	NA
Percent Marketed by ONCAD	0%	2%	3%	--	--
Maize					
Production (tons)	20,200	33,800	43,200	45,000	47,200
Quantity Marketed by ONCAD (tons)	5	14	378	147	NA
Percent Marketed by ONCAD	0%	0%	1%	0%	--

NA = Not available.

Source: CILSS (1977), various tables and pages.