

PN-AAN-666

6980135/62

ISN-31838

Rice Policy in Liberia

by

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July 1979

This paper was prepared as part of a project funded under contract AID/afr-C-1235 by the U.S. Agency for International Development.

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Liberia has achieved rapid rates of economic growth in the post-war period. Monetary sector gross domestic product (GDP) increased sixfold between 1950 and 1969--an annual rate of 10 percent. This expansion was due primarily to the growth of concessions in iron ore, rubber, and, more recently, timber, a pattern which left the vast majority of the population unaffected. With changes in political power and the stagnation of the economy in the late 1960s, however, the government began to look in other directions for sources of growth. As part of this search, agricultural development and increased attention to the rural population became important considerations in government policy.

Rice, the staple food and focal point of traditional agriculture, was one of the most obvious targets for government planners. On the production side, interest has centered on the possibilities of large-scale concessional operations and small-farmer development programs, although little actual investment has been undertaken. Trade policy, on the other hand, has been used vigorously; recently the implementation of a variable levy system has served to maintain the high domestic prices established during the world price rises of 1973-74. Government trade policy reflects both a desire to encourage domestic production to substitute for imports and a strong constraint on the government budget, with the result that consumers rather than the government provide subsidies to producers.

The initial sections of this paper deal with aggregate characteristics of the Liberian rice economy and delineate trends in production, marketing, and consumption. The intent is to highlight the constraints on policy that are created by existing economic and physical conditions. The remainder of the paper is a discussion of the manner in which the choice of policy instruments and tools has affected the rice economy. The third section concentrates on the historical evolution of policy under the Tubman government, and the final section discusses new policies of the 1970s.

ECONOMIC GEOGRAPHY

Population

Recent surveys of the agricultural sector demonstrate the singular importance of rice. The annual national survey of crop production estimates the traditional agricultural population at 826,000, or 54 percent of the total population of 1.5 million.¹ Rice is a staple crop of 90 percent of agricultural households. Employment data from the 1974 Population Census indicates that 70 percent of the total employment of 430,000 emanates from traditional agriculture. Thus, rice plays an important role in the provision of two-thirds of total employment and involves roughly half of the population in its production. Both agricultural population and rice production are concentrated in the three interior counties of Bong, Lofa, and Nimba (see Map 1). During the three crop years between 1974 and 1977, these counties were responsible for 64 percent of rice production. Fifty-eight percent of agricultural households are located in these areas, and they have received the majority of the government's rice development efforts.

Map 1.*



* Numbers in parentheses indicate 1975-76 paddy production, measured in thousand metric tons. Source: Republic of Liberia, Ministry of Agriculture, Production Estimates of Major Crops 1976, Monrovia, 1977.

Land and Climate

The topography of Liberia features an undulating plateau, cut frequently by steeply sloped valleys. Valley bottoms often contain streams and small swampy areas. Almost every type of soil is used for rice cultivation. In dryland areas, latosols dominate. The combination of topography, soil type, and high rainfall (2500-4600 mm/yr) means that soils are particularly low in nutrients; they are heavily leached as the silica, nutrients, and humus are washed out of the thin topsoil. The subsoil is a distinct hardpan due to the accumulation of iron and aluminum, further increasing the hazards of runoff and erosion. Since drainage in the swamps is poor, nutrient retention there is greater than in the uplands, and fallow periods are shorter. These characteristics suggest a potentially high payoff from the use of artificial fertilizers, while the fragility of the upland soil structure limits the potential for the introduction of continuous mechanized cultivation techniques. In the swamps, where continuous cultivation is contemplated, resistance to iron toxicity is a requirement for new seed varieties. The small size, the lack of hardpan, and the unequal depth of the swamps make mechanized irrigation technologies impractical in most areas.

Production

Table 1 lists the major crops of Liberian agriculture, which together occupy about 9 percent of the total arable land area of 4.5 million hectares. Rice, the dominant crop, is produced largely with traditional techniques (see Table 2). Upland cultivation is the single most important technique, accounting for 92 percent of total production. Traditional swamps produce 6 percent of output and improved swamp and irrigation techniques 2 percent.

Table 1.--Major Crops *

Crop	Hectarage 1976-77	Production (<u>mt</u>)	Percent of farmers growing	
			1971-72	1976-77
Rice	200,000	245,000	88	90
Cassava	30,000	136,000	57	61
Coffee	23,300	4,600	20	25
Cocoa	21,100	2,900	18	21
Sugarcane	8,200	92,000	6	17
Rubber	119,100	82,400	8	6

* Data are from Liberia, Republic of, Ministry of Agriculture, Production Estimates of Major Crops, 1976, Monrovia, 1977.

Table 2.--Characteristics of Rice Production*

Technique	Hectarage ('000 ha)			Average size of holding		Production ('000 mt paddy)		
	1974-75	1975-76	1976-77	1975-76	1976-77	1974-75	1975-76	1976-77
Upland	--	181.0	190.0	1.4	1.5	--	209.4	221.4
Swamp	--	8.0	8.0	0.6	0.6	--	13.8	13.8
Improved swamp	--	2.0	2.0	0.3	0.3	--	5.7	5.6
Totals	201	191	200	1.4	1.4	249	229	241

*Data are from Liberia, Republic of, Ministry of Agriculture, National Rice Production Estimates, 1975 and Production Estimates of Major Crops, 1976, Monrovia, 1976 and 1977, respectively.

Key characteristics of existing rice production techniques are presented in Table 3.² For traditional techniques, labor and seeds are the major inputs, and the capital stock is limited to a few hand tools. No chemical inputs are used. Uplands are cultivated with slash-and-burn techniques and fallowed for 10-30 years following a single rice crop. Swamp cultivation follows a similar technology, although transplanting may be substituted for broadcasting. Swamp lands are cultivated for several consecutive years with much shorter fallow periods than upland areas.

Government planners have been interested in establishing permanent as opposed to shifting forms of cultivation and in remedying the dearth of improved technological packages for upland rice. The interest in permanent cultivation has resulted in a concentration on the development of improved swamp and irrigation technologies. A number of techniques have been contemplated, ranging from the introduction of water control in small swamps to the establishment of concessional large-scale, fully-mechanized operations patterned after American and Australian production. Major efforts to date have focussed on project areas of at least 50 ha in size, with mechanized land development. These projects developed 900 ha by 1977 although only 360 ha were actively cultivated at this time. In recent years, increased attention has been given to labor-intensive smallholder swamp development, and this technique forms the basis for most of the current and planned production investment. The Integrated Rural Development projects of the World Bank are the most prominent developments of this type. For upland rice, efforts begun in 1976 have centered on a pilot program to distribute improved seeds (LAC-23) and fertilizer.

In economic terms, rice production techniques appear attractive for home consumption purposes but not for cash cropping. Wage rates for unskilled

Table 3.--Key Characteristics of Rice Production Techniques*
(per hectare)

Production technique	Crops per year	Type of water control	Source of Power		Improved seeds	Fertilizer	Recurrent farm labor (mandays)	Annual land development cost(\$)
			Land preparation	Harvest				
Traditional upland	1	none	manual	manual knife	no	no	226	0
Traditional swamp	1	none	manual	manual knife	no	no	243	8
Improved upland	1	none	manual	manual knife	yes	yes	253	0
Improved swamp-labor intensive	1	bunded swamp	manual	manual knife	yes	yes	362	118
Improved swamp-partially mechanized	1	bunded swamp	tractor, power tiller	manual sickle	yes	yes	222	237
Fully mechanized	2-3	dam irrigation	tractor	combine	yes	yes	n/a	n/a

*Data are from Eric A. Monke, "The Economics of Rice in Liberia."

labor (\$1.25/day in cash and in-kind payments in 1976), strong off-farm labor demand, and more profitable alternative crops have made the commercialization of traditional production a relatively minor phenomenon. Preliminary studies (8) suggest that available new technologies are not attractive in economic terms either, because yield increases are not sufficient to offset increased labor costs in the labor-intensive swamp technique, nor to offset the increased input and capital costs associated with the mechanized swamp and improved upland techniques.

Marketing

Virtually all farm households market some produce. Vegetable and fruit products are sold extensively, and recent national agricultural surveys indicate that between 20-50 percent of households sell avocados, bananas, plantains, palm oil, okra, and other specialty crops. Producing crops wholly for sale is a relatively recent phenomenon, however, because transportation constraints limited the establishment of major market outlets until the late 1950s. Since that time, coffee, cocoa, and sugarcane have emerged as major cash crops, grown by 20-25 percent of all agricultural households. In general, cash cropping remains a complementary activity to food crop production, and very little complete specialization has occurred (1, 7).

Rice has remained largely outside the market sphere. Data from three agricultural censuses, presented in Table 4, indicate that the Liberian rice economy remains dominated by a pattern of production for home consumption. Half of all producing households are self-sufficient, although market participation has increased markedly in recent years. Table 5 shows the distribution of marketing households by county. Market participation rates vary widely across counties, but about

Table 4.--Market Participation *

Year	Percent of holdings		Producing sufficient rice for home consumption
	Buying rice	Selling rice	
1971	30	16	70
1975	51	24	54
1976	57	29	46

*Data are from Liberia, Republic of, Ministry of Planning and Economic Affairs, 1971 Census of Agriculture: Summary Report for Liberia, Monrovia, 1973; Ministry of Agriculture, National Rice Production Estimates, 1975 and Production Estimates of Major Crops, 1976, Monrovia, 1976 and 1977, respectively.

Table 5.--Market Patterns by area *

County	<u>Percent of holdings selling rice</u>		<u>Number of holdings selling rice</u>		<u>Percent of selling holders</u>	
	1975	1976	1975	1976	1975	1976
Bong	32	27	8,700	6,858	27	17
Grand Bassa	12	38	1,620	5,206	5	13
Cape Mount	32	9	1,664	463	5	1
Grand Gedeh	29	40	2,697	3,800	8	10
Lofa	12	5	2,568	1,110	8	3
Maryland	26	28	2,132	2,324	7	6
Montserrado	5	10	650	1,320	2	3
Nimba	31	47	9,517	14,711	30	37
Sinoe	32	49	2,592	4,018	8	10
Liberia	24	29	32,256	39,730	100	100

* Data are from Liberia, Republic of, Ministry of Agriculture, Production Estimates of Major Crops, 1976, Monrovia, 1977.

70 percent of all sellers are located in the interior counties of Bong, Nimba, Lofa, and Grand Gedeh.

Both private and government marketing channels exist for rice, but government purchases for 1976-77 were only 3000 mt paddy, less than 8 percent of total marketings. In the private marketing channel, farmers generally control rice through the processing stage.³ Data from the 1971 Agricultural Census revealed that only 4 percent of marketing farmers sold produce on the farm (22). Of the great majority who travelled to market, about half walked the entire distance and the remainder used motor transport.⁴ Headloading capacities thus act as a constraint on the size of individual sales. The first transaction is made at the market, usually by a woman from the farm family. Average daily sales per seller are between 5 and 20 kg.⁵ Seasonal variations are pronounced at the large regional markets as both the number of sellers and the quantities per seller are increased in the immediate post-harvest months of November-February.⁶ Increased volume during the post-harvest months is due to bulking of larger quantities for shipment to Monrovia, the primary urban market. During the low season, sales are made for local consumption at the large regional markets and at the smaller weekly markets where vehicle access is often limited. Local demand is strongest during the pre-harvest months and thus the small markets show a sales pattern opposite to that for the larger markets.

Processing:

Most processing is done by hand-pounding, and rice is threshed and pounded daily in quantities sufficient for home consumption. Rice mills are generally used for marketings, and the farmer has paddy custom-milled before transporting it to markets for sale. Small-scale mills are the dominant type. Some 220 mills are scattered throughout the

country, principally in the northern and interior counties. Rubber-roller mills make up about 75 percent of the total; the remainder are steel cylinder mills and simple hullers, primarily of English manufacture. Mill capacities are rated at .25 mt paddy per hour, but problems with poor quality of paddy--the presence of stones, high moisture content, insufficient threshing--and the need for occasional shut-downs of the system to allow the diesel engine to cool limit actual capacity to 65 percent of the technical maximum. These mills process 31,000 mt of paddy per year. This is about 35 percent of yearly milling capacity, although demands for processing in the post-harvest months result in utilization rates double the annual average. The government operates three two-ton-per-hour mill-market outlets in the interior counties of Bong, Lofa, and Nimba, where paddy is purchased for \$0.264/kg, processed, and sold for \$20/cwt bag (\$0.44/kg) throughout the year. Paddy purchases are small (about 3,000 mt in 1976-77), and mill utilization rates are on the order of 8 percent of capacity.

The small-scale mills are able to operate at much lower costs per ton of rice milled than the larger mills, for a number of reasons. Lower fixed costs enable them to function profitably at lower capacity utilization rates. Large mills incur additional costs in the form of hired labor, storage, and increased losses equal to about 7 percent of rice output. Finally, the need to attract paddy over a larger radius from the mill and a reliance on commissioned agents for paddy delivery result in higher collection costs for the large-scale mills.

Consumption

Per capita consumption of rice averages 110 kg/yr. Cassava is the next most important staple at 87 kg per capita. There is some variation across regions and between urban and rural areas. Surveys in major rice production areas suggest per capita consumption of 135 kg, with adults consuming as much as 225 kg per capita. Cassava consumption is about 45 kg per capita in these areas (1, 11, 12).

Most imported rice is consumed in urban areas, and historical import patterns have followed the growth of urban areas. Imports were zero in 1945 when the population of Monrovia was about 15,000 (16). But as the urban population increased, marketings of domestic production stagnated. By 1965, annual import volume reached 33,000 mt, and increased to as much as 54,000 mt over the next decade. Annual totals demonstrate a sawtooth pattern over this period, reflecting year-end carryover and the six-month storage capacity in Monrovia. (The only exception is 1971, when large imports may have been the result of a shortfall in 1970-71 domestic production.) The United States is the major source of supply. Relatively minor shipments originate from Asian countries and from Egypt. Prior to 1975, parboiled rice was imported almost exclusively, but a policy decision to encourage consumption of non-parboiled domestic rice resulted in the elimination of imports of parboiled white rice during the 1975-77 period.

Little is known about either income or price elasticities. However, price changes would be expected to have a larger impact in urban areas than in rural producing areas because the income and substitution effects work in opposite directions in the rural areas (as long as income elasticities are non-negative). Urban consumers do appear responsive to price changes. The 1974-76 price increases and varietal switch from parboiled to raw rice resulted in reductions in average annual imports from 48,000 mt in 1970-73 to 34,000 mt in 1974-76. Some, but not all, of this difference was

made up by domestic rice; flows to urban areas were about 12,000 mt rice by 1976. Nominal rice prices in Monrovia increased by 56 percent, while the non-food CPI increased by 48 percent between these two periods. This amounts to a 17 percent increase in real prices and is probably an underestimate of the effective price change as it does not allow for the varietal change from parboiled to white rice. The real price of cassava also increased, while the real price of bread and plantains fell, suggesting that both substitution effects between staple commodities and own-price effects were responsible for declines in imports and consumption. Based on production estimates and import data, average per capita rice consumption appears to have declined by about 8 percent between the 1970-73 and 1974-76 periods.

HISTORY OF RICE POLICY

The history of rice policy, and of economic policy in general, does not really begin until the post-World War II era with the accession of W.V.S. Tubman to the Presidency. Prior to the war, government intervention in the interior regions was limited to the delineation of national boundaries and the establishment of political control over the interior. No internal road network existed and, although cash cropping began in the 1930s and 1940s, rural trade was limited to goods that could be headloaded and was directed toward the French colonies of Guinea and the Ivory Coast. By the time Tubman assumed the Presidency in 1944, the economy was beset by inflation and shortages of consumer goods and the government had financial difficulties (revenues at this time were less than \$2 million)(6).

The major economic policy established in this period was termed the Open Door Policy, which attracted foreign investment and skilled manpower through concessional grants for iron-ore mining and rubber development. This policy was little more than a continuation of historical patterns of

Liberian development. The Americo-Liberians who settled the country were artisans and traders, not agriculturalists, and their interest lay in an export economy rather than in agricultural capitalism. Moreover, the concessional model had already proven successful, as evidenced by the ten-fold expansion in rubber exports during World War II. The results of this policy were dramatic, and Liberia exhibited sustained economic growth until the late 1960s. GDP increased from \$48 million in 1950 to \$366.6 million by 1969. During this same period, exports increased from \$31.0 million to \$196.0 million, and government revenue increased from \$3.9 million to \$61.8 million. The resultant economy was heavily export-oriented and dominated by foreign interests. Half of GDP, 80 percent of government revenue, and 70 percent of wage employment came from the concessional sectors.

Tubman launched the Unification Policy in 1954. The National Unification Council was established to oversee the integration of the people of the interior into the national society and economy. Attempts were made to reduce abuses of the original inhabitants by government officials and soldiers. Liberians from the interior were brought into government administration. Public relations officers were appointed to maintain cordial relations with various groups in the interior and by 1967 the government was spending \$1 million annually on this activity. The completion of a basic transport system to the interior in 1958 resulted in an increasing orientation of commerce toward Monrovia rather than toward the French colonies. During the 1960s, elementary schools and medical units were established in most of the major towns. The Unification Policy was intended to ensure that modernization would involve a smooth transition for rural society. A comment by Tubman concerning the numerous coups d'etat in much of Africa,

provides a succinct summary of this philosophy (6):

There would have been no coup if the poor man has an opportunity of eating smoked fish while the leader eats ham and eggs. But if the poor man has nothing to eat while you eat ham and eggs, he will surely do something against you.

While there was an interest in the political incorporation of the interior, little attention per se was devoted to agriculture--the major economic activity of the rural inhabitants. In 1950 the income of the traditional agricultural sector was \$24.0 million including \$1.8 million in cash crops, or about 40 percent of national GDP. By 1960 the value of agricultural production had increased only to \$25.4 million in nominal terms (\$7.3 million in cash crops), and its share of GDP had fallen to 15 percent. Agriculture was also the least favored sector in terms of government expenditures, receiving less than 2 percent of total expenditures throughout the period. Over 70 percent of the Department of Agriculture's expenditures were on general administration and services; nothing was spent on materials or machinery (6). Major activities in agriculture during this period involved a national soils survey in 1951, the establishment of a Central Agricultural Experiment Station at Suakoko in 1953, and the creation of a National Extension Service in 1960.

In the 1960s government attention toward the rural economy began to increase, spurred in part by marked increases in rice imports and balance-of-payments crises in 1961-63. In 1963 President Tubman launched Liberia's first agricultural development program, Operation Production, Priority Number One (9):

We of this country must realize, know, and understand that we must produce to survive; that increased production is analagous to prosperity, progress, development, happiness, self-sufficiency, patriotism, national pride, and even Godliness.

The objective of the program was to double agricultural production through the establishment of local committees to work with farmers. A Rice Extension Program was begun in which experimental farms were established by the United States Department of Agriculture and the Food and Agriculture Organization of the United Nations to encourage rice production with swamp techniques. Exhortation rather than financial aid appeared to be the major method used to implement the plan. A two-man staff was charged with the administration of the program, but no public appropriations were made for its coordinating activities. Rather, the program was run in a manner similar to the Public Relations Program, as the President made spontaneous grants to honorary county chairmen. The relationship between these grants and agricultural development was often obscure. In one area, for example, \$5,000 of a \$14,900 grant was allocated for the purchase of an automobile for the local chairman (6). Although the impact of the program was negligible and demonstrated the central government's inexperience with agricultural development, the program was significant in that it represented the initial step in reorienting government development policy toward the agricultural sector.

A second attempt, the Crash Program for Agricultural Development, was launched in 1968. Tubman called for a program which would (14):

[serve] as an official guideline for the agricultural development of the country . . . [and] as a stimulant in getting agriculture moving in every field and on every level of the national endeavor . . . It is expected that every citizen and foreigner . . . will earnestly undertake and relentlessly

pursue some production effort, no matter what the size or extent, until the total national potential has been fully regimented, and the planned goals attained.

Program goals included "making the country as nearly self-sufficient in the production of food crops and particularly rice as soon as possible." The program emphasized a long-term commitment to assist small farmers, largely through the establishment of cooperatives. The cooperatives would provide a marketing outlet for commodities, supply inputs, and implement a system of standardized grades, weights, and measures. Cooperatives were to replace existing marketing channels, since it was believed (without evidence) that "local traders are generally inefficient and exploitative" (14).

In addition, the plans called for the establishment of 90 one-acre swamp rice demonstration plots and the development of 1,500 acres per year in large-scale projects with mechanical land clearing. Small farmers would be organized through cooperatives to cultivate these large developments. Finally, a Rice Committee was formed to oversee the importation of rice. Initially, the Committee gave import rights to one company to import Egypt's brown rice and to mill it into white rice. Substantial problems were encountered as the rice spoiled and developed odor problems. The project was quickly disbanded (5). A tender system was then instituted in which the Committee would accept competitive bids from any prospective importer.

While the Crash Program produced few tangible results, it was important for rice policy because it laid the foundation for much of the subsequent government involvement with the rice economy. Small swamp

development projects were continued and reached fruition some 10 years later as World Bank projects, while large-scale partially-mechanized developments formed a key component of government production efforts in the 1970s. Finally, the Rice Committee actions and government control of imports formed the cornerstone of trade and price policy and enabled the government to intervene effectively in the rice market.

MODERN RICE POLICY

By the end of the 1960s much of the growth potential of the iron ore and rubber sectors was exhausted. While the two-product export-oriented economy brought substantial gains in GDP and a strongly positive balance of trade, a desire to sustain economic growth dictated a search for new activities. Attention turned increasingly to the agricultural sector. With the succession of President Tolbert in 1971, a new economic policy-- Total Involvement for Higher Heights--was formulated. Under this plan increased emphasis was placed on rural integrated development and diversification of agricultural production. The introduction of cash cropping was concentrated on production of coffee and cocoa for export and production of rice for import substitution. Self-sufficiency in rice continued to be a goal of the plan, as it had been during Tubman's regime. The decision to develop rice production demonstrated the new orientation of economic policy and the commitment of the Tolbert government to the rural population who had been largely ignored in the past.

Accordingly, government expenditures on agriculture began to increase. While expenditures were only \$2.6 million in 1971 (4 percent of total expenditures), by 1974 the total budget for agriculture was \$8.2 million (8 percent of the total) and by 1975, \$12.8 million (22). About 44 percent of the 1975

total came from government revenues, the remainder from foreign donor organizations. Increased budgetary outlays reflected primarily increases in agricultural sector investment. Development expenditures were about \$1 million in 1971 and had increased to \$10 million by 1976 with an additional 40 percent increase projected for 1977. Expenditures were primarily on research and on rice and tree crop production.

Government Investments in Rice Development

Government involvement in rice production continued to follow the 1968 plan. Two special divisions were created within the Ministry of Agriculture to deal with rice production. The first, known as the Special Projects division, was concerned with the development of water control in large swamp areas (50 ha or more) and with the organization of small farmers to work these developments, resettling the farmers when necessary. Cooperatives were established to act as market outlets and sources of inputs and credit. Swamp rice was only one component of these projects; tree crops, primarily coffee and cocoa, were to be planted in upland areas. Shifting slash-and-burn practices were to be abandoned. Mechanization was a major component of this program. Agrimeco, an autonomous government corporation involved with agricultural mechanization, was expected to provide mechanical services for land clearing and development.

While plans called for the development of 1,500 ha per year beginning in 1971, actual developments fell far below this target, and by 1976 a total of only 900 ha had been developed (20). Although eight sites were involved, 650 ha were located in the Zlehtown Project in Grand Gedeh County and in the Foya Project in Lofa County. Total membership in the cooperatives associated with the eight projects numbered 2,460.

A number of serious bottlenecks were encountered. Equipment down-times,

poor management of the cooperatives, input shortages, and lack of farmer enthusiasm all hampered development of the projects (13). The projects were also expensive to implement. By 1976, though the number of projects had been reduced to five and cultivated area had declined to 360 ha, subsidization costs for the Ministry of Agriculture were \$0.3-0.4 million annually. Additional subsidies were provided by Agrimeco on the capital equipment and by the Taiwan government, which supplied twenty consultants (18). By 1977, it was decided to phase out the Special Projects. The experiment with partial mechanization had failed.

The experience at Gbedin, a project in Nimba County, illustrates the difficulties encountered by the Special Projects. Originally begun in the 1950s by the USDA as a swamp rice demonstration farm, the project was reactivated in the 1960s by the Ministry of Agriculture with the assistance of the Taiwanese Agricultural Mission and was incorporated into the Special Projects program in the 1970s. Objectives of the project were to develop 1,200 ha of swamp and to relocate and train 600 families in swamp cultivation. By 1968 only 70 farmers were resettled and 75 ha cultivated; by 1976 in spite of the efforts of 35 staff people, only 63 farmers were active in the project, of whom only three were original settlers. Cultivated area was 69 ha. Annual subsidy costs for the project were \$43,000, and the cooperative required an additional subsidy of \$10,000 per year.

Problems in the Gbedin project were manifold. Farmers complained about the non-availability of fertilizer and water. Machinery break-downs were frequent because Agrimeco had purchased used equipment, spare parts were in short supply, and machinery operators were inadequately trained. This resulted in delays in land clearing and preparation which upset cropping schedules. The administration was poorly trained and morale was low, partly because of long delays in the receipt of wages from the government. Farmers did not understand clearly their obligations to the cooperatives to pay

for services with portions of the harvest. While the management wanted to market rice, farmers themselves wanted to decide between home consumption and marketing. Management was also late in the reimbursement of farmers for rice sales. Finally, the experts from Taiwan were hampered by language problems, with the result that they often worked by themselves rather than with the farmers.

The second type of project development was known as the Expanded Projects. These involved the improvement of small swampy areas scattered throughout the country. Swamps were generally less than 1 ha in size and cultivated by individual households. An advance team was to identify the areas to be improved and enlist farmer interest in development. Following this, a technical assistance team would arrive and assist with actual swamp preparation. The project began in 1972 with two sets of teams, and by 1975 four teams were working in the interior countries. About 60 employees were involved, with leadership provided by twenty Taiwanese advisors. By 1975, roughly 1,000 ha had been identified, but only half of this amount was developed, an annual rate of 125 ha (13). Expenditures approximated \$0.2 million annually, excluding the costs of the Taiwanese assistants. Seventy-five percent of Ministry costs went for personnel. Lack of transport facilities and delays in procurement of equipment were frequently cited as constraints in team performance (18). In 1977, when the Taiwanese were replaced by advisors from the People's Republic of China, the program was disbanded.

By the mid-1970s government efforts to introduce new production technologies had not achieved much success. Improved techniques accounted for only one percent of cultivated area. Only two percent of farmers used improved seeds and one percent used fertilizer (15). Farmers had not demonstrated a strong affinity for the new technologies. In large part disinterest occurred because the new techniques were not so economically

attractive to farmers as planners had assumed. While the new techniques were more complex and involved increased use of intermediate inputs plus more management and labor organization, without government subsidies net returns per man-day were not substantially higher than for the traditional techniques. Even with subsidies, rice had limited attraction as a cash crop due to alternative opportunities in tree crops or sugarcane (8).

Off-farm constraints were also important. Organizational deficiencies in the delivery of essential supporting services made it difficult for farmers to find a reliable supply of improved inputs in most areas. Farmers were expected to maintain their own pure seed stock and had to travel to Monrovia to obtain fertilizers, a 200-300 km trip from most production areas. Shortages of planning and extension personnel caused a pervasive lack of technical assistance to the traditional farmer. Only 4 percent of agricultural holdings reported having received advice from extension workers (26).⁷

Although the new techniques required greatly increased annual out-of-pocket expenditures by the farmer, little access to seasonal credit was provided through government or private channels. Since capital inputs are very limited in traditional techniques, credit is usually used for non-agricultural purposes, and creditors are generally relatives or village officials rather than traders. Commercial banks do not operate in rural areas. Government credit for rice-related activities was provided through the Agricultural Credit Division. About \$2 million was spent annually, primarily for the support of Agrimeco and the Expanded Rice Programs. Some seasonal credit was dispensed through four cooperatives-- Interfowar and Gbandi in Lofa County, Amenu in Grand Gedeh County and Dokadan

in Nimba County--but these cooperatives comprise less than 1 percent of farm families.

Fulfilling farmer needs for more technical information, improved credit availability, and modern inputs is made even more difficult because of meager infrastructure. Environmental factors such as the level and intensity of rainfall and the presence of numerous valleys and streams has made the construction of roads both expensive and logistically complicated. Transportation facilities have developed slowly in Liberia. In 1945, there were 300 km of roads, none of which were hard-surfaced. By 1962, 1300 km of surfaced roads had been built, and this increased to 2000 km by 1974. In addition, there were 3000 km of dry-weather and secondary laterite roads. Of this 5000 km total, 1100 km was built in and by concessions.⁸ The result is one of the lowest road densities in West Africa--0.02 km/square km for all-weather roads and about the same density for seasonal roads. Family plots and villages are often isolated, and access to markets and to supplies of inputs is costly. Substantial walking is required. On average, farms are 30-60 minutes' walk from home villages. More than an hour is required to reach markets, and usually a combination of walking and motor transport is utilized (17). The use of foot trails and headloading clearly limits the scale as well as the speed of transport operations, and consequently, transportation problems affect government policies on both inputs and outputs.

By 1977 new strategies had emerged. Success with the concessional model in rubber production and iron-ore mining invited its application to the rice sector, and proposals were developed for large-scale fully-mechanized rice plantations of at least 1,000 ha in size. A pilot study was completed in 1978 for a project of 1,800 ha in Grand Gedeh County. This operation was to be fully mechanized, modelled after the techniques used in much of the

United States and Australia, with negligible labor employment. Government planners were attracted to this method because of centralized control and the ability to direct production conveniently to the Monrovia market. In addition, this approach largely avoided the problems of inadequate transportation infrastructure, deficiencies in administrative abilities, and an ineffective extension service that hampered the small farmer-oriented projects. The key to the effectiveness of large-scale rice plantations hinged on economic considerations, however, and when preliminary studies suggested that substantial government subsidization would be necessary to sustain production, the proposal was discarded.

Two new types of programs for small farmers have emerged. The first, the Integrated Rural Development projects under the aegis of the World Bank, is essentially a reorganization of the small-scale swamp approach advocated under the Expanded Rice Program. Modelled after similar projects in Sierra Leone, programs are planned for Bong and Lofa Counties. Besides the development of 4,000 ha of swamp rice and 11,000 ha of improved upland production, the projects attempt to deal with infrastructural constraints through the development of health and educational facilities and road construction. Only 50 percent of the \$37 million project cost is intended for rice.

The final program currently contemplated by the government involves the extensive dissemination of an improved seed-fertilizer package to upland producers (19). This is seen by the government as an intermediate step toward ultimate technological change. To the government, upland farmers are afraid of growing rice in the swamps and lowlands because of schistosomiasis and sociocultural obstacles. Upland cultivation is wasteful of both land and labor. Since it will take time to convince farmers to cultivate lowland rice,

the short-run approach is to improve yields of rice on the upland (16).

The choice of appropriate technique is largely an economic question, and it is difficult to support the government's conclusion that upland production is inherently less efficient than more permanent forms of cultivation. Upland techniques are more land-extensive than irrigated techniques, but in most areas land is not a scarce resource and in general commands a market price close to zero. Labor and capital, on the other hand, are the more critical potential resource constraints, and upland and irrigated technologies do not appear inherently different in their utilization of these resources. The key issue for the successful introduction of new technologies revolves around profitability and, given current demographic conditions, there appears little reason to expect or require that upland cultivation should disappear from Liberian production patterns.

An improved seed-fertilizer package under consideration is intended to reach 80 percent of upland producers, primarily by an eight-fold increase in the size of the extension force. This will lower the ratio of extension workers to holdings to 1 : 50. Each holder will be visited for one year only; after this period the farmer is responsible for maintaining his own seed stock and obtaining fertilizer. The plan calls for the establishment of 20 regional centers to distribute seeds and fertilizers. The three-year program cost is currently estimated at \$32 million. It is unclear whether the facilities or extension service will be maintained after project completion.

A pilot version of the program was begun in 1976 in the southern counties of Grand Gedeh, Sinoe, and Maryland. In total, 1,369 farmers received seed and fertilizer, with an extension worker density of one for every 60 holdings. While the rice was popular with consumers, it has a harder husk, and hand-pounding was reported to require 35 percent more time than traditional rice. Seed repayment rates were 67 percent, although the purity of the

seeds is doubtful as farmers often mixed seeds and varieties during planting. Dilution of seed purity will have an obvious impact on potential output increases in successive years. Furthermore, the injection of increased variation in grain shape and size has major implications for the potential quality of rice that can be marketed. With the LAC-23 seed, which is harder to mill, the result after processing is overmilled traditional rice or un'ermilled LAC-23 rice. This implies a reduced output quality relative to imported rice.⁹ Other problems that surfaced in the second year involved the distribution of fertilizer. Delays meant that the first year's recipients had to plant without fertilizer, while new farmers in the program were required to wait. Finally, yield effects appeared substantially less than the 87 percent increases promised in the program and achieved on experimental plots. While no thorough yield studies were made, reports of extension workers suggest a 35-50 percent increase. Reasons for this difference are not known.

The new production programs recognize the importance of institutional and infrastructural constraints and both the improved upland and labor-intensive swamp programs emphasize increases in extension and credit availabilities and improvements in transportation and input distribution facilities. The improved upland program, for example, calls for one extension worker per fifty farms and one input distribution center per 5,000 farms. Annual credit will be made available for all intermediate input purchases.

While the new programs may relieve some of the institutional and infrastructural constraints that hampered their predecessors, the economic viability of the new technologies and their attraction to farmers as "improved" techniques remain uncertain. Table 6 presents data concerning incentives for

Table 6.--Incentives for Cash-Cropping Rice in Liberia ^{*a}
 (\$/mt rice, delivered to Monrovia)

Technique	Private		Social		Labor as percent of total costs		Private returns/ man-day
	Costs	Profit	Costs	Profit	Private	Social	
Upland	554	-96	545	-231	70	81	.93
Improved upland	520	-62	533	-219	65	64	1.01
Unimproved swamp	464	-6	455	-141	75	77	1.22
Improved swamp, labor intensive ^b	416	42	428	-114	55	53	1.50
Improved swamp, partially mechanized ^c	349	109	488	-174	53	38	2.34

* Data are from Eric A. Monke, "The Economics of Rice in Liberia," Stanford/WARDA Study of the Political Economy of Rice in West Africa, Food Research Institute, Stanford University, Stanford, July 1979.

^a These calculations do not consider the economic incentives of home production-home consumption systems. In this case, the new techniques appear attractive relative to the traditional techniques and farmers may find the new technologies attractive for this purpose. See (10).

^b These calculations are based on a different fertilizer mix than that contemplated for the World Bank projects.

^c This technique is representative of the now-defunct Special Rice Projects, and is included for comparative purposes.

cash-cropping rice. Private profitability is negative for the improved upland program and only slightly positive for the labor-intensive improved swamp. Tree crops and sugarcane remain more attractive in terms of relative profitability, with returns above \$2.00 per day for farmers who have access to the necessary capital inputs (primarily seedlings) and fertilizer. Furthermore, the levels of private profitability that do exist in the new techniques depend on subsidies. Government production subsidies for the new techniques are \$20/mt rice (this effect is partially offset by taxation of post-production activities). Subsidies from consumers of about \$145/mt rice are provided through the imposition of a variable levy on imports. Thus the social profitabilities of the new techniques are strongly negative.

The last two columns of Table 6 highlight the importance of labor in total costs. As a source of income in agriculture rice must compete with tree crops and sugarcane, while local crafts and the rubber and mining concessions also contribute to a strong rural labor demand and 1976 wage levels of about \$1.25/day. While the new technologies substitute intermediate inputs for labor and thus reduce the relative importance of labor in total costs, input substitution effects are not sufficient to make the new technologies economically attractive. Consideration of economic efficiency suggests that it is less costly to the economy to continue to rely primarily on imports to meet market demand in urban areas.

Government Price and Trade Policies for Rice

Although government policy of the post-Tubman era achieved little in terms of the introduction of new technologies, major innovations were introduced in price and trade policy. Policy makers soon realized that the exhortations

of the 1960s were not sufficient to induce increased production and that prices and profit incentives were necessary to bring about the desired responses. While it was recognized that subsidization was necessary to increase production, the choice between government and consumers as the source of subsidy has influenced the relative use of input versus output price incentives. To date, governmental budgetary constraints appear to have dictated substantial emphasis on consumers as the source of subsidization.

At the producer level, an attempt was made to support paddy prices through the establishment of a purchasing system at each of the three government mills located in the interior countries. A purchase program was begun in 1973/74 at a price of \$0.11/kg, but drew little farmer response. By 1976/77, prices had been raised to \$0.26/kg, but purchases remained small, at about 3,000 mt paddy or about 1 percent of total production. In part, the limited farmer response was due to the organization of the purchase program. The Liberian Produce Marketing Corporation (LPMC) attempted to collect rice largely through licensed agents and cooperatives, who received a handling allowance and a commission for their efforts. However, cooperatives did not grade rice and generally made deductions from the support price without resort to moisture tests or other objective criteria. Licensed agents did not use scales or objective evaluations either, and in general paid on a volume basis, at reported prices as low as \$0.16/kg. The result was farmer suspicion and disinterest in the program. Finally, implementation of the paddy purchase program proved very costly. Losses on government account in 1976 were about \$80/mt rice purchased.

A more important factor that limited the effectiveness of the paddy purchase program was the structure of the price system. LPMC maintained a constant purchase price of \$0.394/kg milled equivalent, which was relatively attractive to farmers in the post-harvest months of December-

February when retail rice prices in rural areas were on the order of \$0.33/kg. A constant selling price for rice of \$0.44/kg was also maintained (sold in lots of 40 kg). This price became attractive to consumers and retailers during the pre-harvest months of May-September, when rural retail prices were as high as \$0.66/kg, with the upper bound established by the price of imported rice in rural markets. Clearly, however, there was little reason to expect farmers to supply rice to LPMC under this price regime. Rather, they processed and sold the rice on the market. The result was that 78 percent of total paddy purchases by LPMC occurred between December and February, while 57 percent of total sales took place between May and September. Consequently, while official prices approximated free market prices in rural areas on an annual average basis, purchased volume was not sufficient to modify the seasonal movement of prices.

Although price policy at the farmer level was ineffective, government controls over import prices had quite the opposite experience. The Rice Committee, by virtue of its control over imports, became the most powerful policy-making group of the modern era. Established in 1968 to control imports and to avoid supposed shortages and surpluses that resulted under free trade conditions, this group tried a number of different policies. In 1968, the government began a cost of marketing study with the intent to establish ceiling prices on imported rice at the wholesale level. Market shortages resulted as importers held up orders of rice, and the program was quickly terminated. Equally short-lived measures included the decision to import partially-milled rice and an attempt to encourage marketing of domestic production through quantitative restrictions and rationing of imported rice in 1972 (1). The latter policy was terminated upon the instantaneous appearance of a black market which circumvented the limitations placed on retail rice prices.¹¹

A more important policy, and one that was closely related to price policy, was the decision to import lower-cost white rice rather than American parboiled rice. This policy was undertaken because it was felt that a major constraint to the adoption of local rice was that consumers were not accustomed to its taste. By changing the quality of imports, it was believed, consumer tastes could be altered so as to prepare for the adoption of domestic rice. The alternative policy of introducing parboiling into the rural production process was believed to be impractical. Finally, it was hoped that exclusive use of white rice would reduce speculation and black markets when supplies ran low, since parboiled rice could be stored for a longer period than white rice.

Currently, imports are regulated through a tender system. Three categories of rice are recognized: commercial rice in bags of 40 kg or more; luxury rice in small packages; and concessional rice, used as a wage good by the rubber, mining, and forestry industries. Only the first category is regulated by the Committee. The Committee monitors stock levels in Monrovia, and when supplies fall to 3,000 mt, tenders are invited. The Committee specifies the quantity (usually 3,000 mt), and prospective importers submit sealed bids which stipulate time of delivery, price, and quality of rice. No attempt is made to regulate annual quantities of imports. The rice is sold at government-regulated prices of \$21.55/cwt bag (\$0.475/kg) through officially-licensed rice stores located throughout Monrovia.¹² A variable levy is used to absorb the difference between the c.i.f. price plus distribution costs and the wholesale price.

Government control is simplified because the import market is dominated by two companies, one of which is government-owned, and by the foreign concessions, which sell rice at subsidized prices to their workers. These

groups are responsible for about 90 percent of total imports; the concessions take about a 16 percent share.¹³ Imports of rice are consumed almost exclusively in urban areas and compose less than 20 percent of total rice consumption. However, rice imports make up nearly 60 percent of total marketings. Consequently, the ability of the government to control the price of imports is a key influence on market price behavior in both rural and urban areas.

The price of local rice is less directly controlled than the price of imports, but the high degree of substitutability among varieties makes additional price control unnecessary. In Monrovia, LPMC makes local rice available to the rice stores at the same price as imported rice. However, there is little demand as local traders supply most of the domestic rice and undersell LPMC. Domestic rice is sold at a discount relative to imported rice because of its inconsistent quality and the presence of impurities.¹⁴ In rural areas, imported rice appears only sporadically, at a 1976 price of about \$27 cwt bag (\$585/mt) in the interior counties. Again, the price is constant throughout the year.

The decision to implement a variable levy system on imported rice was the most significant policy of the Rice Committee in the 1970s. Both the easing of supply conditions on world markets after 1975 and the change in the quality of imported rice meant declining world prices and increases in the size of the variable levy. In 1975, c.i.f. prices were \$444/mt, and the levy was \$43/mt. By 1977, c.i.f. prices were \$281/mt with tax revenue of \$145/mt, equivalent to a tariff rate of 52 percent. The revenues generated by the variable levy are collected in the Agricultural Development Fund,

which is to be used for investments in tree crops and rice and as a price stabilization fund in the event that world prices rise above the domestic price. No funds had been expended by mid-1977, and disbursements are controlled by the Ministry of Finance rather than the Ministry of Agriculture. The variable levy had become an effective generator of government revenue; by 1977 the levy amounted to \$5 million annually, equal to one third of total governmental expenditures on agriculture. Furthermore, this policy indicated a strong preference on the part of government to have subsidization for domestic producers come from consumers rather than from government coffers.

Examination of the time-series of prices for Monrovia demonstrates some important changes between pre- and post-1973 price behavior. Before 1973, domestic rice sold at the same price or at a premium over imported rice. This price relationship reflects both a thin market and sporadic flows of rice from rural to urban areas, as only a few thousand metric tons of domestic rice were sold in urban areas. However, the sharp price rise of 1973 resulted in a reversal of this relationship. Retail prices for imported rice rose 85 percent between 1972 and 1976, from \$275/mt to \$508/mt, while domestic rice prices rose less than 60 percent, from \$308/mt to \$488/mt. The Monrovia non-food consumer price index increased 64 percent during this period, suggesting real increases in the price of imported rice and real declines in the price of domestic rice.¹⁵

The increase in the price of imported rice was further reinforced by the switch to a lower quality of rice. This quality change probably resulted in an effective real price increase of 25-30 percent for imported rice. If one ignores income and substitution effects (real incomes showed little change during this period), this suggests an import price elasticity of demand

of -0.8 to -1.0.¹⁶ This price behavior reflected major alterations in urban marketing patterns, and wholesalers and importers noticed the appearance of marked seasonal patterns in rice sales. During the post-harvest months of December-March some 9,000 mt of domestic rice flowed to urban areas,¹⁷ and sales of imported rice were only 40 percent of their monthly average for the remainder of the year. Domestic rice actually outsold imports for these months--2,200 vs. 1,400 mt/month.

These changes in urban marketing patterns had their counterparts in the rural producing areas. Before 1973, the amount of rice marketed was small. Surveys in Bong and Lofa counties in 1971-72 found that on average rice made up 10-12 percent of the value of cash sales per household and about 6 percent of the value of household rice production.¹⁸ A national survey during 1970-71 found that less than 2 percent of farmers reported selling more than 50 percent of their rice crop. In contrast, the same survey found that 46 percent sold more than half of their cassava output (7). Using average sales of 150 kg paddy/holding, this suggests total marketings for 1971-72 of 17,000 mt paddy. Since only 16 percent of holdings in production sold rice, the average sale was about 1 mt paddy per seller.¹⁹ Hence rice, as with other crops in the traditional agricultural sector, is grown as a cash crop.

By 1976-77, market participation had increased substantially. Twenty-nine percent of farmers reported selling rice, nearly double the total five years earlier.²⁰ The number of small-scale rice mills, an additional indicator of market activity, doubled during this period.²¹ Total marketings were now on the order of 39,000 mt paddy, or about 16 percent of total

production.²² This amounts to average sales of 0.3 mt paddy/holding, and 1.0 mt paddy per seller. Consequently, the substantial increases in marketings in the 1970s apparently were not due to increases in marketed output per farmer. The expansion of the market economy has taken an extensive rather than intensive course. The number of participants in the market has increased, both as a result of population increase and the creation of additional profitable opportunities arising from the increase in rice prices (see below). National survey data show a greater variance in farm size than in family size, suggesting large farms continue to play an important role in rice marketings.²³

While price data are scarce for rural producing areas, the pattern of price behavior that developed was different than that in the urban areas. Until 1972, annual average prices in rural areas seemed relatively stable in nominal terms. Rice sold in cwt bags for \$8.50 (\$0.19/kg) and in rural markets, retail prices averaged \$0.22/kg, with seasonal ranges from \$0.17-0.28 (10, 11). This was below prices for domestic rice on the Monrovia market, which averaged about \$0.30/kg during this period. By 1976, prices had increased sharply. Rice in cwt bags now sold for \$20 (\$0.44/kg), with a seasonal range of \$15-25 (\$0.33-0.55). Prices at the retail level ranged from \$0.45-0.75/kg, with the magnitude of the seasonal price movement varying from year to year. Thus for rural producers, rice prices had increased by about 150 percent in nominal terms, and perhaps 75 percent in real terms. Given the 135 percent increase in marketed supply over this period, this suggests a marketed supply elasticity of 1.8.

But in the aggregate, the magnitude of the supply response was small. Since population growth accounts for 6,000 mt of additional marketed production, the maximum supply elasticity, resulting if all the increased output came from expanded acreage and there was no substitution in farmer consumption patterns (presumably between cassava and rice), is about 0.1.

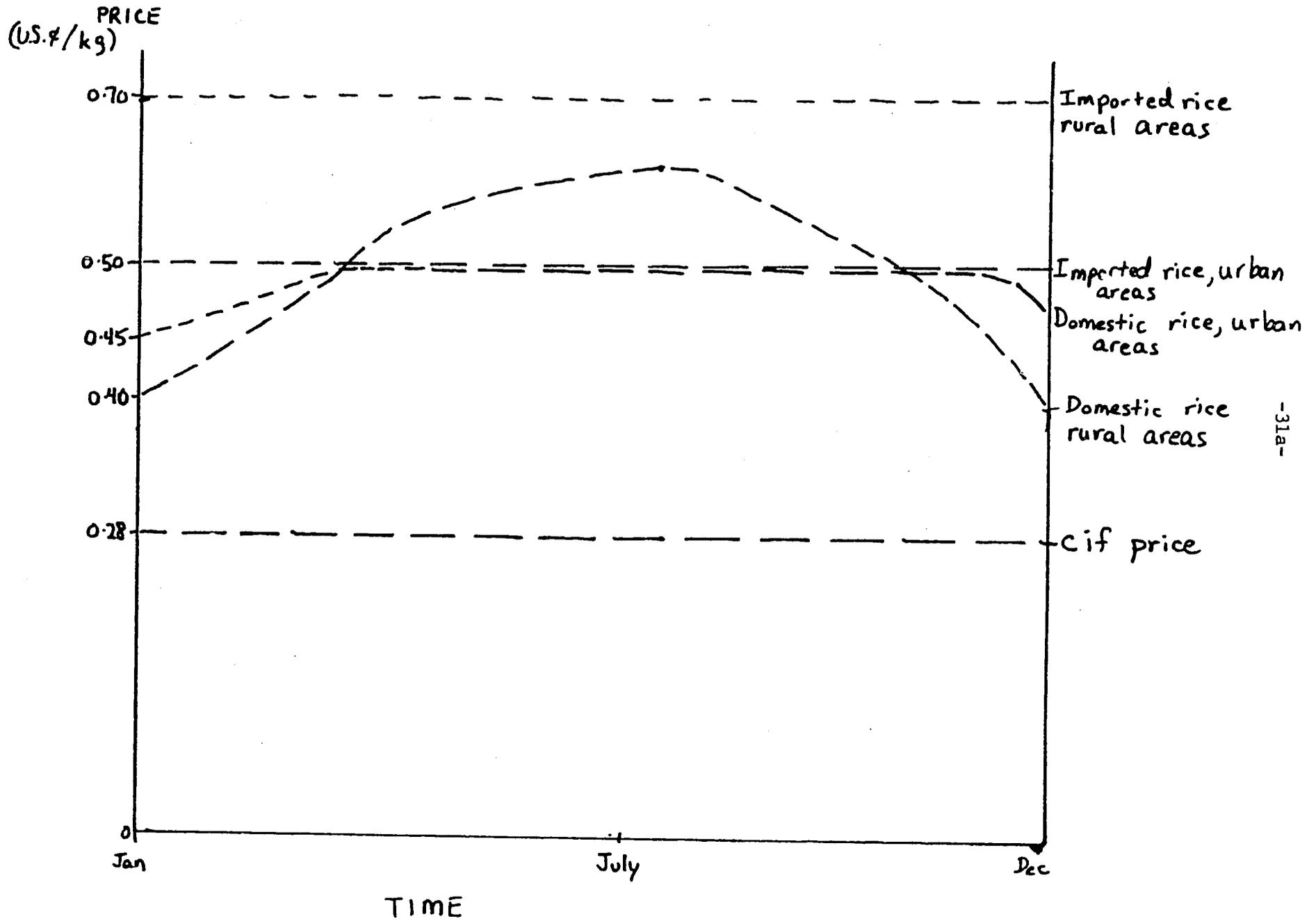
A supply elasticity of this magnitude does not imply that farmers lack price responsiveness. Relative prices of rice did increase, but the constraints of a traditional two-factor technology (land and labor), the lack of access to profitable new technologies, and severely restricted capital markets can be important constraints on the shape of an aggregate supply curve. The result of price policy under these conditions is inflation rather than increases in real output. Although nominal rice price movements were partly offset by an 80 percent increase in the non-food price level during the 1970-76 period, rural unskilled wage rates doubled during this time while land remained an essentially free resource. Thus much of the potential impact of positive price policy was absorbed by input price inflation.

By 1977, rice markets had become substantially more integrated as rural prices were now more in line with urban prices. In fact, for much of the year, and probably on an annual average basis, retail rice prices in rural areas were above prices in urban areas, a reversal of historical relationships. Chart 1 summarizes these price relationships. Prices for imported rice ran the pricing system. Constant throughout the year, they promoted flows of domestic rice to urban areas only in the post-harvest months. Imported rice prices acted as a ceiling on rural area prices by limiting potential increases in the price of domestic rice on rural markets.

Government Policy and Income Distribution

Numerous references have been made to the disparities between rural and urban income levels (3, 29). But in contrast to historical patterns, it

Chart 1.--Retail Prices, 1977



-31a-

appears that in the 1970s government policies benefitted rural areas. Rural areas made substantial gains in income relative to the urban sector during the 1972-76 period. Information contained in the National Development Plan and publications on national accounts estimation (23, 27, 28, 29) can be used to specify, in general terms, the nature of the rural-urban linkages, and to estimate rural-urban income differentials.²⁴

The rural population's contact with the monetary economy comes primarily through the sectors of Mining and Commercial Agriculture and Forestry, which serve as major sources of off-farm employment. The mining sector is a foreign enclave economy, connected to the rest of the economy through taxes (5-7 percent of sector GDP) and wage payments (15 percent of sector GDP). The Commercial Agriculture sector includes plantations of rubber, coffee, cocoa and oil palm, forestry concessions, export fishing firms, and large-scale poultry farms. Rubber production alone accounts for 60 percent of the GDP of this sector; wage payments absorb 40 percent of GDP originating in rubber. All wage payments of the mining sector and 40 percent of the commercial agriculture GDP are allocated to the rural sector. This assumption overestimates rural income somewhat, since some of the wage payments in mining accrue to urban dwellers and rubber is more labor intensive than the other industries in the commercial agriculture sector, and thus rural-urban income differentials will be underestimated. Finally, absolute urban incomes are distorted by the inclusion of concessional income in urban income figures.²⁵ Concessions (primarily timber, rubber, and iron-ore) provide about 50 percent of monetary GDP. The urban population benefits from this income primarily through taxes (about 7 percent of sector GDP), the remainder accruing to expatriates and foreign sources.

Results of these calculations are presented in Table 7. Real incomes in urban areas fell by 25 percent between 1972 and 1976, while

Table 7.--Income Distribution*

	Urban		Rural	
	1972	1976	1972	1976
Monetary sector (<u>million \$</u>)				
Agriculture	2.7	5.6	15.3	32.2
Mining	9.9	12.9	21.3	27.7
Other sectors	191.9	260.0	--	--
Traditional sector (<u>million \$</u>)	--	--	71.9 ^a	143.9
Total (<u>million \$</u>)	204.5	314.5	108.5	203.8
Income per capita (<u>\$</u>)	686	888	95 ^b	168
Real income per capita				
(1972 prices)	686	516	95	98

*Data are from Liberia, Republic of, Ministry of Planning and Economic Affairs, Estimates of Domestic Product at Current and Constant 1971 Prices, 1964-1973 and Quarterly Statistical Bulletin of Liberia-Summary for 1976, Monrovia, 1975 and 1977, respectively.

^aThis differs from official estimates due to revisions in the estimation of the value of rice production. Based on data presented in this study, 1972 rice output is valued at \$31.5 million rather than the \$19.7 million presented in official estimates.

^bvan Santen, in two micro-surveys of Foya and Gbarnga, estimated per capita incomes at \$54 and \$83, respectively (11, 12). van Santen evaluated rice at a farm gate price of \$132/mt rather than at rural retail prices of \$220/mt. If the higher price is used, van Santen's estimates become \$70 for Foya and \$103 for Gbarnga.

real incomes in rural areas remained constant. As a result, urban to rural nominal income differentials declined from 7 : 1 to 5 : 1 during this period. Thus, in a period of strong inflation between 1972-76, when the economy experienced a 72 percent increase in the CPI, government policy was able to maintain rural sector incomes.

Rice price policy played an important role in maintaining the purchasing power of rural inhabitants. Forty percent of the increase in rural income during this period was due directly to the decision to maintain high rice prices through the variable levy system.²⁶ Table 8 presents some summary estimates of the impact of rice price policy on real incomes of the rural and urban sectors. Most of the income transfers occurred between rural consumers and rural producers; this accounts for the stability of rural real incomes observed in Table 6. These figures also illustrate the importance of revenue-generating effects of the tariff.

Real income transfers from urban consumers were directed primarily into government coffers rather than toward rural producers because imports continued to dominate urban consumption patterns. In 1977, with the variable levy at \$144/mt due to declines in world prices, the difference between urban-government and urban-rural transfers on rice expenditures increased even further.

A final area of welfare loss resulting from the rice price policy is the impact on consumer welfare of a real price change. These are not incorporated in the estimates of Table 7 due to the uncertainty of estimation of the critical parameter--the price elasticity of demand. But even at the relatively large elasticity of -0.9, the equivalent income effect of the changes in rice prices is relatively small; estimates of real per capita income presented in Table 7 fall from \$98 to \$93 for rural inhabitants and from \$516 to \$514 for urban dwellers.

Table 8.--Impact of Rice Price Policy on Real Incomes, 1972-76*

Type of transfer	Total transfer (million \$)
Income transfers ^a	
Urban consumers-rural producers ^b	1.5
Rural consumers-rural producers	22.1
Urban consumers-government ^c	2.4
Rural consumers ^{c,d} -government	0.6
Consumer welfare losses ^e	
Rural consumers	6.4
Per capita (\$)	5.0
Urban consumers	0.6
Per capita (\$)	2.0

* Data are from the text; Wesley Joseph, "Liberia," in J. Caldwell (ed.), Population Growth and Socioeconomic Change in West Africa, Columbia Press, New York, 1975; Republic of Liberia, Ministry of Planning and Economic Affairs, 1974 Census of Population and Housing, Monrovia, 1976; Eric A. Monke, "Staple Food Commodities, Government Intervention, and International Trade: The Case of Rice," Ph.D. Dissertation, Stanford University, Stanford, 1979.

^a 1976 transfers are estimated under the following estimates of consumption patterns:

	Urban	Rural
Per capita consumption (mt)	0.107	0.107
Imports (mt)	29,000	8,000
Domestically produced (mt)	9,000	122,000

^b Real producer prices are estimated to have increased by 75 percent above 1972 prices of \$220/mt.

^c Estimates for consumer-government transfers are based on a 1976 tariff of \$82/mt.

^d Rural consumption of imports comes primarily through subsidized sales by the rubber and mining concessions. Concessional imports are about 15 percent of annual imports.

^e Excess burden consumer welfare losses are calculated in terms of the Hicksian equivalent variation measure. Price elasticity of demand is assumed as -0.9, the income elasticity is assumed as 0.5. The price elasticity is the most important parameter in empirical estimation. The more price-inelastic the demand, the lower the value of the welfare loss. These estimates are not included in Table 6.

CONCLUSION

The most important conclusion to be drawn from this analysis is that prices work. The ability of the government to control price levels in both rural and urban areas through trade restrictions has been the major success of Liberian rice policy.

Government price policy may have accomplished much more than it intended. It has been successful in encouraging a much closer integration of rural and urban rice markets and has effectively transmitted real price increases to rural producers. Although rice as a cash crop is still economically unattractive to a majority of producers, market participation nearly doubled in only five years. In the face of severe technological and infrastructural constraints, the price response of farmers was impressive.

Implementation of the variable levy system for imported rice has allowed the government to encourage rice production through transfers from consumers to producers rather than through direct government subsidization of producers, thus sidestepping potential constraints on the government budget that might result from direct production subsidies. Although government finances are relatively secure in Liberia, the government has largely avoided policy alternatives that are likely to require subsidization, such as production projects, and preferred policies that result in revenue generation, such as the variable levy. This suggests that budgetary considerations are of critical importance to government planners.

The second major point of this analysis is that, while prices are important, they are not enough. Increases in rice marketings since 1974 have been limited in the aggregate because the effects of rising input prices have eroded much of the impact of rice price increases. Government attempts

to introduce technological change in rice production have met with very limited success, as direct interference in rural production has proven to be far more complex and demanding of government resources (both financial and human) than import price manipulation. The inability to relieve the institutional constraints of input delivery and credit availability as well as the erratic delivery of technical and mechanical services have done little to create enthusiasm among farmers. In addition, the basic problems of transportation availabilities to encourage marketing and of the size and quality of the extension service to provide adequate followup services remain unsolved. But most importantly, the new technologies are less privately profitable than alternative cash crops. To date, therefore, there has been little incentive for the farmer to adopt much more complex, and under Liberian conditions, often riskier, rice technologies.

Given the limited response to substantial levels of price protection of output, government disinterest in maintaining substantive producer incentives through input subsidization, and the limited profitability of the existing technologies to farmers, major increases in rice production do not seem likely, at least in the short run. The available new techniques may replace traditional techniques of production for home consumption, but they are not likely to result in sizeable increases in rice marketings.

Over the longer run, the development of the rice sector depends on three factors. The first, and most critical, centers on the creation and dissemination of economically attractive new technologies, i.e., the ability to increase production efficiency. Rainfed technologies have received little research and development and the potential for new technologies is largely unknown. The second critical area involves future investment in infrastructure. Improved transportation facilities will undoubtedly increase rice marketings

as more farmers become integrated into the commercial sphere. The adoption of new technologies will require both an effective extension service and improvements in financial capital markets to allow farmer access to improved inputs. But the chief beneficiaries of these developments are likely to be the more profitable alternatives of coffee, cocoa, and sugarcane. The final area involves the future behavior of rice prices. It is unclear whether the relative gap between domestic and world rice prices will be maintained over time or be allowed to erode if world prices rise. The relationship between domestic prices of rice and inputs will be an important determinant of future production response. Failure on the part of government planners to maintain this relationship in its current form will further shift production incentives away from rice.

Modern rice policy has been most affected by, and often the result of, a search for new sources of economic growth. That policies should result in benefits to farmers and thus improve income distribution was not central to the government's decision-making process as evidenced by the willingness to explore technologies of any scale, regardless of distributional impact. Rather, the emergence of small-scale techniques has been based on economic superiority relative to their large-scale counterparts. But as the companion paper (8) to this analysis suggests, these new techniques will increase the growth of rice output largely through increases in the efficiency of production for home consumption. This will free resources for other income-generating activities which, under current conditions, will not include much marketing of rice. Opportunities for growth of the Liberian agricultural economy lie with small farmers, but in the absence of effective new technologies, rice appears an unlikely source of much agricultural growth.

FOOTNOTES

¹This figure may be somewhat underestimated because the household size in the survey, 5.4 persons, is below the estimates of the microeconomic research of Currens, van Santen, and McCourtie.

²More detail concerning the technologies of the rice economy is contained in the companion analysis to this essay (8).

³The farm-gate price for paddy is largely irrelevant because there is relatively little trade in paddy.

⁴The national rice survey reports that for half the participants, this involved at least a one-hour trip (17).

⁵Currens estimated sales of 5 kg/seller for the Lawalaza market in Lofa County (1, p. 159); van Santen estimated sales of 14 kg/seller for the Kolahun market, one of the largest of Lofa County.

⁶Kolahun, a major Lofa market, for example, averaged 102 traders and sales of 2.3 mt rice/day during the peak season, and only 69 traders and 0.8 mt rice/day during March-October (10).

⁷The extension service was created in 1960 to "provide technical assistance and help the small-holder." In 1977 there were 85 agents and aides, or one worker/1,500 households. In general, the quality of workers is low. Average schooling is less than nine years, as past openings were often filled on the basis of political strength rather than ability (6). Few receive organized training from the Ministry of Agriculture. In addition, lack of transportation and support funds (84 percent of the extension service budget is spent on salaries), ineffective program design (the Improved Upland program,

for example, makes farmer visits for one year only), late salary payments to extension workers, and logistical problems of obtaining necessary inputs at appropriate times have further hampered the morale and effectiveness of the extension service.

⁸ See The National Socio-Economic Development Plan (29). Transportation data for 1973 indicated a total of 23,000 vehicles, including 9,200 buses and trucks and 4,600 taxis. Most of the transport business is of the single vehicle owner-operator variety.

⁹ Similar problems have been encountered in Asian countries, where varietal innovation has increased the range of grain shapes and sizes. Examination of 18 milled rice samples in Liberia revealed only five to contain pure varieties.

¹⁰ High transport costs act to reduce rapidly the farmer returns from the price support system. But in Voinjama (Lofa County) farmers have organized truck-chartering and own-delivery systems, and currently deliver 75 percent of the paddy to the mills, thus bypassing all middlemen. The result is that the Voinjama mill is responsible for 50 percent (1,500 mt) of LPMC paddy purchases. On the other hand, at Ganta this system has not developed. Farmers directly deliver only 20 percent of total purchases of 700 mt; the farmers that do deliver directly are relatively large producers whose average transaction volume is 1.9 mt. Transactions with agents averaged 11.2 mt, suggesting that lower reported prices to farmers may reflect increased bulking costs rather than lack of competition in the rice market. These figures are based on October, 1976-January, 1977 survey data.

¹¹ Rationing is still practiced at the wholesale level when Monrovia supplies become low due to late arrivals of rice.

¹² Official prices are also established at the retail level of \$0.484/kg, but these are not strictly enforced. A standard 16 ounce blue plastic cup is distributed to market women, but dashing and shortening of the cup by scraping it on the sidewalk make standardization difficult.

¹³Based on import data for 1973 (92 percent) and 1976 (90 percent).

¹⁴The discount in the annual average price series is probably underestimated because the prices are monthly averages, while the distribution of quantities is heavily biased toward the months of December-March:

Monrovia Prices

	<u>Local rice</u>	<u>Imports</u>
1974-75 (Dec.-Mar.)	45.9	55.0
1975-76 (Dec.-Mar.)	44.6	50.6

¹⁵The total CPI increased by 72% over this period. These numbers may differ from those referred to elsewhere in the text due to different year coverage.

¹⁶Quantities used in this calculation represent averages for 1971-72 and 1975-76 to reflect annual carryover. The elasticity estimates are minimum in absolute terms since the cross-price elasticities included in this estimate are positive.

¹⁷This estimate is based on monthly sales data for imported rice for the Abi-Djaoudi firm and LPMC for the 1975-76 year. These two firms accounted for 70 percent of total imports. Average monthly sales were 57,621 cwt bags. Average monthly sales for April-November were 70,248 cwt bags and this is used as the consumption standard for urban areas (imported rice is consumed almost exclusively in urban areas, and only in years of extreme shortfall are there any movements of imported rice to rural markets). Although there are no formal laws to restrict the flows of imports, a de facto segregation occurs due to understandings between the government and major importers not to make large sales to the major producing areas. Thus imported rice must be transported in small quantities with high transport costs and rural prices for imported rice are on the order of \$0.15/kg greater than in Monrovia. Average monthly sales for the December-March period are 28,926 cwt bags. As prices are constant throughout the year, these figures suggest that 165,287 bags of imported rice are "replaced" by domestic rice. This figure is then adjusted for the fact

that the sales figures only apply to 83 percent of total imports, suggesting 8,800 mt of rice flows from rural to urban areas in the post-harvest season. The remaining 17,000 mt of total domestic marketings is distributed among rural areas and goes to urban areas as a constant flow, although shipments to urban areas are limited due to higher market prices for rice in rural areas vis-a-vis urban areas.

¹⁸ van Santen's results (11,12) found average sales of 103 kg of rice per holding.

¹⁹ This is equivalent to the output from 1 ha of upland rice or 0.6 ha of swamp rice, and implies that the larger upland farms and individually controlled swamp holdings were primary sources of marketed output. Data from one study (7) found that 8 percent of upland farms, representing 9,000 upland rice holdings, were greater than 5 ha in size. These large farms were usually operated by village elders who had claims on voluntary labor or by farmers with the financial ability to hire. Another survey (2) found that rice from personal farms run primarily by women was a major source of marketed output. Swamp rice holdings totalled 10,000.

²⁰ The number of total holdings increased by 35 percent over this period. The number of upland rice holdings increased by 34 percent from 96,000 to 129,000, while swamp holdings increased by 37 percent from 9,500 to 13,000.

²¹ Approximately 100 new mills began operation between 1973 and 1976.

²² Micro-economic production data were not available for 1976-77, necessitating the use of less direct indicators of marketings. Rubber roller mills compose 73 percent of total small scale mills, and sales of rubber rollers for 1976-77 were 640 prs. With a capacity of 35 mt/paddy pair, and assuming non-rubber roller mills process the same amounts of paddy as rubber roller mills, annual small scale mill throughput is 31,000 mt paddy. Government mills purchased 3,000 mt paddy. Handpounding sales are estimated from government purchase data. Government mills purchase handpounded

rice for \$0.44/kg throughout the year, but purchases occur only in December and January. For 1976-77, 200 mt of handpounded rice were purchased, or about 15 percent of government paddy purchases over this period. Handpounded sales can thus be estimated at 5,000 mt of paddy, giving total rice marketings of 39,000 mt paddy, or about 26,000 mt rice.

²³See (17). Another potential explanation is that larger farmers expanded a great deal. It is also possible that a substantial number of farmers began sales on a very small scale, perhaps substituting cassava for rice in their own consumption patterns. But cassava prices have increased at roughly the same pace as rice prices, thus negating substitution incentives. Retail rice prices increased by 88 percent in Monrovia between 1972-76, from 12.9¢/lb to 24.2¢/lb, while cassava prices increased by 119 percent, from 3.2¢/lb to 7.0¢/lb. During the 1971-76 period, rice prices increased by 74 percent, cassava prices by 79 percent.

²⁴In the estimation of rural and urban per capita incomes, an initial approach is to take a dual economy view and attribute non-market sector income to the rural population and monetary income to the urban population. This is clearly a simplified approach as it ignores linkages between the rural sector and the monetary economy (although sales of small-farmer production are included in subsistence GDP).

²⁵Including concessional income in the estimation of urban income leads to per capita estimates of \$1,126 and \$1,415 for 1972 and 1976, respectively.

²⁶The value of rice production during this period rose from \$31.5 million to \$70.8 million (evaluated at rural retail prices of \$220/mt and \$488/mt, respectively). These figures underestimate the actual effect of rice policy on incomes since they neglect the effects of rice price increases on unskilled wage rates (rice, as the staple food, acts somewhat as a wage good) and thus on the costs of other commodities produced in the rural economy.

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Table A-1.--Population of Liberia*
('000)

Year	Total		
	Total	Urban	Rural
1965	1,236	215	1,021
1966	1,263	225	1,038
1967	1,291	237	1,054
1968	1,319	248	1,071
1969	1,348	260	1,088
1970	1,378	272	1,106
1971	1,408	285	1,123
1972	1,439	298	1,141
1973	1,471	312	1,159
1974	1,503	325	1,178
1975	1,536	339	1,197
1976	1,570	354	1,216

* Liberia, Republic of, Ministry of Planning and Economic Affairs, 1974 Census of Population and Housing, 1976.

Liberia, Republic of, Ministry of Planning and Economic Affairs, Demographic Annual of the Population Growth Survey, 1971, 1973.

Joseph, Wesner, "Liberia," in Population Growth and Socioeconomic Change in West Africa, ed. by John Caldwell (New York: Columbia), 1975.

A population census was taken in 1974. Urban population is defined as cities with more than 10,000 inhabitants, estimated at 325,000. Population of cities with more than 2,000 inhabitants is 438,000.

Total annual population growth rate is estimated at 2.2 percent. Birth rate is 50/1,000, estimated by the Population Growth Survey. Death rate is 28/1,000 estimated by W. Joseph. No net immigration (Population Growth Survey). A population census was performed in 1962, but data are not used due to suspected underestimation, particularly of the urban population.

Table A-2.--Gross Domestic Product of Liberia*

Year	Gross domestic product (Million U.S.\$)						Per capita gross domestic product (U.S.\$)		Percent share in GDP	
	Current prices			Constant prices (1971)			Current prices	Constant prices	Agriculture	Rice
	Monetary	Subsistence	Total	Monetary	Subsistence	Total				
1965	223.5	56.3	279.8	225.5	60.9	286.4	226	232	29.6	9.7
1966	243.3	55.3	298.6	248.8	62.9	311.7	236	247	27.4	9.3
1967	259.4	60.6	320.0	267.1	64.0	331.1	248	256	26.9	9.2
1968	276.9	60.4	337.3	279.2	65.1	344.3	256	261	25.6	8.5
1969	309.8	62.2	372.0	303.6	66.6	370.2	276	275	26.6	7.9
1970	323.1	68.9	392.0	324.8	67.8	392.6	284	285	27.3	8.0
1971	342.5	69.6	412.1	342.5	69.6	412.1	293	293	26.1	7.6
1972	372.2	71.9	444.1	354.0	70.5	424.5	309	295	24.2	7.1
1973	375.2	98.0	473.2	343.4	76.2	419.6	322	292	32.2	10.3
1974	459.2	n.a.	n.a.	356.6	n.a.	n.a.	n.a.	n.a.	-	-
1975	558.1	n.a.	n.a.	343.5	n.a.	n.a.	n.a.	n.a.	-	-
1976	560.8 ^a	145.9	704.7	354.3	78.6	432.9	449	276	31.3	10.0

* Liberia, Republic of, Ministry of Planning and Economic Affairs, Estimates of Domestic Product at Current and Constant 1971 Prices, 1964-1973, 1975. Liberia, Republic of, Ministry of Planning and Economic Affairs Quarterly Statistical Bulletin of Liberia (summary for 1976), 1977.

^aPreliminary.

GDP figures for the monetary sector for 1965-72 are based on data presented in Estimates of Domestic Product at Current and Constant 1971 Prices; for the years 1973-76, The Quarterly Statistical Bulletin, 1976 Summary is used.

Subsistence sector GDP estimates for 1965-73 are based on data contained in Estimates of Domestic Product at Current and Constant 1971 Prices, although rice production is recalculated based on production estimates presented in Table A-3 and 1971-72 price of \$220/mt rice. The price index presented in the document is used to determine prices for preceding years. 1976 GDP in constant 1971 prices is estimated to increase in proportion to monetary sector increases (increases in terms of current prices for the two sectors are nearly identical).

Share in GDP agriculture includes both monetary (Agriculture, Forestry and Fishing) and subsistence sector contributions.

Table A-3.--Area Planted, Yield, and Production of Major Crops, Liberia*

Year	Rice			Cassava			Coffee			Cocoa		
	Area (ha)	Yield (mt/ha)	Production (mt)									
1965	159,000	1.2	191,000				11,000	0.30	3,200	2,000	0.34	700
1966	162,000	1.2	194,000				27,000	0.30	8,700	4,400	0.34	1,500
1967	163,000	1.2	196,000				13,000	0.30	4,000	5,000	0.34	1,700
1968	167,000	1.2	200,000				19,000	0.30	5,600	5,300	0.34	1,800
1969	169,000	1.2	203,000				15,000	0.30	4,600	3,200	0.34	1,100
1970	172,000	1.2	206,000				17,000	0.30	5,100	6,200	0.34	2,100
1971	175,000	1.2	210,000				18,000	0.30	5,300	7,400	0.34	2,500
1972	178,000	1.2	213,000				11,000	0.30	3,300	7,600	0.34	2,600
1973	190,000	1.2	228,000				15,000	0.30	4,600	8,800	0.34	3,000
1974	201,000	1.2	249,000				13,000	0.30	3,800	9,100	0.34	3,100
1975	191,000	1.2	229,000	31,000	1.4	43,400	14,000	0.30	4,200	9,500	0.34	3,200
1976	200,000	1.2	245,000	30,000	1.8	54,000	16,000	0.29	4,600	8,500	0.34	2,900

* Liberia, Republic of, Ministry of Agriculture, Production Estimates of Major Crops, 1976, 1977.

Liberia, Republic of, Ministry of Agriculture, National Rice Production Estimates, 1975, 1976.

Liberia, Republic of, Ministry of Planning and Economic Affairs, Quarterly Statistical Bulletin for Liberia (1975 summary), 1976.

Production year refers to earlier year of crop year. For example, 1965 production is from 1965-66 crop year.

Production for crops for years 1974-76 is taken from National Rice Production Estimates, 1975 and Production Estimates of Major Crops, 1976. 1976 data is modified as indicated in the text. Acreage estimations for years prior to 1974-76 are assumed to have changed in proportion to the growth of farm population (1.6 percent per year according to the national survey estimates). Average acreage and yields for 1974-76 are used as a basing point for the historical estimates. Average yield - 1974-76 - 1.2mt/ha.

Area under cultivation - 1974-76 = 197,000 has. An exception to this rule is made for the years 1972-74, when a real price increase of 75 percent is assumed to have increased total hectareage by 8 percent or 17,000 hectares (assuming a supply elasticity of 0.1). Increases in marketed supply were substantially greater than this.

Cassava, cocoa and coffee production for 1975 and 1976 are based on official government estimates presented in Production Estimates of Major Crops, 1976. Area refers to productive area, rather than planted area. Estimates for 1965-74 are inferred from export data (Quarterly Statistical Bulletin for Liberia, 1975 Summary).

Table A-4.--Selected Prices of Rice, Liberia*
 ((U.S.\$)/kilogram milled rice)

Year	c.i.f.	Retail, Monrovia				Wholesale, Monrovia		Producer, official	
		Official		Market		Official Imported	Market	Paddy	Milled equivalent
		Domestic	Imported	Domestic	Imported				
1965	0.19			n.a.	n.a.				
1966	0.16			n.a.	n.a.				
1967	0.19			0.290	0.290				
1968	0.19			0.299	0.286				
1969	0.19			0.317 ^a	0.317				
1970	0.20			0.315 ^a	0.315				
1971	0.18			0.299 ^a	0.299	0.217	n.a.	0.110	0.164
1972	0.18			0.308	0.275	0.217	n.a.	0.110	0.164
1973	0.27			0.444	0.475			0.154	0.230
1974	0.46			0.541	0.552	0.528	0.528	0.220	0.328
1975	0.44	0.484	0.484	0.506	0.546	0.475 ^b	0.475	0.264	0.394
1976	0.34	0.484	0.484	0.488	0.508	0.475	0.475	0.264	0.394

* Liberia, Republic of, Ministry of Planning and Economic Affairs, External Trade Statistics, various years.

^aData for 1969-71 represent an average of imported and domestic prices.

^bChanged in mid-year.

C.i.f. prices are average unit values, obtained by dividing the total value of imports by the total quantity. Imports are currently white rice, 35 percent broken.

Official retail and wholesale prices come from government sources (personal communication).

Market retail prices were provided by the Price Statistics Division, Ministry of Planning and Economic Affairs.

Market wholesale prices were provided by LPMC and rice store owners.

Official paddy prices were provided by LPMC, and converted to milled equivalent prices at a milling ratio of 0.67.

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Table A-5.--Selected Retail Prices of Major Foods, Liberia*
(U.S. cents/kilogram)

Year	Consumer price index (1964=100)				
	Total	Food	Cassava	White bread	Plantain
1965	102.2	101.6	7.5	58.7	18.7
1966	104.6	106.8	5.3	58.7	18.3
1967	110.4	108.3	8.1	58.7	19.4
1968	114.3	106.1	7.7	58.7	15.2
1969	125.3	118.7	6.8	58.7	15.8
1970	126.0	120.2	9.2	58.7	16.5
1971	126.1	109.0	8.6	58.7	18.0
1972	131.0	109.0	7.0	58.7	17.6
1973	156.6	141.9	11.0	65.7	21.8
1974	187.2	179.4	16.3	83.3	26.2
1975	212.5	207.0	14.3	93.9	35.1
1976	225.3	205.3	15.4	93.9	33.4

* Liberia, Republic of, Ministry of Planning and Economic Affairs, Quarterly Statistical Bulletin of Liberia (summary for 1976), 1977.

Liberia, Republic of, Ministry of Agriculture, Statistical Handbook, Republic of Liberia, 1976.

The consumer price index data are taken for The Quarterly Statistical Bulletin of Liberia, Summary for 1976 for the years 1970-76. Data for 1965-69 are drawn from Ministry of Agriculture, Statistical Handbook, Republic of Liberia. The weights and selected items were derived from a family expenditure survey conducted in Monrovia in 1963 among a sample of wage earners and clerical employees households of two or more persons with monthly incomes not exceeding \$250. The weights were revised according to an additional survey conducted in 1964.

Category	All Items	Food	Drinks and tobacco	Fuel and light	Clothing	Household goods
Group weight (%)	100.0	34.4	5.7	5.0	13.8	6.1
Number of items	79	32	6	3	16	7
Category	Health, personal care and services			Rent	Miscellaneous	
Group weight (%)	11.4			14.9	8.7	
Number of items	9			1	7	

Retail prices are taken from Quarterly Statistical Bulletin of Liberia, Summary for 1976.

Table A-6.--Rice Availability and Consumption, Liberia
('000mt, unless otherwise indicated)

Year	Production	Availability			Net availability	Consumption Per capita (kg)
		Changes in stocks	Seed and losses	Net imports		
1965	128	n.a.	18	33	143	116
1966	130	n.a.	18	46	158	125
1967	131	n.a.	18	34	147	114
1968	134	n.a.	18	46	162	123
1969	136	n.a.	19	28	145	108
1970	138	n.a.	19	49	168	122
1971	141	n.a.	20	54	175	124
1972	143	n.a.	20	42	165	115
1973	143	n.a.	21	46	175	119
1974	153	-3	22	34	168	112
1975	166	0	23	31	174	113
1976	153	0	22	37	168	107

Paddy production is converted to rice equivalent at a milling ratio of 0.67, based on a milling survey of Liberia (1977) and a handpounding survey for Sierra Leone by D. Spencer (1976). Production year refers to later year of crop year. For example, 1965 production is from 1964-65 crop year.

Changes in stocks represents stocks at the end of the year minus stocks at the beginning of the same year. Figures for 1965-73 are not available.

Losses are 10 percent of paddy production. Seed use is 52 kilograms of paddy per hectare. Seeds and losses are converted to rice equivalents at a milling ratio of 0.67.

Net availability is defined as production minus seeds and losses, minus changes in stocks, plus net imports.

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