

PN-AAM-883
ISN=29380

- RESEARCH REPORT



*John
Bedman*

Public Distribution of Foodgrains in Kerala — Income Distribution Implications and Effectiveness

by P. S. George



March 1979

**PUBLIC DISTRIBUTION OF FOODGRAINS IN KERALA—
INCOME DISTRIBUTION IMPLICATIONS AND
EFFECTIVENESS**

P. S. George

**Research Report 7
International Food Policy Research Institute
March 1979**

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Library of Congress Cataloging in Publication Data

George, Poykayil Simon, 1939—

Public distribution of foodgrains in Kerala.

(Research report — International Food Policy Research Institute; 7)

Bibliography: p. 65.

- 1. Food supply — India — Kerala. 2. Grain trade — India — Kerala.**
 - 3. Income distribution — India — Kerala. I. Title. II. Series:**
- International Food Policy Research Institute. Research report —
International Food Policy Research Institute; 7.
HD9016.I43K474 362.5 79-14715**

ISBN 0-89629-008-5



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FOREWORD

A number of developing countries, particularly in South Asia, use large-scale public food distribution programs intended to meet the minimum food requirements of low income people. Evidence that agricultural growth alone may fail to meet the food needs of the poor and may itself be contained by lack of effective demand has brought increasing attention to the South Asian experience with food distribution programs. Questions have arisen as to which groups are reached, the degree to which food distributed through the systems represents a net addition to consumption, the impact these programs have on food production and other sectors of the economy, and the cost and the efficiency of these programs when compared with the alternatives such as direct income transfers and more narrowly targeted schemes.

While the reliability and efficiency of public distribution systems depend on local conditions to a great extent, experience from systems elsewhere can provide guidelines for planning and implementation of similar programs. To

this end, the study of the public distribution system in Kerala by P. S. George is valuable. His exposition is of particular interest because of its relatively long history of operation; its broad coverage, particularly in rural areas; and its interaction of procurement and distribution policies.

This study is part of a set of studies initiated by the International Food Policy Research Institute dealing with various aspects of food subsidy/ration systems. A study based on detailed surveys of families by Shubh Kumar was published in January 1979 and an analysis by Raisuddin Ahmed of food consumption policies in Bangladesh is in press. Studies on the experience of Sri Lanka and a comparative analysis of the South Asian systems are forthcoming.

John W. Mellor

Washington, D.C.
March, 1979

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PREFACE

The growing concern of national and international organizations over eradication of the hunger and malnutrition prevalent among low income consumers in many developing countries has generated a sense of urgency about analyzing the scope and effectiveness of specific policy measures available for increasing the consumption levels of the poor. In a few countries in South Asia, target-oriented public distribution systems for foodgrains are important policy measures used to supply foodgrains to target groups.* Since the operation of these public distribution systems involves procurement from local and international markets, movement restrictions, and distribution through fair price shops at subsidized price levels, public distribution has a major impact on a number of elements of the national economy. Public distribution can be both a step toward economic growth and a step toward achieving some level of equity in food consumption.

The procurement and distribution arrangements for public distribution of foodgrains has an impact on income redistribution among farmers and consumers. Supplying certain food items to targeted groups at price levels below the open market rate helps ensure a minimum food consumption standard for those target groups. However, the effectiveness of such a system is often questioned because of its potential impact on the consumption level of the consumer target group, its impact on other sectors of the economy, its cost, and its compatibility with a direct transfer instead of price subsidies.

This study addresses some of these

issues by analyzing the public distribution of foodgrains in the state of Kerala in India, where a comprehensive distribution system has existed for the urban and rural areas for more than 25 years. The analysis includes the factors influencing ration offtake in Kerala; the distribution of benefits among consumers belonging to different income groups; the impact of rationing on consumption levels of low income consumers, gains to the producers and consumers in the state, and income redistribution; and the relative efficiency of public distribution and income transfer.

By examining the public distribution system in Kerala, this study attempts to provide useful information about its viability and effectiveness in the context of Kerala's economy. It also provides some generalizations, particularly in terms of the factors which account for successful planning and implementation of public distribution systems.

I am grateful to Dr. James Gavan and Dr. John Mellor for very stimulating discussions on a number of issues covered in the paper and to Raisuddin Ahmed, K. L. Bachman, Paul Isenman, Dharm Narain, Leonardo Paulino, J. S. Sarma, Peter Timmer, Alberto Valdes, and Juan Zapata for useful comments on an earlier draft of the paper. I thank Mr. P. M. Abraham IAS and Mr. George Mathai IAS for providing data on food distribution in Kerala, Khai Nguyen for his excellent statistical assistance, Ruth Rounds for her efficient secretarial assistance, and Barbara Barbiero for her most helpful and constructive editorial work. I alone assume responsibility for the contents.

* While the public distribution of foodgrains in some countries covers only the urban areas, the public distribution system in Sri Lanka and the state of Kerala in India covers both urban and rural areas.

1

SUMMARY

This study analyzes the operation of the public distribution system for foodgrains in Kerala, a southern state in India. Kerala's public distribution system, which reaches about 97 percent of the population in both urban and rural areas, is reputed to be the best public distribution program in India. The arrangements for the public distribution of foodgrains in the state include compulsory procurement of paddy from farmers by using a graded levy system, movement restrictions for foodgrains from outside the state, importation of grains by the state government from the central pool, and distribution of specified quantities of grains at fixed prices to the consumers through fair price shops. Since farmers sell paddy in the open market after meeting the levy requirements and consumers buy grains from the market to supplement the quantity obtained from the fair price shops, the operation of the public distribution system in Kerala has created a dual market mechanism.

In order to understand the context in which the distribution of foodgrains in Kerala takes place, the study examined Kerala's past agricultural production, food availability, and procurement and distribution performance. The factors influencing procurement volume, organizational arrangements made for procurement and distribution, and governmental expenditure on public distribution were also analyzed. The analysis indicated that the procurement volume was mainly influenced by the gap between the open market price and the procurement price.

It also showed that the performance of the public distribution system in Kerala was influenced by the small portion of food requirement met by production within the state, large differences between the open market price and ration price, a comprehensive distribution network, flexibility in the frequency of purchases from the fair price shops, the limited quantity of grains sold through fair price shops, and the low quality of ration grains when compared with locally preferred varieties.

Using normal demand variables, the study attempted to determine the factors influencing the quantities of grain sold through ration shops. It found that the volume of ration rice sold was influenced by supply constraints and not by variables influencing consumer choice, while the volume of wheat purchases from ration shops was affected by demand variable.

The benefits of rationing derived by consumers belonging to different income groups were analyzed using a small cross section survey. Ration rice accounted for a major share of the rice consumption of consumers belonging to the low income groups.

The study analyzed the impact of rationing on the consumption levels of low income consumers, gains to the producers and consumers in the state, and income distribution. In order to determine the consumption impact, the consumption levels of rice in the absence of rationing were estimated. The estimated rice consumption levels without rationing and/or movement restrictions were lower than the existing consumption levels for all

consumers in Kerala. This level was lowest for consumers belonging to the low income groups. In the absence of rationing, consumer expenses were much higher than the gains to the producers. The sensitivity of these gains to different levels of supply elasticity indicated that the result was valid for a range of supply elasticities.

The analysis of the income distribution aspects of public distribution in Kerala showed that procurement arrangements reduced the skewness in farm income among the consumers and resulted in interregional income transfer. The gains to consumers and producers in Kerala were further delineated in terms of the movement restriction and pure rationing effects.

The study also examined the relative efficiency of public distribution over direct income transfer and concluded that, in the short-run, the objective of in-

creasing the consumption levels of the low income consumers could be achieved more effectively through rationing than it could through a general income transfer. Results indicated that rationing of foodgrains provided higher operational efficiency and political feasibility than would direct cash transfers.

The economic viability of rationing in Kerala without Central Government subsidization was analyzed under the assumption that the Kerala government obtained the entire supply of foodgrains at the international market price. Using 1973/74 to 1975/76 price levels, the analysis indicated that Kerala could support its own public distribution system. Finally, the gains in Kerala were analyzed based on changes in the retail price gap, ration quantities, share of ration quantities between supplies from within the state and imports, and government subsidy levels.

2

AGRICULTURAL PRODUCTION AND FOOD AVAILABILITY

Kerala, a state in southern India (Figure 1), is one of the most densely populated regions in the developing world. It has an area of 38.9 thousand square kilometers and a population of 21.3 million (according to the 1971 census). About 84 percent of Kerala's population lives in rural areas and 60 percent of the population is literate. During 1974/75, Kerala's per capita income measured at 1960/61 price levels was Rs. 307, which was Rs. 37 below the national average.¹

Kerala has a long tradition of providing public services in the areas of health, education, and subsidized food distribution to most of its population. It is generally believed that its public service programs have contributed to a better quality of life in Kerala, as compared with the rest of India.²

Agricultural Setting

The agricultural production pattern in Kerala is characterized by a large number of small holdings, a large proportion of

area under nonfood crop cultivation, and slow productivity growth.

During the last 25 years, agricultural production in Kerala has changed considerably. The average size of agricultural holdings in Kerala in 1970/71 was about 1.2 acres,³ while the national average was about five acres. During the last 20 years, the average size of holdings in the state decreased by half. As Table 1 indicates, while holdings with less than one acre accounted for 56 percent of the total holdings in 1953/54, they increased to more than 68 percent in 1970/71. Holdings with more than 10 acres (1 percent of the total) accounted for about 15 percent of the total operated area.

During 1975/76, Kerala's agricultural contribution to the state domestic product was 10.6 percentage points above the national average,⁴ while its cropping intensity was 20 percentage⁵ points above the average for the nation. More than 35 percent of Kerala's cultivated area supported nonfood crops.⁶ Perennial crops such as arecanut, cashewnut, coconut,

¹ See Government of Kerala, Bureau of Economics and Statistics, *Statistics for Planning* (Trivandrum: Kerala Government Press, 1977). According to the exchange rate in January 1979, one U.S. dollar = 8 rupees (approximately).

² According to physical quality of life index (PQLI) developed by the Overseas Development Council, which is based on life expectancy, infant mortality, and literacy, Kerala has a PQLI of 69 as compared to a PQLI of 41 for India.

³ 1 acre = .4047 hectares.

⁴ See *Statistics for Planning*, p. 74. The actual percentages were 52.6 percent in Kerala, 42 percent in India.

⁵ The total cropped area in Kerala was 7.5 million acres and the net area sown was 5.4 million acres. Cropping intensity was 139 percent in Kerala and 119 percent in India.

⁶ Of the total cropped area of 7.50 million acres, 4.66 million acres were under food crops and 2.83 million acres were under nonfood crops. Some of the areas under nonfood crops may not be suitable for growing food crops. Even in areas where transfer from nonfood crops to food crops is feasible, there will not be any comparative advantage in making the transfer. The magnitude of food deficiency in the state is such that a transfer alone will not make the state self-sufficient in foodgrains.

Figure 1—Location of Kerala in India



Source: Government of India, Ministry of Agriculture, *Indian Agricultural Atlas*, 3rd ed. (Dehra Dun: Map Publication Office, 1971), p. 1.

Table 1—Characteristics of operational holdings, 1953/54-1970/71

	Size of Holdings (acres)				Total
	Less than 1	1-5	5-10	Above 10	
Number of holdings	(percent)				
1953/54	55.6	32.4	6.5	5.5	100
1959/60	59.4	31.7	5.1	3.8	100
1966/67	59.7	32.2	5.6	2.5	100
1970/71	67.9	27.3	3.6	1.2	100
Area					
1953/54	8.1	24.7	14.9	52.3	100
1959/60	11.3	30.5	15.7	42.5	100
1966/67	12.4	38.3	21.2	28.1	100
1970/71	17.3	47.5	20.1	15.1	100
Average size of Holdings	(acres)				
1953/54	0.43	2.29	6.93	39.50	2.99
1959/60	0.43	2.14	6.89	25.60	2.24
1970/71	0.31	2.12	6.75	15.00	1.22

Source: Data for this table were taken from M.A. Oommen, "Land Reforms and Changes in the Agrarian Structure of Kerala Since Independence" (Trichur: University of Calicut Economics Centre, 1977) and United Nations Department of Economic and Social Affairs, *Poverty, Unemployment and Development Policy: A Case Study of Selected Issues with Reference to Kerala* (New York: United Nations, 1975), p. 71.

tea, coffee, rubber, and cardamom occupied a large portion of this area. As Table 2 shows, rice, the major food crop, accounted for about 29 percent of the cropped area in 1975/76; coconut, the next important crop, accounted for about 25 percent of the cropped area; and the third important crop, tapioca,⁷ accounted for about 10 percent of the cropped area. The changes in cropping pattern between 1952 and 1975 indicate that during this period the area under nonfood crop production increased more rapidly than the area producing food crops.⁸

Because of the number of rubber, coffee, and tea plantations and the large

area being cultivated for condiments, spices, and other perennial crops, Kerala has the lowest per capita foodgrain production in India. While the average annual per capita foodgrain production in Kerala from 1974/75 to 1976/77 was 56.8 kilograms, the national per capita foodgrain average for these years was 185.2 kilograms.

Finally, the growth rate in foodgrain production has been much smaller than the growth rate for all foodcrops in Kerala. Between 1952/53 and 1974/75 (see Table 3), foodgrain production increased by only 2.4 percent per year, while production of all food crops in-

⁷ Tapioca refers to the tropical plant with a starchy root, which is commonly known as cassava.

⁸ M.V. George, "Recent Trends in Production and Productivity in Kerala Agriculture," paper presented at the Seminar on Kerala Economy, Economics Centre, Calicut University, Trichur, 1977.

Table 2—Area, production, and yield of major crops, 1975/76

Crop	Area	Production	Yield Per Acre
	(1,000 acres)	(1,000 tons)	(kg)
Rice	2,186.9	1,365	624
Coconut	1,856.0	3,764 ^a	2,028 ^b
Tapioca	781.1	5,183	6,635
Rubber	507.6	126	248
Cashewnut	261.7	119	454
Arecanut	229.1	13,731 ^a	5,993 ^b
Tea and coffee	178.6	207	1,159
Plantain	116.6	357	3,061
Cardamom	115.2	2	18

Source: Government of Kerala, Kerala State Planning Board, *Economic Review 1976* (Trivandrum: Government Press, 1977), p. 108.

^a Million nuts

^b Nuts per acre

Table 3—Linear growth rates in area, production, and productivity, 1952/53-1974/75

	Foodgrains	All Food Crops	Nonfood Crops	All Crops
	(percent)			
Area	0.7	1.5	3.3	2.2
Production	2.4	4.7	2.7	3.9
Productivity	1.8	2.7	-0.6	1.4

Source: M.V. George, "Recent Trends in Production and Productivity in Kerala Agriculture," paper presented at the Seminar on Kerala Economy, Economics Centre, Calicut University, Trichur, 1977, p. 3.

creased by 4.7 percent per year. This was primarily because of the higher rates of growth in the noncereal crops, particularly tapioca.⁹ In addition, increased productivity contributed more to increased production during this period than did increased area, thus indicating improvement of farming techniques. However, productivity of nonfood crops during this period showed a declining tendency.

Availability of Food

Local and imported rice and tapioca are important food sources in Kerala. As Table 4 indicates, the per capita daily availability of foodgrains and tapioca in Kerala between 1971 and 1976 varied from 458 grams in 1971, to 505 grams in 1973, to 480 grams in 1976. In general, local production of rice accounted for

⁹ The yield of tapioca increased from 2,996 kg/acre in 1952/53 to 7,166 kg/acre in 1974/75. This is attributed to introduction of high yielding varieties of tapioca and improved cultural practices. See George, "Recent Trends," p. 7.

Table 4—Daily availability of foodgrains and tapioca, 1971-1976

	Per Capita Availability					
	1971	1972	1973	1974	1975	1976
	(gm/day)					
Rice from local production	157	160	159	142	148	148
Rice from imports	95	97	88	89	60	103
Imported wheat	7	10	24	29	60	29
Rice equivalent of tapioca	199	229	234	228	222	200
Total foodgrains	259	267	271	260	268	280
Total food (foodgrains and tapioca)	458	496	505	488	490	480

Source: Government of Kerala, Kerala State Planning Board, *Economic Review 1976* (Trivandrum: Government Press, 1977), p. 105.

less than one-third of the total per capita availability of food, and rice imports accounted for about one-third of the total availability of rice. The availability of rice-equivalent quantities of tapioca exceeded the availability of rice from local production. During years of low rice imports, wheat imports increased to bridge the gap between the requirements of rice and its availability.

Coconut is also an important source of the total calories consumed by the residents of Kerala. Data on this food source were included in a study conducted by the Center for Development Studies (CDS) at Trivandrum, which compared the per capita availability of total calories and their sources based on food balance sheets. The national averages for 1960/63 and the Kerala averages from 1961/62 to 1970/71 are summarized in

Table 5. (See the Appendix, Table 27, for details.) According to this study, the average per capita availability of calories in Kerala was higher than the national average (2,340 versus 2,016). However, consumer surveys¹⁰ conducted by the National Sample Survey (NSS) Organization indicate that calorie intake in Kerala was lower than the national average in 1961/62 and 1971/72.¹¹ The CDS study attributed this discrepancy to the under-reporting of consumption estimates of tapioca, coconut, and other food items in the survey.

The 1971/72 NSS survey in Kerala indicated that about 35 percent of the rural and 50 percent of the urban population in Kerala consumed less than 2,230 calories (see Table 6). The number of calories consumed by consumers with a monthly per capita expenditure of more than Rs.

¹⁰ Consumer surveys are conducted periodically by the National Sample Survey Organization, Department of Statistics, Ministry of Planning, Government of India. For a discussion on the reliability of NSS data see M.S. Ahluwalia, "Rural Poverty in India, 1956/57 to 1973/74," in *India: Occasional Papers*, World Bank Staff Working Paper No. 279 (Washington, D.C.: The World Bank, 1978), and P. S. George "Inequalities in Consumption—Some Problems in Measurement and Interpretation," IIPRI Staff Working Paper 77/33 (Washington, D.C.: International Food Policy Research Institute, 1977).

¹¹ The NSS estimates of food consumption based on the 1961/62 survey indicate that Kerala had a daily per capita consumption rate of about 1,620 calories, while the national average was 2,445. The 1971/72 figures for rural and urban areas were 2,724 and 2,539 respectively throughout India and 2,023 and 2,103 in Kerala.

Table 5—Daily per capita availability of calories and their sources, India 1960/63 and Kerala 1961/62-1970/71

	India (average 1960/63)	Kerala (average 1961/62- 1970/71)
Total calories	2,016	2,340
Share of cereals in total calories	66.7	43.0
Share of rice in total calories	52.1	91.5
Share of pulses and oilseeds in total calories	10.4	1.4
Share of tapioca, potato and sweet potato	1.3	27.1
Share of coconut kernels in total calories	0.3	10.6

Table 6—Daily calorie intake in rural and urban areas, 1970/71

Monthly Per Capita Expenditure	Rural Areas			Urban Areas		
	Number of Households	Daily Calorie Intake	Deficiency (-) Surplus (+)	Number of Households	Daily Calorie Intake	Deficiency (-) Surplus (+)
(Rs.)			(percent)			(percent)
Up to 15	19	893	-60	19	953	-58
15-21	36	1,229	-45	44	1,079	-52
21-24	28	1,716	-24	33	1,375	-39
24-28	49	1,466	-35	40	1,490	-34
28-34	79	1,900	-16	70	1,787	-21
34-43	58	2,320	+ 5	84	1,989	-12
43-55	95	2,603	+15	82	2,289	+ 2
55-75	113	2,955	+31	63	2,700	+20
75-100	56	3,614	+61	42	3,060	+36
More than 100	75	4,293	+91	102	3,907	+74
All Classes	608	2,023	-10	829	2,103	- 7

Source: Government of India, "National Sample Survey," 26th Round (National Sample Survey Organization), 1971/72.

100 in rural areas was more than four times the calorie intake of consumers with a monthly per capita expenditure of less than Rs. 15. The extent of deficiency in calorie intake for the population spending less than Rs. 15 was 60 percent of the requirements in rural areas and 58 per-

cent of the requirements in urban areas. The population with a monthly per capita expenditure above Rs. 100 had a calorie intake of about 81 and 74 percent above the requirements in rural and urban areas respectively.¹²

Thus, in Kerala, tapioca is an important

¹² If underreporting similar to that which occurred in the 1961/62 NSS survey occurred in this more recent survey, only about 20 percent of the rural population and 25 percent of the urban population may have actually had inadequate diets at this time.

source of calories and rubber, tea, coffee, and spices are important nonfood agricultural items. Although the largest portion of agricultural area is allotted to rice production, the amount of rice produced falls short of the needs of the state, making the importation of additional

quantities of rice and wheat necessary. In addition, although estimates vary, calorie consumption for most of the people in Kerala is less than the national average, with this caloric deficiency being slightly greater in the rural than the urban areas.

3

PUBLIC DISTRIBUTION OF FOOD

Public distribution of food, or rationing, is an important facet of food management operations of a number of developing countries today.¹³ Kerala's experience in public distribution has attracted the attention of a number of social scientists, both within and outside of India, and international organizations such as the United Nations.¹⁴

Public distribution of food in Kerala is undertaken at two levels. Food is provided to primary school children through a school feeding program¹⁵ and foodgrains are sold to the general public through ration or fair price shops. This study analyzes distribution through the ration shops only.¹⁶

Controlled foodgrain distribution in Kerala, as well as throughout India, was instituted during World War I.¹⁷ A major

expansion of rationing in Kerala occurred in 1964, when food shortages throughout India led to the curtailment of private interstate trade in foodgrains. The Civil Supplies Department of Kerala assumed responsibility for collecting and organizing available foodgrains and regulating their distribution through licensed ration shops. A portion of the rice distributed through the ration shops was collected from local producers using levy procurement. The Central Government provided all wheat and a large portion of rice through its domestic procurement from major producing areas and imports. The ration shops, through which the food was distributed, were linked with a chain of wholesale distributors licensed for this purpose. The costs of this rationing program are incurred by the Kerala gov-

¹³ See J. Tobin and H.S. Bouthakker, "A Survey of the Theory of Rationing," *Econometrica* 20 (October 1952): 521-553 and J. M. Davis, "The Fiscal Role of Food Subsidy Programs," International Monetary Fund Staff Paper 20 (Washington, D.C.: International Monetary Fund, March 1977).

¹⁴ A fairly comprehensive analysis of the development experience of Kerala is available in a study conducted at the Center for Development Studies, Trivandrum, on behalf of the United Nations Department of Economic and Social Affairs, United Nations Department of Economic and Social Affairs, *Poverty, Unemployment and Development Policy: A Case Study of Selected Issues with Reference to Kerala* (New York: United Nations, 1975). Also see D.R. Gwatkin, "Nutrition Planning and Physical Well-being in Kerala and Sri Lanka," paper presented at the Interiencia-AAAS Symposium on Nutrition and Agriculture, February 13-14, 1978.

¹⁵ During 1974-75, the school feeding program served 1.83 million primary school children in 8,853 schools. Food items supplied under this scheme were provided by CARE. The food received during 1974-75 was valued at Rs. 51.6 million. The Kerala government incurred a total expenditure of Rs. 5 million for the implementation of the program. (See Government of Kerala, Education Department, *Administration Report of the Education Department for the Year 1974/75* (Ernakulam: Kerala Government Press, 1976).

¹⁶ Ration shops are licensed retail outlets for the distribution of foodgrains under the rationing system.

¹⁷ For a detailed discussion on the evaluation of public distribution in India, see J. Knight, *Food Administration in India, 1939-47* (Stanford: Stanford University Press, 1954), and A. Gupta, *Public Distribution of Foodgrains in India*, Centre for Management in Agriculture Monograph No. 69 (Ahmedabad: Indian Institute of Management, 1977). Analysis of the achievement of public distribution is available in R. Krishna, "Government Operations in Foodgrains," *Economic and Political Weekly*, September 16, 1967, pp. 1695-1706, and P. S. George, "Government Intervention in Foodgrain Markets," IFPRI Working Paper 78-31 (Washington, D.C.: International Food Policy Research Institute, 1978).

ernment and the Central Government. The state government recovers most of its administrative overhead and direct costs of distribution from the margins charged at the wholesale and retail levels, while the Central Government incurs net costs in order to maintain the ration system in Kerala.

Procurement for Public Distribution

Rice for the public distribution system in Kerala comes from local procurement and imports from outside Kerala. Local procurement accounts for only a small portion of the total rice distributed through ration shops. Since the state is not a wheat growing area, the entire wheat supply comes from outside sources. Paddy is procured under the provisions of the Kerala Rice and Paddy (Procurement by Levy) Order 1966.

The different taluks¹⁸ in the state are classified into three categories based on their average yield of paddy.¹⁹ Levy rates for these three categories are fixed on a graded scale. Holdings with less than two acres of paddy area are exempted from the levy. Levy rates increase according to the size of holdings for areas with more than two acres. The levy rates prevalent during 1975/76 appear in the Appendix, Table 28.

As can be seen in Table 7, from 1966 to 1970 local procurement paddy was

about 7 percent of local production. However, during the 1970s, procurement accounted for only about 3 percent of the total production. This decrease may be explained by land reform and other activities that led to reductions in the size of holdings.²⁰ It is also possible that the Levy Order of 1966 may have increased the *de jure* subdivision of holdings.²¹

The procurement price of paddy is determined on the basis of the price level fixed by the Central Government.²² As Table 8 indicates, the procurement price during 1966/67 was Rs. 43.81 per quintal. It increased to Rs. 74 per quintal during 1975/76. In addition to the procurement price, the farmers received an incentive delivery bonus in some years. Thus the total receipt of farmers during 1966/67 was Rs. 52 per quintal. There was a major increase in the procurement price in 1967/68 to Rs. 65 per quintal and the procurement price remained at that level for six continuous years. The increase during the nine year period beginning in 1967/68 was only 14 percent.

The procurement price of paddy realized by the farmers was very much below the farm price of paddy. When the farm price of paddy was expressed as a percentage of the levy price, it varied from 139 during 1970/71 to 333 during 1974/75. During 1974/75, when the farm price of paddy increased by about 31 percent of the previous year's price level, local procurement declined from 4.3 percent to 3 percent of production (from about 81,000 to 60,000 tons).²³ In fact, even

¹⁸ For administrative purposes, the state is divided into 11 districts and each district is subdivided into taluks. (The number of taluks in a district varies between four and seven.)

¹⁹ Category A = more than 2,500 kg/hectare; Category B = 2,200-2,250 kg/hectare; Category C = less than 2,000 kg/hectare.

²⁰ According to levy records, the proportion of paddy land in holdings with more than two acres was only about 25 percent of the total holdings. Population pressures may be another reason for the reduction in size of holdings.

²¹ M.A. Oommen, *Land Reforms and Changes in Agrarian Structure of Kerala Since Independence* (Trichur: University of Calicut Centre, 1977).

²² These levels are available from various reports of the Agricultural Prices Commission in India.

²³ Throughout this study, all references to tons indicate metric tons.

Table 7—Procurement of paddy from local production, 1966/67-1975/76

Year	Total Paddy Procurement (1,000 tons)	Procurement as a Percentage of	
		Local Production	Total Ration Offtake
1966/67	93.1	5.7	7.3
1967/68	118.6	7.0	12.8
1968/69	138.0	7.3	14.1
1969/70	130.9	7.4	5.6
1970/71	114.5	5.9	9.3
1971/72	105.0	5.2	8.4
1972/73	78.1	3.8	5.9
1973/74	80.9	4.3	7.0
1974/75	60.3	3.0	5.1
1975/76	60.0	3.0	7.5

Source: Government of Kerala, Department of Civil Supplies, *A Handbook of Statistics, 1976* (Ernakulam: Kerala Government Press, 1977), p. 38

Table 8—Procurement price and open market (farm level) price, 1966/67-1975/76

Year	Procurement Price of Paddy	Incentive Delivery Bonus	Total Procurement Price	Farm Price	Ratio of Farm Price to Procurement Price
	(Rs./quintal)				
1966/67	43.81	8.19	52.0	106.76	205
1967/68	52.0	13.0	65.0	140.48	216
1968/69	56.25	8.75	65.0	111.98	172
1969/70	56.25	8.75	65.0	100.31	154
1970/71	56.25	8.75	65.0	90.53	139
1971/72	56.25	8.75	65.0	99.62	153
1972/73	56.25	8.75	65.0	119.19	183
1973/74	63.0	8.75	71.75	187.53	261
1974/75	74.0	—	74.0	246.23	333
1975/76	74.0	—	74.0	182.98	247

Source: Government of Kerala, Department of Civil Supplies, *A Handbook of Statistics, 1976* (Ernakulam: Kerala Government Press, 1977), p. 38.

when the production levels remained stationary in the mid-1970s, the procurement volume declined.

Factors Influencing Procurement

The procurement volume of paddy is influenced by a number of factors, most important of which are the gap between the open market (farm level) and the procurement prices, production levels, and administrative efforts to enforce the levy system.²⁴ Of these three factors, the first two can be analyzed with past data on production, procurement, and prices in Kerala.

For this analysis, the procurement volume of paddy from 1966/67 to 1975/76 was related to the ratio of the open market (farm level) price and the procurement price, and to production levels. The results indicated that the procurement volume declined as the open market price increased. However, procurement volume also showed a negative relationship to production levels, which can probably be explained by the changes in distribution of holdings. The estimated equations for this analysis are:²⁵

$$y_1 = 299.58 - .333x_1 - .105x_2; R^2 = .68,$$

(t values) (-3.35) (-1.69)

$$\log y_1 = 20.46 - .841 \log x_1$$

(t values) (-4.18)

$$- 1.606 \log x_2; R^2 = .76,$$

(-2.29)

where:

y_1 = procurement volume of paddy, (1,000 MT),

x_1 = ratio of farm level prices to procurement price, and

x_2 = production of paddy (1,000 MT).

Similar results were found when the percentage of paddy production procured by the state government was substituted for procurement volume of paddy. The estimated equations were:

$$y_2 = 21.28 - .0176x_1 - .009x_2; R^2 = .75,$$

(t values) (-3.31) (-2.96)

$$\text{and } \log y_2 = 24.71 - .662 \log x_1$$

(t values) (-4.25)

$$- 2.596 \log x_2; R^2 = .82,$$

(-3.66)

where y_2 is paddy procurement expressed as a percentage of paddy production. Thus, both functional relationships indicate that procurement volume in Kerala in the past was influenced by the ratio of the open market price to the procurement price. However, the evidence of the relationship between procurement and production was inconclusive.

Organizational Factors Influencing Public Distribution

The distribution of foodgrains in Kerala occurs through informal rationing. Households eligible for ration purchases can buy certain maximum quantities from the ration shops at controlled prices. Eligibility for ration purchases is determined on the basis of the size of land holdings. Only about 3 percent of the families with holdings sufficient to meet their home consumption requirements are excluded from the ration distribution. The maximum quantities that each consumer can buy from the ration shops are fixed at different levels, which account for only a portion of the family consumption requirements.²⁶ Consumers take their

²⁴ See Wolf Ladejnsky, "The Failure of Wheat Trade Takeover," August 1973, p. 39 (mimeographed).

²⁵ The econometric specification suffers from a problem of identification since the open market prices are likely to be influenced by procurement level and effort. In spite of this, it is useful to show that, to some extent, the tendency for levy evasion will be high when market prices go up.

²⁶ For example, the daily ration quota during 1976 varied from 80 to 160 grams of rice per adult and 110 to 160 grams of wheat per adult.

ration quotas in amounts and at times they decide. The rest of their consumption requirements are obtained from the open market. Since the government controls the interstate movement of food, the quantities available in the open market are limited to supplies from local production after 'evy requirements have been met. Because of this, the open market price is always much higher than the ration price.²⁷

The state has an elaborate network of retail outlets for the distribution of foodgrains. In order to facilitate physical distribution, the Food Corporation of India (FCI) established 15 main depots and 33 subdepots in the state. These depots supply foodgrains to 256 approved wholesalers (210 private and 46 cooperative). These wholesalers are affiliated with 11,565 ration shops (8,462 private and 2,923 cooperative).²⁸ On an average, one FCI depot or subdepot supplies about seven wholesale dealers and one wholesale dealer supplies 45 retail outlets. One retail outlet serves an average of 345 households with ration cards.

One of the important strengths of rationing in Kerala is its large coverage, both in terms of the coverage of the population and the coverage of the distribution network. The universal coverage of rationing in the state has been partially responsible for minimizing leakages and has influenced the stability of the rationing system. When target-oriented distribution programs are used, it is often difficult to effectively determine who should be eligible for these programs. This is particularly true when income levels of the participants are considered

to be the basis for the means test. Kerala's answer to this problem is to avoid any attempt to enforce a nonviable means test. At the same time, the small volume of foodgrains available through rationing at relatively low levels has contributed to preventing misuse of the ration quota. In most areas retail shops are easily accessible to Kerala consumers. FCI and wholesale depots are also easily accessible and the network of roads and transportation facilities is adequate to facilitate physical movement of foodgrains.

The state's huge foodgrain deficit is another factor influencing the performance of rationing in the state. In the past in India, offtake from ration shops in a good crop year was low, and therefore public distribution was superfluous, while in a bad crop year there was heavy demand for foodgrains through public distribution. Thus in areas of marginal shortages, it was difficult to make the system survive during good crop years and to make supplies available during bad crop years. Such fluctuations in ration offtake did not create a major problem in Kerala, where market arrivals from local production were sufficient to meet only a relatively small portion of the consumers' requirements during both good and bad crop years. The gap between consumption requirements and local production resulted in the open market prices remaining at a substantially higher level than the ration prices, which in turn provided adequate incentives for consumers to continue their purchases from the ration shops.

In addition to the coverage of the ration shops and the shortage of foodgrains in

²⁷ This dual market mechanism has implications for both producers and consumers. For a discussion of some of the issues involved, see Dharm Narain, 'Agricultural Price Policy', paper presented at the National Symposium on Agricultural Research and Development Since Independence, New Delhi, 1974. M. L. Dantwala, 'Incentives and Disincentives in Indian Agriculture', *Indian Journal of Agricultural Economics* 22 (April-June 1967): 1-25 and K. Subbarao, 'Market Structure in Indian Agriculture: A Study of Economic Efficiency of Paddy Free-Marketing System in West Godavari District', Ph.D. dissertation, University of Delhi, 1977.

²⁸ *Handbook of Statistics*, pp. 22-23.

Kerala, a number of organizational and administrative arrangements made by the state government also have influenced the performance of public distribution in the state. The retail outlets were developed as viable units for handling ration commodities. In many other states in India, lack of rural retail outlets suitable to handle ration items was considered the major problem in extending ration coverage to the rural areas and it was often necessary to combine ration food items with other essential commodities. However administrators in Kerala deliberately avoided grouping rationed food commodities with other items mainly because they feared such linkages might be used by the retailers to force the consumers to buy unwanted items. The retail outlets were given license to sell ration goods with the explicit understanding that they would exclusively deal in ration items. Each retail outlet was expected to earn a monthly net income of about Rs. 200 from the sale of ration commodities.

Since the quantity of rice sold through the ration shops is adequate to meet only a portion of the consumers' requirements, many consumers have to supplement the ration quantities with other items. Tapioca, a relatively inexpensive cereal substitute, is the most common supplement used by the poor. Rich consumers are able to buy rice from the open market at high prices. The availability of foodgrains from the open market provides the needed support for maintaining some amount of choice for the consumers.

The administrative arrangements for rationing in Kerala also provide some flexibility in how much can be purchased at one time. In many other parts of the country, ration foodgrains are made available only once a month and many poor families cannot accumulate enough money to buy their ration quota in one installment. In Kerala the ration quota is distributed weekly and installment

purchases are possible.

Another important aspect of rationing in Kerala is that while the Government of India has had to incur subsidies on food distribution in Kerala (see discussion below), thus far the Kerala government has been able to recover all operating costs of the system from its consumers. In addition, the state has not made any capital investments in support facilities for rationing. The storage facilities are provided by the wholesalers and retailers and investments in these facilities are financed by nongovernmental agencies. Also, transportation arrangements are made by the wholesalers using the margins allowed by the state government.

In addition to the universal coverage of rationing and quantity limits, the high literacy in the state, public awareness of ration entitlement, and the strong ties with a number of political parties supported at the village level also help reduce leakage. In addition, when ration allotments do not reach the retail outlets or when the consumers cannot get their ration quota, those in the official hierarchy are available to provide assistance.

Government Expenditures on Public Distribution

While the state government recovers operating costs of rationing from the consumers, the Central Government incurs a consumer subsidy on foodgrains supplied to the state. The FCI acts on behalf of the Central Government to arrange for procurement, importation, and distribution. The price of grains procured from domestic markets and the issue price of grains are fixed by the Central Government. The costs incurred by the Food Corporation in arranging supplies from domestic production include the procurement price of grains; procurement charges (including gunny cost and tax); and the movement, storage, and

distribution costs incurred by FCI for issues through the public distribution system. For imported grains, the costs incurred by FCI include the purchase price from the foreign markets, port clearance charges, and distribution costs. The total cost of sales incurred by the Corporation on both imported and local grains is often higher than the issue price fixed by the Central Government. This difference between the cost of sales and issue price is met in the form of consumer subsidies by the Government of India. The magnitude of Central Government subsidies varies according to the type of grains and whether they are local or imported. The rates of consumer subsidy during 1973/75 to 1975/76 appear in Table 9.

The total Central Government subsidy for food distribution in Kerala was estimated using the rates of consumer subsidy; quantities of rice and wheat distributed during 1973/74, 1974/75, and 1975/76; and the proportions of imported and local rice in total rice distribution.

Since the proportion of local and imported rice in the total rice supplied by the Central Government to Kerala for these years could not be determined, it was assumed that the proportion of imported rice distributed through the public system in Kerala was the same as the corresponding proportion at the national level. The Central Government subsidy estimated for the years 1973/74, 1974/75, and 1975/76 was Rs. 70.04, Rs. 141.93, and Rs. 1.05 million, respectively.

Table 9—Rates of consumer subsidy incurred by the Government of India for public distribution, 1973/74-1975/76

Item	Origin	1973-74	1974-75	1975-76
			(Rs./ton)	
Wheat	Local	165.9	16.6	107.4
Wheat	Imported	587.1	533.3	408.2
Rice	Local	(-)19.5	(-)53.7	(-)81.5
Rice	Imported	388.2	276.6	886.1
Milo	Imported	419.5	346.6	636.0
Coarse grains	Local	n.a.	24.1	198.7

Source: Data taken from Food Corporation of India, *Annual Report 1974/75* (New Delhi: Food Corporation of India, 1975) and Food Corporation of India, *Annual Report 1975/76* (New Delhi: Food Corporation of India, 1976).

- A negative sign indicates net gains.

4

RATION OFFTAKE

The average annual offtake²⁹ from ration shops between 1965 and 1976 ranged from 893,000 to 1,218,000 tons (Table 10). The per capita annual offtake of rice and wheat from the fair price shops varied between 42 and 65 kilograms. Though the per capita annual offtake shows some stability over time, the composition of the offtake between rice and wheat changed substantially in different years, at least compared to other states in India. The share of wheat in the total offtake varied from 6.2 percent in 1971 to 47.9 percent in 1975. The variations in the commodity composition were primarily dependent upon the availability of foodgrains from the central pool.³⁰ Though the amount of offtake of rice and wheat indicates some substitution of these two items, it would be incorrect to interpret this as an indication of the existence of perfect substitution between rice and wheat in the demand sense because of the supply pattern. This aspect is discussed in more detail in the analysis of factors influencing ration offtake.

The ration offtake data in Table 10 indicate a decline in total ration offtake and per capita annual offtake from 1969 to 1974. While rice offtake increased by 191,000 tons between 1968 and 1969, wheat offtake declined by 276,000 tons for that same period. This shortfall in wheat offtake might have been due to the

23 percent increased availability of tapioca at this time. During the entire period from 1969 to 1974, tapioca production continued to increase, especially during 1971/72 when production was about 18 percent above the 1970/71 production level. Tapioca production stabilized after 1973. Wheat offtake was high in 1975 when the rice offtake was low.

The ration price is fixed at wholesale and retail levels on the basis of the issue price from the central pool. Generally, the state government recovers the expenditures incurred through food distribution from the consumers. The nature of margins added by the state government to cover the distribution costs since January 1975 are shown in Table 11. In this table, the issue price corresponds to the price at which the state government received rice and wheat from the Central Government. The maximum and minimum levels of both wholesale and retail prices indicate the difference in transportation and incidental charges allotted for the wholesalers and retailers located in different regions. After meeting all the direct costs of distribution, the margins between the wholesale price and issue price, and between retail price and wholesale price also contributed to the administrative overheads of the state government.

Between 1966/67 and 1975/76, the retail price of ration rice in Kerala increased

²⁹ The ration quantities purchased by consumers.

³⁰ Since local procurement of rice accounted for only a small portion of the foodgrains distributed through ration shops, the variation in offtake given in Table 11 represents the availability of foodgrains from the central pool.

Table 10 — Ration offtake of rice and wheat, 1964-1976

Year	Rice	Wheat	Total (Rice and Wheat)	Wheat as a Percent of Total	Per Capita Annual Offtake
			(1,000 tons)		(kg)
1965	906	312	1,218	25.6	65
1966	848	303	1,151	26.3	60
1967	613	455	1,068	42.6	55
1968	648	392	1,040	37.7	52
1969	839	116	955	12.1	47
1970	822	71	893	7.9	43
1971	843	56	899	6.2	42
1972	886	84	970	8.7	44
1973	762	198	960	20.6	43
1974	786	186	972	19.1	42
1975	531	489	1,020	47.9	43
1976	904	220	1,124	19.6	47

Source: Government of Kerala, Department of Civil Supplies, *A Handbook of Statistics, 1976* (Ernakulam: Kerala Government Press, 1977), pp. 35-36.

Table 11 — Ration price, January 1975

Item Variety	Issue Price	Wholesale Price		Retail Price	
		Minimum	Maximum	Minimum	Maximum
		(Rs./quintal)			
Rice: Coarse	135	141.40	143.15	146	148
Rice: Medium	150	156.40	158.15	161	163
Rice: Fine	162	168.65	170.40	173	175
Rice: Superfine	172	178.65	180.65	183	185
Wheat	125	131.00	133.00	134	136

Source: Government of Kerala, Department of Civil Supplies, *Administration Report of the Supplies Department for the Year 1974/75* (Ernakulam: Kerala Government Press, 1976), p. 17.

by about 95 percent (see Table 12). During the same period, the ration wheat price increased by about 116 percent. Throughout this period, the open market price of rice was substantially higher than the ration price of rice. The open market price and ration rice price ratio

was lowest during 1971/72, when it was about 41 percent higher than the ration price. The ratio between these two prices was the highest in 1967/68 when the open market price was about 174 percent above the ration price.

Table 12—Ration and open market prices, wheat and rice, 1966/67-1975/76

Year	Ration Wheat Price	Ration Rice Price	Open Market Rice Price	Price Ratio of Open Market Rice to Ration Rice
		(Rs./quintal)		(percent)
1966/67	62	76	161	212
1967/68	74	76	208	274
1968/69	74	102	198	194
1969/70	85	103	166	161
1970/71	85	104	155	149
1971/72	85	108	152	141
1972/73	98	108	176	159
1973/74	134	134	240	179
1974/75	134	136	349	260
1975/76	134	148	381	268

Source: Government of Kerala, Department of Civil Supplies, *A Handbook of Statistics, 1977* (Ernakulam: Kerala Government Press, 1977) pp. 64-65.

Factors Influencing Ration Offtake

A number of factors influence the quantities of foodgrains sold through the ration shops.³¹ Because of quality and price considerations it is possible to treat ration rice and wheat as additional commodities entering the consumer's bundle of choice goods.³² When ration commodities are treated as additional items entering the consumer's choice function, the demand for ration commodities is influenced by the same set of variables that influence other nonration commodities. Following conventional economic theory, the variables influencing demand are price, income, taste, and preference. Since the demand for ration commodities is a rising function of income for the low

income groups and a falling function of income beyond certain income levels,³³ and persons with comparatively large holdings (and large incomes) are excluded from rationing,³⁴ it may not be appropriate to use income to explain ration off-take in an aggregate sense. Also, since in the past the price of ration commodities remained constant over various periods of time, it is appropriate to use the gap between open market and ration price instead of the absolute price levels. The following regression models were specified to explain the quantities of ration rice and wheat sold through the ration shops:

³¹ The quantities sold through the ration shops indicate both ration off-take (which has a demand connotation) and availability. While availability was a serious constraint for rice, it was not for wheat.

³² The consumers in different parts of India, and sometimes even within a state, have definite foodgrain preferences based on taste, cooking quality, and milling quality. See P.S. George, V.V. Choukidar, and M.B. Dave, *Consumption Pattern and Preferences for Rice* (Ahmedabad: Indian Institute of Management, 1972).

³³ This is because at the low income levels ration rice is often substituted for tapioca and as income goes up, open market rice is substituted for ration rice.

³⁴ About 3 percent of households with production from their own land sufficient to meet their family consumption requirements were not eligible for ration foodgrains.

$$q_{rr} = f\left(\frac{P_{or}}{P_{rr}}, P_{rw}, P_t\right), \text{ and}$$

$$q_{rw} = f\left(q_{rr}, P_{or}, \frac{P_{rw}}{P_{rr}}, \frac{P_t}{P_{rw}}\right),^{35}$$

where:

q_{rr} = quantity of rice sold through ration shops,

P_{or} = open market price of rice,

P_{rr} = ration rice price,

P_{rw} = ration wheat price,

P_t = tapioca price, and

q_{rw} = quantity of wheat sold through ration shops.

In order to estimate the coefficients of the above regression models, monthly data on quantities and prices from 1970 on were used. The estimated equations indicated that none of the equations for rice were statistically or economically significant. However, a large portion of the variations in quantities of wheat sold through ration shops could be explained by the four variables of ration rice off-take, open market price of rice, ratio of ration wheat price to ration rice price, and ratio of tapioca price to ration wheat price. While all coefficients showed meaningful directions of change, indicated by the signs of the coefficients, only the first two variables had statistically significant coefficients. The estimated equation was

$$q_{rw} = 55304 - 0.624 q_{rr} + 7000.2 P_{or} - 16004 PWR + 29790 PTW; R^2 = .78,$$

(t values)	(-8.91)	(2.78)
elasticities	-2.43	0.68
	(-1.26)	(1.04)

where:

q_{rw} = monthly wheat sales through ration shops (tons),

q_{rr} = monthly rice sales through ration shops (tons),

P_{or} = monthly open market price of rice (approximated with farm level prices) Rs./kg),

$PWR = \frac{P_{rw}}{P_{rr}}$ = ratio of ration wheat price to ration rice price, and

$PTW = \frac{P_t}{P_{rw}}$ = ratio of tapioca price to ration wheat price.

Before reporting this equation, the correlation between q_{rr} and P_{rr} was checked to make sure that multicollinearity did not exist. A low correlation coefficient between these two variables further confirmed the result that variations in rice off-take could not be explained by market variables, especially price differentials.

The regression coefficient for rice sales through ration shops indicates that consumers did not substitute rice and wheat freely. When rice sales through ration shops declined by one kilogram, wheat sales increased by .62 kilograms; thus indicating that during rice shortages, consumers might have used only a portion of the money saved from the reductions in rice purchases on wheat and the balance for the purchase of rice or tapioca from the open market. Absence of monthly data on consumption of these items make it difficult to test the validity of this statement.

The inability to explain rice sales in ration shops by normal demand variables suggests that rice off-take by consumers was probably influenced by supply conditions, rather than by consumer choice. It was pointed out that the supplies to the ration system in Kerala were mainly provided by the Central Government through FCI depots. The Central Government gave fixed monthly rice and wheat allotment quotas to the state, and state

³⁵ In addition to the usual price variables, q_{rr} was introduced in the equation to test the influence of the supply constraint of ration rice in determining the quantities sold through ration shops.

officials directed ration shops to withdraw supplies based on these allotments. An analysis of the monthly allotments from the central pool and the offtake from the ration shops indicated that, in most months, the rice allotment was used entirely and the wheat allotment used only partially. During 1975, rice allotment was substantially reduced from the previous year's allotment, and this influenced a higher proportion of allotment of wheat being lifted during 1975.³⁶ It is possible to infer that offtake of wheat reflects non-availability of rice and when rice is made available, the maximum allotment is lifted.³⁷ This, along with the results of the regression analysis, leads to the conclusion that ration offtake of rice in Kerala was the result of supply constraints and therefore cannot be explained through demand variables. However, since supply was not a limiting factor for wheat, its offtake can be explained through demand variables.³⁸

Distribution Aspects of Rationing on Consumption Levels

In order to determine the extent of benefits derived by consumers belonging to different income groups, it is necessary to obtain data on distribution of ration offtake among consumers belonging to different economic categories. In particular, it is important to determine the extent to which households belonging to different income groups depend on ration shops to meet their consumption requirements.

Since existing data on ration distribution provide only the aggregate picture, an attempt was made to obtain primary data from household surveys. For this purpose, a household survey was undertaken during the week of November 20-26, 1977 to determine the proportion of consumption requirements met through ration shops. The household sample was taken during the week of November 20-26, 1977 to determine the proportion of about 800 households registered with the ration shops in these two villages, a random sample of 100 households was selected and the required information was collected through personal interviews using a structured questionnaire.

During the reference week of the survey, the average household consumption of rice was 11.32 kilograms (see Table 13). Purchases from the ration shop accounted for about 56 percent of the rice consumption. Open market purchases accounted for about 33 percent of rice consumption and retentions from own production accounted for the rest (about 11 percent). The average consumption of rice in households with annual incomes of Rs. 600 or less was 8.4 kilograms. With the exception of the households with annual incomes of Rs. 3,601 to 4,800, consumption of rice increased as incomes rose. About two-thirds of the total rice consumed in families with incomes of Rs. 1,200 or less came from ration shops. About 40 percent of the rice consumed in families whose incomes were above Rs. 3,600 was purchased in ration shops.

The ration availability of rice was suf-

³⁶ While the daily rice ration during 1975 remained at 80 to 100 gm/adult, daily wheat ration was allowed to reach 240 gm/adult

³⁷ This is particularly true since in most cases, open market prices were substantially higher than the ration price. When the margin between these two prices is high and when the availability is less than the quantity demanded by consumers at the corresponding margin, the actual offtake of rice cannot reflect the true demand.

³⁸ This result for Kerala is also consistent with the results obtained by R. Krishna and A. Chhibber, "A Policy Model of the Indian Wheat Sector," paper presented at the International Food Policy Research Institute/International Maize and Wheat Improvement Center Conference on Food Security, Mexico, 1978. They indicate that the interplay of the issue price fixed by the government and the open market wholesale price does influence the offtake of consumers from the fair price shops.

Table 13—Household consumption of rice by income group and source of supply, week of November 20, 1977

Annual Income Group	Percentage of Households	Weekly Household Consumption of Rice	Percentage of Rice Consumption From		
			Ration Shops	Open Market	Own Production
(Rs.)		(kg)			
Up to 600	20	8.40	67.3	32.7	—
601-1,200	23	9.43	67.8	32.2	—
1,201-2,400	30	13.47	57.2	13.1	29.7
2,401-3,600	10	13.89	48.0	44.0	8.0
3,601-4,800	10	12.00	40.8	42.5	16.7
More than 4,800	7	13.42	38.3	19.2	42.5
Total	100	11.32	56.1	33.0	10.9

Table 14—Household consumption of rice, wheat, and tapioca, week of November 20, 1977

Annual Income Group	Rice From		Ration Wheat	Tapioca	
	Ration Shops	Own Production		Own Production	Market Purchases
(Rs.)			(kg)		
Up to 600	—	2.75	0.10	0.40	12.50
601-1,200	—	3.04	1.09	2.96	8.35
1,201-2,400	1.77	4.00	3.87	4.13	11.33
2,401-3,600	1.11	6.11	1.44	4.33	8.33
3,601-4,800	2.00	5.10	0.50	4.50	2.20
More than 4,800	5.71	2.57	0.71	3.29	—
Total	1.24	3.73	1.89	3.71	9.48

efficient to meet only a portion of rice requirements of the consumers. While the consumers belonging to upper income groups deliberately gave up a portion of their rice quota in favor of other alternative commodities, consumers belonging to the lower income groups were forced to buy alternative commodities because of the supply limits from the ration

shops.³⁹ Whether alternatives were chosen deliberately, or because of supply constraints, it is useful to examine these choices made outside of the ration system.

The major items of household consumption and their sources included rice from ration shops, open market rice (local production entering the market), rice from own production, ration wheat, and

³⁹ While the consumers belonging to the low income groups used more than 90 percent of ration quota, consumers in the higher income groups used only about 60 percent.

tapioca. For the total sample, the weekly consumption basket included 1.24 kilograms of rice and 3.71 kilograms of tapioca produced by the consumers (Table 14). The dispersal of these items indicates substantial variations among the different income groups. Consumers belonging to the lowest income group did not have their own rice production. After obtaining their ration quota of rice, they preferred to buy open market tapioca and rice instead of utilizing their ration

wheat quota.

Table 14 indicates that many rural households consumed only a small quantity of wheat. When their rice quota was exhausted, consumers preferred to purchase tapioca from the open market than wheat from the ration shops.⁴⁰ Wheat purchases from ration shops accounted for only about one-third of the total wheat allotment for the total sample and were the lowest in the low income households.

⁴⁰ The relative calorie prices of ration wheat (2500 calories/Rs. of grain) and tapioca (2700 calories/Rs. of tapioca) were comparable.

5

THE IMPACT OF RATIONING

Rationing has major direct and indirect impacts on a number of areas of the national economy (see Figure 2). Local procurement efforts needed to maintain supplies to the ration system influence open market supply, farm price, farm income, and thus agricultural resource allocation by farmers and the level of production of different agricultural commodities. Imports for rationing restrict the foreign exchange available for other sectors and government allocation of resources for other development activities, particularly intersectoral allocation. Thus the imports and local procurement for the ration supply influence the level of economic growth of the nation.

At the consumer end, the ration availability influences the consumption pattern through income and substitution effects. The level of expenditure on ration commodities, other food items from the open market, and nonfood items generally influence the quality of life. If ration commodities are available for only the low income consumers, they also influence the inequalities in living standards among the populations belonging to different income groups. When foodgrains distributed in a deficit area are procured from a surplus area outside of Kerala, it results in some amount of interregional transfer of income. The nature of this transfer depends on the changes in intersectoral resource allocations in both the surplus and the deficit areas.

This brief description of the direct effects of rationing highlights some difficulties associated with evaluating the

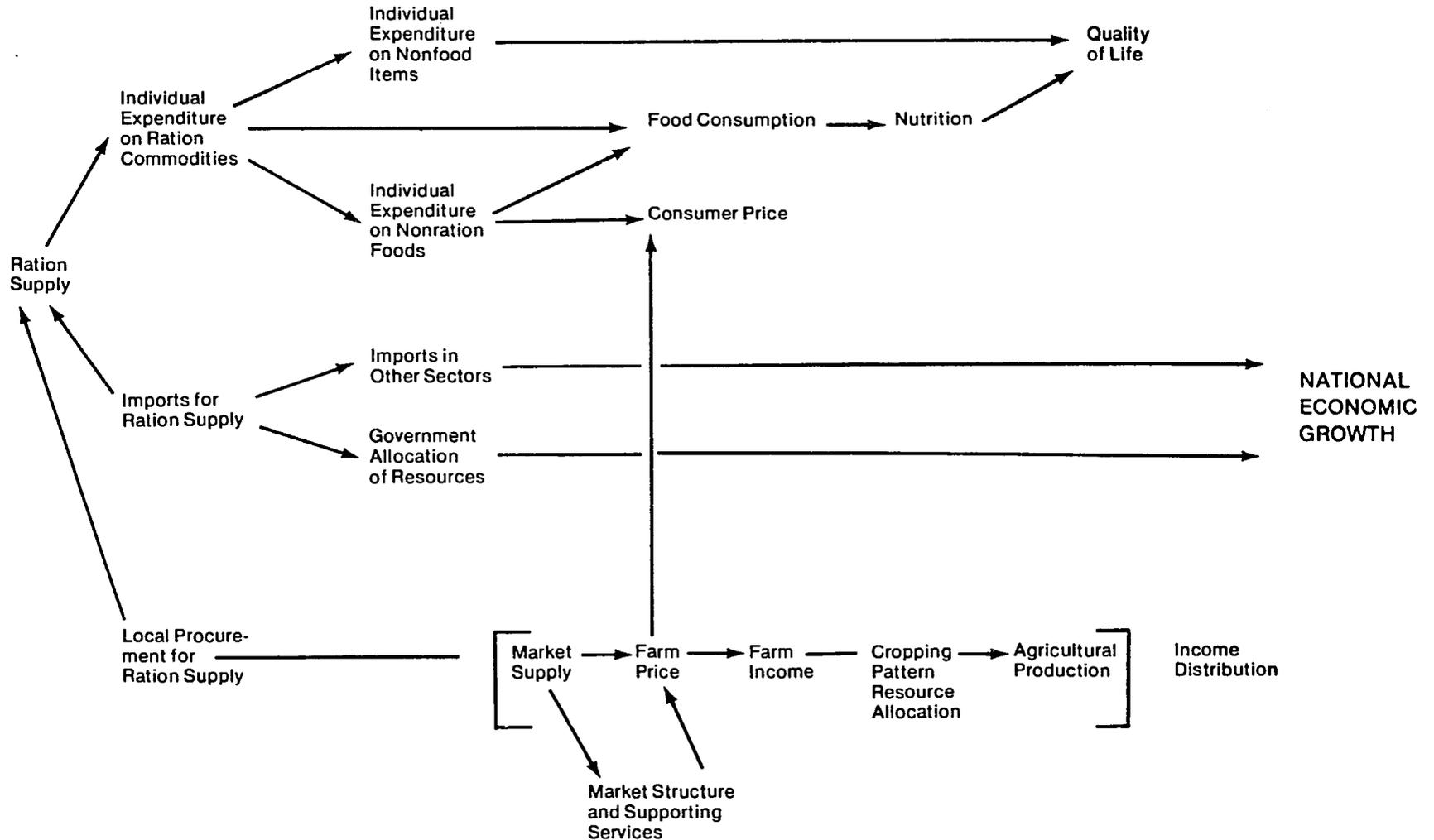
impact of rationing in Kerala, where most of the commodities supplied through ration shops originate from outside the state. A complete analysis of the intersectoral and interregional losses and gains both within and outside Kerala involves developing an appropriate analytical framework for the analysis. Though this can be developed by adopting a complex regional analysis framework, the empirical nature of the analysis might still introduce serious limitations on the use of such models. Because of this, the present analysis has a restricted scope and does not attempt to estimate the full impact of rationing.

Impact of Rationing on Consumption Levels

To determine the impact of rationing on consumption levels, the levels that might prevail in the absence of rationing were estimated and compared with the actual consumption levels under rationing.

In the absence of a complete demand interrelationship matrix for each income group, the impact of rationing on the consumption level of rice for each group of consumers was estimated on the basis of each group's actual expenditures on rice. For this purpose it was assumed that the consumers determined their total expenditures on rice first. These quantities then were adjusted according to price

Figure 2—Influence of ration system on individual expenditure and national economic growth sectors



changes.⁴¹

Expenditures on rice in each income group corresponding to the purchase pattern in Table 13 were used as the basis for determining the quantities corresponding to two price levels:⁴² the existing open market price level in Kerala (S_1) and the hypothetical national free market price level (S_2).⁴³ When S_1 is used, the retail price within the state remains at the existing open market price level. When S_2 is used, it implies that rationing is abolished and interstate movement restrictions are removed. Thus, in the absence of structural inadequacies, the difference between the market price of rice in Kerala and the market price of rice in other parts of the country is the transportation costs and related marketing margins.

S_1 was available from published data. The open market price in a paddy growing state in South India was used for S_2 . Since rice from Andhra Pradesh was used for ration distribution in Kerala, the price in Andhra Pradesh was taken as the base price and appropriate transportation costs were added to this price level.⁴⁴

The estimated consumption levels of

rice in the absence of rationing indicated that consumers belonging to all income groups possibly would experience a fall in the rice consumption levels. In other words, when rationing is removed and the market prices in the state become comparable to the prices in surplus states, the actual consumption level in all groups falls below the consumption levels under rationing. The fall in consumption is greatest for the low income groups where consumption is already low. As pointed out earlier, the actual consumption levels are likely to fall below the levels reported in Table 15 because the retail price used in obtaining these figures corresponds to the retail price in a surplus state where zonal restrictions existed.

Rationing Gains to the Producers and Consumers in Kerala

In the absence of analytical procedures and data needed to quantify the full impact of rationing (both the direct and indirect income distribution gains of rationing), the gains of rationing were measured through income gains or losses

⁴¹ This is somewhat consistent with the assumptions of a two stage maximization process considered in demand theory. Though there exists some amount of substitution among the different commodities, the extent of free substitution of wheat or tapioca for rice in a given income group may be relatively small. However, this assumption is limited. It overlooks the fact that price changes for rice, wheat, and tapioca will have a significant real income effect even within an income group, and hence will probably cause significant price responsiveness (among the poor), even when the pure substitution effect is the same at all income levels. Also, the substitution of other commodities for rice might change the expenditure pattern when rationing is abolished. If rice expenditures increase in the process, using this assumption, the estimated decline in actual consumption will be exaggerated. However, since the increase in rice expenditures will occur at the expense of other items, the omission of this aspect probably compensates for its exclusion in the analysis.

⁴² These two price levels correspond to the possible range in which the price level in Kerala will fall when rationing is abolished. Therefore the results corresponding to these two price levels can be treated as upper and lower limits of gains and losses.

⁴³ Though the national free market is only hypothetical when zonal restrictions exist, it is no longer hypothetical for the period after 1977 when these restrictions were removed.

⁴⁴ The price level in Andhra Pradesh corresponds to the period when both levy and restrictions on interstate movements of foodgrains were in force. When levy procurement is abolished, increased market supply in Andhra Pradesh would influence a downward movement in prices and at the same time movement restrictions are removed, demand pull from outside the state would influence an upward movement in prices. While it is difficult to predict the exact outcome of these two conflicting pulls, the price increase due to demand pull would probably more than offset the price depressing tendency of increased open market supply when levy is removed. Thus it may be safe to assume that the price levels prevailing in Andhra Pradesh during the past would be a lower bound (minimum level) of S_2 .

Table 15—Estimated consumption level of rice by income group, no rationing, market price corresponds to national free market price (S_i), 1974/75

Income Group	Actual Weekly Consumption	Estimated Weekly Consumption	Percentage Decline from Actual Consumption
(Rs.)		(kg)	
Up to 600	8.40	6.91	17.7
601-1,200	9.43	7.72	18.1
1,201-2,400	13.47	11.54	14.3
2,401-3,600	13.89	13.26	4.3
3,601-4,800	12.00	11.74	2.2
More than 4,800	13.42	12.09	9.9

to both producers and consumers.⁴⁵

Farm incomes with and without rationing were estimated in order to determine the income gain to the farmers as a result of abolition of rationing. The estimated income gain to the producers as a result of the abolition of rationing over the actual income realized under rationing was defined as:⁴⁶

$$W_p = \sum_{i=1}^n \{(q_{oi} + q_{ji}) P_{fo} - q_{oi} P_{fr} - q_{ji} P_j\}, \text{ or}$$

$$W_p = \sum_{i=1}^n q_{oi}(P_{fo} - P_{fr}) + \sum_{i=1}^n q_{ji}(P_{fo} - P_j),$$

where:

W_p = producer gain,

q_{oi} = quantity of paddy sold in the open market by farmers belonging to i th area group,

P_{fo} = farm level price of paddy in the absence of ration,

P_{fr} = farm level price of paddy under ration (historical price),

q_{ji} = quantity of paddy sold under levy in j th group, and

P_j = levy price of paddy.

The gain to the consumers as a result of the abolition of rationing was defined as the difference between the consumer expenditures with and without rationing, or

$$W_c = R_r (P^* - P_r^*) + q_m (P_r - P_r^*),$$

where:

W_c = consumer gain,

R_r = quantities of rice distributed through ration shops,

P_r^* = market price of rice in the absence of ration,

P^* = ration price of rice,

q_m = quantities of rice purchased from the open market, and

P_r = open market price of rice under rationing.

⁴⁵ These measures provide a partial estimate of the impact of a dual price system and therefore cannot be used to compare the efficiency loss of the dual market mechanism with a free market. The basic approach followed here is to estimate the changes in farm income and consumer expenditures in the absence of rationing over their current levels under rationing in Kerala.

⁴⁶ Supply elasticity is assumed to be zero. The effect of a relaxation of this assumption is discussed later on.

The total gains to the producers and consumers in Kerala as a result of abolition of rationing were defined as:

$$W = W_p + W_c.^{47}$$

The producer gain in the absence of rationing depended on the quantity of levy in different area groups, open market sales in different groups, farm level prices in the absence of rationing, levy price, and farm level price under rationing.

The total production of paddy in the state during 1974-75 was about two million tons. The marketed surplus during 1959 was estimated at 23 percent of production. Because of the reductions in the size of holdings during the last 15 years, the marketed surplus was taken as 20 percent of the total production. As noted, levy accounted for about 3 percent of production. The Kerala Directorate of Economics and Statistics estimated the market arrivals of paddy in Kerala during 1974/75 to be about 8 percent of production. Therefore, the remaining 9 percent of production was marketed in rural areas. These estimates of production, marketed surplus, and levy payment for the entire state were further divided into levy categories using the distribution of

holdings, proportion of marketed surplus, and the incidence of levy on producers. In order to obtain production estimates in each category, data on the distribution of holdings of paddy area published by the Board of Revenue (Civil Supplies) was used. The quantity of levy was determined on the basis of levy rates found in the Appendix, Table 28. The open market sales were obtained from the total marketed surplus and levy sales. In order to obtain the marketed surplus according to size of holdings, cross-section survey data on marketing patterns were used. The estimated marketed surplus and levy payments according to size of holdings are available in Table 16.

The producer gain was determined at price levels corresponding to S_1 and S_2 . In order to derive the farm level prices from the retail prices corresponding to S_1 and S_2 , the relationship between the retail and farm prices was established using time series data. The estimated regression equations provided the following results:

$$P_r = .227 + 1.065 P_f; R^2 = .96, \text{ and} \\ (\text{t value}) \quad (14.88)$$

$$\log P_r = 0.044 + 1.034 \log P_f; R^2 = .96, \\ (\text{t value}) \quad (15.63)$$

Table 16—Estimated production, marketed surplus, and levy payments by size of holding, 1974/75

Size of Holding	Paddy Production	Levy	Open Market Sales
(acres)		(1,000 tons)	
Up to 2	1,399	—	113.2
2-5	430	28.9	155.4
5-10	144	23.9	53.8
More than 10	28	7.5	17.4
Total	2,001	60.3	339.8

⁴⁷ When compulsory procurement is undertaken in surplus states, it has implications for both farm incomes and consumer expenditure in the surplus states. Since this analysis excludes this aspect, the results should be viewed strictly from the point of view in Kerala.

where P_r is the retail price (Rs./kg.) and P_f is the farm level price (Rs./kg. of paddy equivalent to 1 kg. of rice).

During 1974/75, the open market price of rice in Kerala was Rs. 3.49 per kilogram and the national free market price was Rs. 2.50 per kilogram. From these consumer prices, the farm level prices were derived using the above relationship between retail prices and farm level prices.⁴⁸ If the national free market price were used (thus distinguishing the price level inside and outside of the state by the transfer cost), the farm prices in the absence of rationing would fall below the actual open market price. Thus, the farmers in Kerala were protected against a price decline through the zonal arrangements.

The quantity data in Table 16 and the price data in Table 17 provide the basis

for determining the net income gains to the farmers in Kerala. Table 18 provides the gains on paddy sold in the open market, the gains on levy sales of paddy, and total gains to the paddy producers. When zonal restrictions and rationing are removed under a free market, the farmers in Kerala lose about Rs. 260 million, of which about 85 percent of the loss is for farmers with less than 5 acres of paddy land. Thus the graded levy and rationing operations in the state have enhanced the income opportunities of small farmers in Kerala.

Consumer gain in the state from the abolition of rationing depends on the ration purchases, open market purchases, market prices with and without rationing, and rationing price.⁴⁹ Using the values for these variables, the gains to the consumers were determined under the price

Table 17—Estimated farm level price without rationing and estimated price differences, 1974/75

	Open Market Price Level in Kerala (S ₁)	National Free Market Price Level (S ₂)
	(Rs./ton)	
Farm level price of paddy absence of rationing ^a	2,460	1,550
Actual farm level price of paddy ^b	2,460	2,460
Levy price of paddy ^c	740	740
Price difference on open market sales ^d	—	-910
Price difference on levy sales ^e	1,720	810

^a P_{fo}

^b P_{fr}

^c P_l

^d $P_{fo} - P_{fr}$

^e $P_{fo} - P_l$

⁴⁸ Throughout this paper, the consumer price, or retail price, is expressed in terms of rice price and the farm level price, or farm price, is expressed in terms of paddy price.

⁴⁹ While estimating the impact of rationing on consumption levels, it was assumed that the expenditure on rice remained the same and the quantities were adjusted to changing price situations. However, in this situation, it is assumed that the quantities remained the same and the expenditures under rationing and nonrationing were estimated at the two price levels.

Table 18—Gains to farmers in the absence of rationing, 1974/75

Size of Holding	Net Income on Quantities Sold in the Open Market			Net Income on Quantities Sold Under Levy			Total Gains	
	Quantity of Open Market Sales ¹	Gains ²		Quantity of Levy Sales ¹	Gains ²		Open Market Price Level in Kerala (S ₁)	National Open Market Price ³ (S ₂)
		Open Market Price Level in Kerala (S ₁)	National Free Market Price Level ⁴ (S ₂)		Open Market Price Level in Kerala (S ₁)	National Free Market Price Level (S ₂)		
(acres)	(1,000 tons)	(million Rs.)		(million Rs.)	(1,000 tons)		(million Rs.)	
0-2	113.2	—	-103.01	—	—	—	—	-103.01
2-5	155.4	—	-141.41	28.9	49.7	23.41	49.7	-118.00
5-10	53.8	—	-48.96	23.9	41.1	19.36	41.1	-29.60
Above 10	17.4	—	-15.83	7.5	12.9	6.07	12.9	-9.76
Total	339.8	—	-309.21	60.3	103.7	48.84	103.7	-260.37

¹ q_{oi}

² $q_{oi} (P_{fo} - P_{fr})$

³ A negative sign indicates that farmers in Kerala would incur a loss when zonal restrictions are removed.

⁴ q_{li}

⁵ $q_{li} (P_{fo} - P_f)$

⁶ $q_{oi} (P_{fo} - P_{fr}) + q_{li} (P_{fo} - P_f)$

levels corresponding to S_1 and S_2 (see Table 19). The estimated values of gains to the Kerala farmers provided in Table 18 and the income gains to Kerala consumers provided in Table 19 determine the total gains resulting in the absence of rationing. These estimates, summarized in Table 20, indicate that when rationing is removed, the combined effect on the pro-

ducers and consumers in the state under both price levels mentioned causes an overall loss. In particular, the prices corresponding to a national free market price for foodgrains would result in combined losses to the producers and consumers in a major deficit state such as Kerala.

The welfare gains of the state under

Table 19—Gains to consumers in the absence of rationing, 1974/75

	Open Market Price in Kerala (S_1)	National Open Market Price (S_2)
	(Rs./ton)	
Assumed retail price of rice in the absence of rationing ^a	3,490	2,500
Ration rice price ^b	1,360	1,360
Actual retail rice price ^c	3,490	3,490
Gap between ration and assumed open market prices ^d	-2,130	-1,140
Gap between ration and actual open market prices ^e	—	990
	(million Rs.)	
Consumer gains on ration purchase	-1,384.50	- 741.00
Consumer gains on open market purchase	—	224.24
Net consumer gain ^f	-1,384.50	- 516.76

^a P_r^*

^b P_r

^c P_r

^d $P_r^* - P_r$

^e $P_r - P_r^*$

^f A negative sign indicates a net loss to consumers.

Table 20—Net gain to producers and consumers in the absence of rationing, 1974/75

Situation	Consumer Gain	Producer Gain	Net Gain
	(million Rs.)		
Actual Kerala price (S_1)	-1,384.50	103.70	-1,773.21
National free market price (S_2)	- 516.76	-260.37	- 777.13

Note: A negative sign indicates loss.

rationing would be incurred partly at the expense of welfare losses in surplus states. Since evaluation of welfare loss in surplus states would involve a somewhat detailed analysis of the agricultural production and consumption pattern in these states, no attempt is made to determine whether such welfare losses in surplus states exceed the welfare gains of deficit states, thereby resulting in a net welfare loss to the country. However, a comparison of the estimates of direct subsidy by the Central Government with the gains of the producers and consumers in Kerala at both price levels indicates that the Central Government's contribution to ration distribution in Kerala during 1974/75 (Rs. 143.93 million) accounted for only a portion of the net gains to the state.

Sensitivity of Gains with Respect to Supply Elasticity

The analysis of the producer gains in the absence of rationing in the last section made an implicit assumption that supply elasticity was zero. Though this assumption simplified the analysis, it is unrealistic to assume that the farmers would produce the same amount of rice, irrespective of the price levels. In order to analyze the sensitivity of the results with respect to a nonzero supply elasticity, the net gains to the producers and consumers in Kerala were estimated⁵⁰ on the basis of assumed supply elasticities at 0.1, 0.2, and 0.3.⁵¹

The results provided in Table 21 indicate that the conclusions arrived at on the basis of a zero supply elasticity re-

Table 21—Gains to producers and consumers under nonzero supply elasticity, 1974/75

Supply Elasticity	Consumer Gain	Producer Gain	Net Gain
(million Rs.)			
.1	-538.70	-247.00	-785.70
.2	-554.13	-233.53	-787.66
.3	-572.90	-220.07	-792.97

⁵⁰ To obtain these revised estimates it was necessary to:

1. Obtain the production levels of paddy corresponding to the new price levels. Since S_1 assumed no change in price levels, it was necessary to carry out the analysis only for the national free market price (S_2).
2. Obtain the new levels of total sales and open market sales according to the size of holdings from the estimated production levels.
3. Determine the net income to the producers corresponding to the estimated levels of open market sales. The changes in total production will also influence the market prices, and the gains to the consumers. However, since the national price (S_2) was influenced by conditions outside the state, the consumer price under this situation was assumed to be the same as before.
4. Determine the consumer prices and consumer gains corresponding to supply elasticities of 0.1, 0.2, and 0.3. This, together with the net income to the producer, provided the revised estimates of the net gain.

⁵¹ In general, aggregate supply elasticity for foodgrains in India is assumed to be small. (See M.L. Dantwala, ed., "Symposium on Farmer's Response to Prices," *Journal of the Indian Society of Agricultural Statistics* 22 (June 1970): 7-10 and J.V. Mellor and A. Dar "Determinants and Development Implications of Foodgrain Prices, India 1949-50 to 1963-64," *American Journal of Agricultural Economics* 50 (November 1968): 962-974. Since there is no major foodgrain competing for rice in Kerala, what is true for all foodgrains could be true for rice.

main valid even after providing adjustments for supply elasticity.

The Impact of Public Distribution on Income Distribution in Kerala

Though the general conclusion that abolition of rationing would result in welfare losses to Kerala is in itself an important result, the analysis of the impact of rationing on income redistribution in the state is of relevance as well. As mentioned earlier, the income redistribution aspects of rationing can be analyzed at both the producer and consumer levels.

For this analysis, the farmers' gross income from rice sales was determined based on the distribution of marketed surplus according to sales to the government and open market sales in different farm size groups shown in Table 16. When rationing is abolished, the entire marketed surplus is sold at the open market prices. (The extent of income gains to the farmers as a result of abolition of rationing appears in Table 18.) However, the share of total income for the different size of holdings is independent of the realized price levels. The distribution of gross income from rice sales with procurement and with no procurement is represented in Figure 3.⁵² It is evident from the graph that the present levy procurement reduces the inequalities in gross farm income from rice sales.

In order to analyze income redistribution aspects of rationing on consumers, the realized income of consumers belonging to different groups was determined using the household consumption pattern of rice according to the sources of purchase. For this purpose the ration income was defined as:

$$R = PQ,$$

where:

R = the ration income,

P = the gap between price in the absence of rationing and ration price, and

Q = the ration quantity.

The ration quantities were taken from the actual ration offtake (Table 13).

As before, the price in the absence of rationing was considered at two levels, S_1 and S_2 . The realized income to the consumers was defined as the sum of their actual cash income and the implied ration income. Figure 4 indicates that rationing had an impact on reducing the inequalities in actual income distribution.⁵³

To sum up, when the impact of rationing using the national open market price level was compared with the impact of rationing using the existing open market price level, there was evidence that Kerala benefitted from the ration operations. The benefits to the state included:

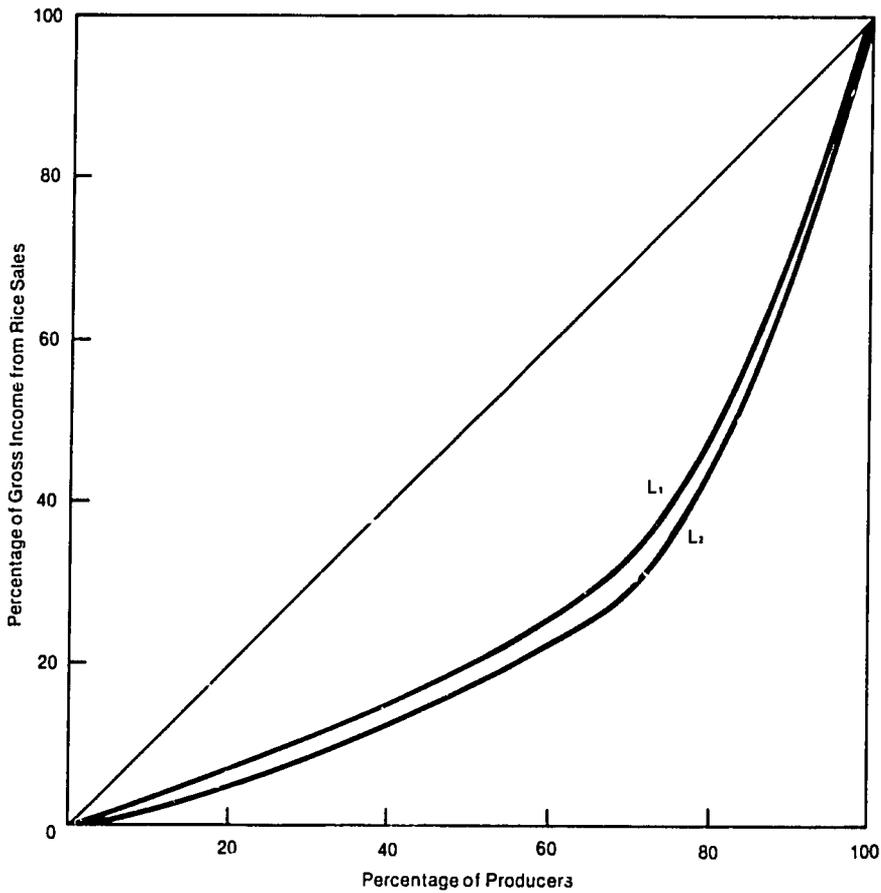
1. Increased consumption levels of rice for all consumers, particularly for the low income consumers.
2. Some redistribution of farm income in the state through levy operations. The small farmers were able to realize higher income levels as compared to a free market situation and graded levy operations took away some of the gains from the large farmers.
3. Redistribution of realized incomes among the consumers.
4. Redistribution of income from surplus areas outside the state in favor of Kerala.

Thus it appears that the abolition of both rationing and movement restrictions would result in a net welfare loss to the state.

⁵² For the values of the cumulative distribution of producers and gross income see the Appendix, Table 29.

⁵³ For the values of the cumulative distribution of households and household income see the Appendix, Table 30.

Figure 3—Distribution of gross farm income from rice sales, 1974/75



L₁ = Distribution under Procurement
 L₂ = Distribution under No Procurement

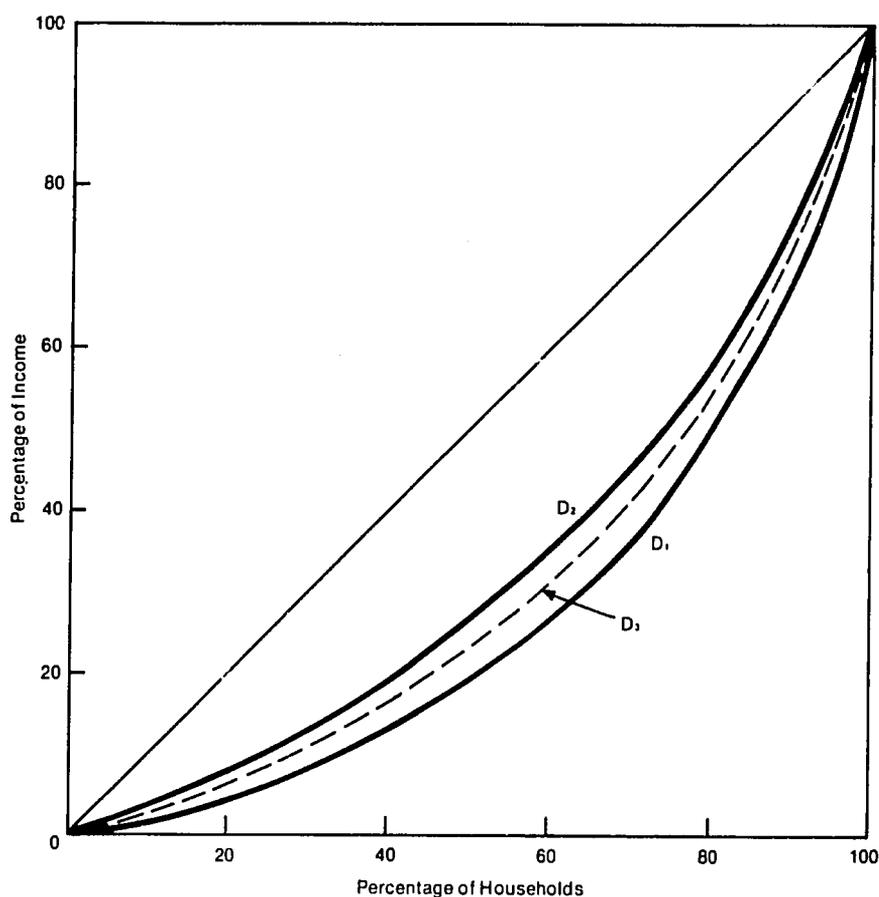
Sources of Gains to Producers and Consumers

As mentioned, public distribution in Kerala has two important elements: movement restrictions on foodgrains into Kerala from outside the state and sale of foodgrains imported from outside the state by the government through fair price shops. In the past the farm level price received by the producers and the retail price paid by the consumers in Kerala were subject to the influence of both these policy elements. While this

study has estimated rationing gains to the consumers and producers, gains from movement and levy restrictions were not viewed separately. This distinction was made with data from Kerala for 1974/75.

Figure 5 depicts the producer sector in Kerala as it existed during the 1974/75 production year and hypothetically how it would have existed with the removal of movement restrictions and levy. During 1974/75, the total amount of paddy sold in the open market was 339,800 tons at Rs. 2,460 per ton and the amount sold to

Figure 4—Distribution of actual and realized household income, 1974/75



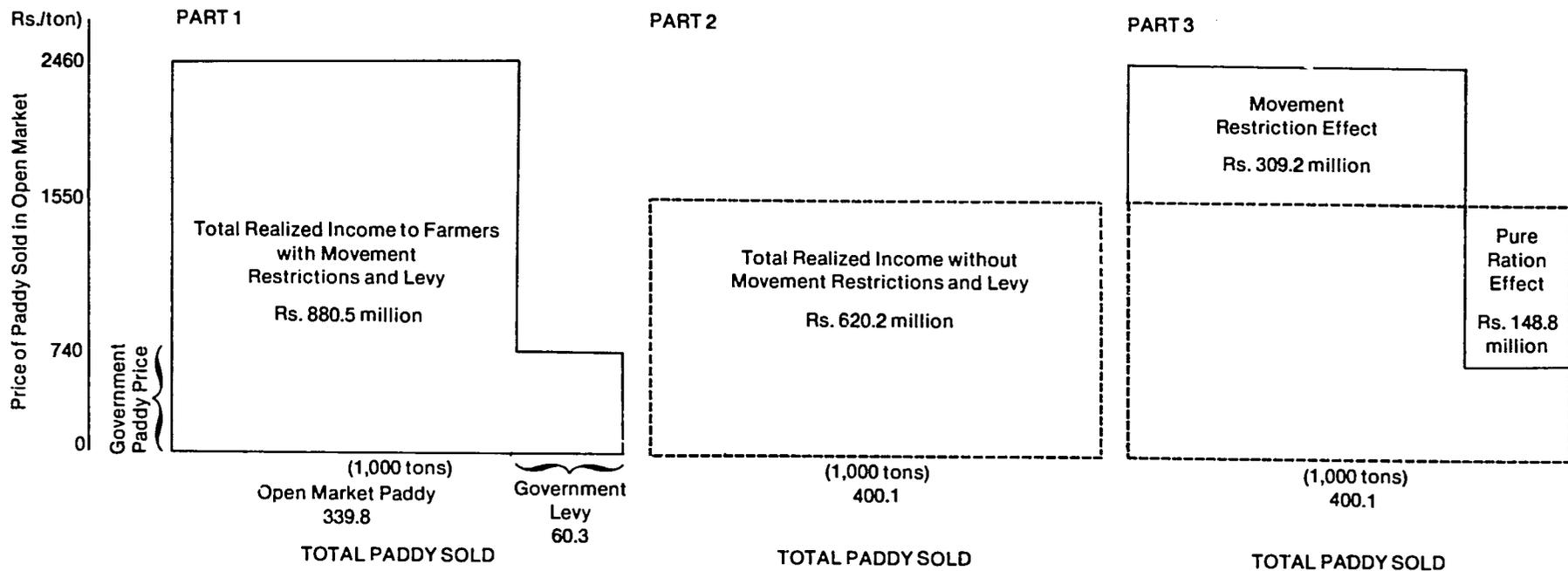
D₁ = Actual Household Income
 D₂ = Realized Income Corresponding to Ration
 Valued at Current Market Prices
 D₃ = Realized Income Corresponding to Ration
 Valued at National Open Market Price Levels

the government as levy was 60,300 tons at Rs. 740 per ton, making the total realized income to farmers Rs. 880.5 million (Figure 5, Part 1). In the absence of movement restrictions and levy, the same total amount would be sold at a price of Rs. 1,550 per ton, making the total realized income to farmers only Rs. 620.2 million (Figure 5, Part 2). Viewed separately, the loss to farmers through lifting movement restrictions, or the movement restriction effect, would have been Rs. 309.2 million and the gain to farmers by lifting levy requirements, or the pure ration effect, would have been Rs. 48.8 million (Figure 5,

Part 3). Thus, the total net gain of Rs. 260.4 million to farmers during 1974/75 had a movement restriction effect of Rs. 309.2 million and a pure ration effect of Rs. -48.4 million.

Figure 6 represents consumer expenditures in Kerala during 1974/75 with movement restrictions and rationing in effect and what the situation would have been without these restrictions. Total consumer expenditure on rice with movement restrictions and rationing in effect was Rs. 1,674.5 million. In this situation, 226,500 tons of rice were bought at the open market price of Rs. 3,490 per ton and 650,000

Figure 5—Farm income with and without movement restrictions and levy, 1974/75



tons were bought from ration shops at Rs. 1,360 per ton (Figure 6, Part 1). In the absence of movement restrictions and rationing, the consumers would have spent Rs. 2,191.3 million on purchases at the existing level of consumption (Figure 6, Part 2). Therefore, the elimination of the movement restrictions (Rs. 224.24 million) and rationing (Rs. 741.00 million) would have resulted in an increase in consumer expenditures of Rs. 516.76 million (see Figure 6, Part 3). Thus, while the pure ration effect reduces consumer expendi-

ture, the movement restriction effect increases consumer expenditure.

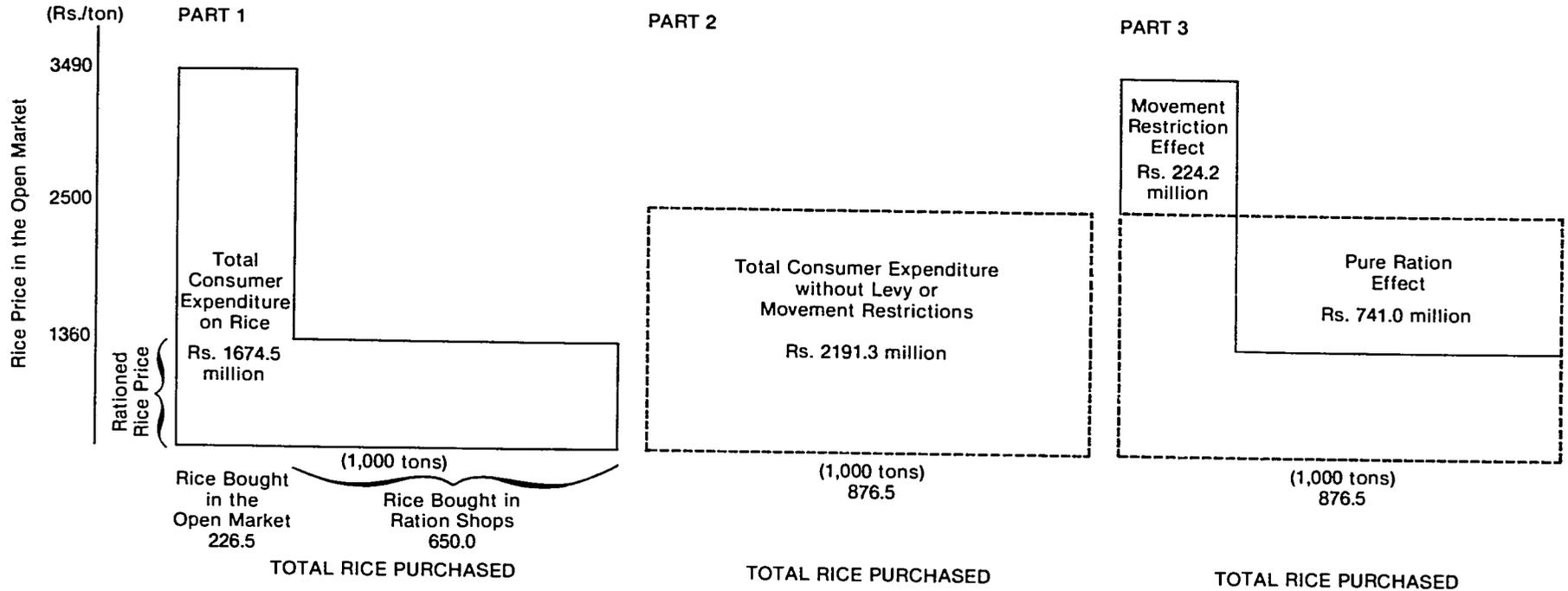
The estimated levels of the movement restriction and pure rationing effects indicate that the movement restriction effect is more than six times the absolute value of pure rationing effect on farm income (see Table 22). Further, the consumer savings through the pure rationing effect is more than triple the consumer loss due to the movement restriction effect.⁵⁴

Table 22 — Movement restrictions and pure rationing effects of public distribution, 1974/75

Source	Movement Restriction Effect	Pure Rationing Effect	Total Effect
		(million Rs.)	
Farm Income	(+)309.21	(-) 48.84	260.37
Consumer Savings	(-)224.24	(+)741.00	516.76
Total Gains in Kerala	(+) 84.97	(+)692.16	777.13

⁵⁴ Since this study did not make any estimates of the income loss to the farmers in areas outside Kerala, it is not possible to determine whether this loss exceeds the gains in Kerala or not.

Figure 6—Consumer expenditure with and without movement restrictions and levy, 1974



6

RELATIVE EFFICIENCY OF PUBLIC DISTRIBUTION AND INCOME TRANSFER

Since price reductions affect consumers in much the same way that increases in consumer income do, rationing should cause an increase in realized income to the consumers.⁵⁵ Traditional welfare economics assumes that cash transfers are superior to price subsidies as a means of improving income redistribution.⁵⁶ However, as Davis points out, when the object of rationing is to increase the consumption levels, a justification for subsidies over general income transfers is provided by collective or nonindividualistic preferences. In the context of such theoretical welfare considerations, it is useful to analyze the relative efficiency of income transfers and rationing in increasing the consumption levels of low income consumers based on empirical evidence from rationing in Kerala.

The framework for this analysis is based on a comparison of actual consumption levels under rationing to estimated consumption levels when cash incomes are provided to offset the loss in ration income. In order to carry out the analysis, it was necessary to determine the ration income and the consumption levels corresponding to new income levels when the loss in ration income was offset through direct cash payments. The procedure for determining ration income was discussed in Chapter 5. The ration quantities (Q) were taken from the actual ration

offtake data provided in Table 14. As before, the values of P were estimated at the open market price level of rice in Kerala (S_1) and the national free market price level of rice (S_2).

The consumption levels of rice corresponding to the new income levels were obtained from an estimated relationship between expenditures on rice and income levels using the functional form:⁵⁷

$$\log y = a + \frac{b}{x} + c \log x,$$

where y is expenditure on rice, and x is family income.

The estimated equations are graphed in Figure 7. In this figure, G_1 corresponds to actual family income used as the independent variable in the regression equation. G_2 and G_3 correspond to graphs when ration incomes at price levels corresponding to S_1 and S_2 respectively were added to the actual income levels. (The realized income levels were used as the independent variable.)

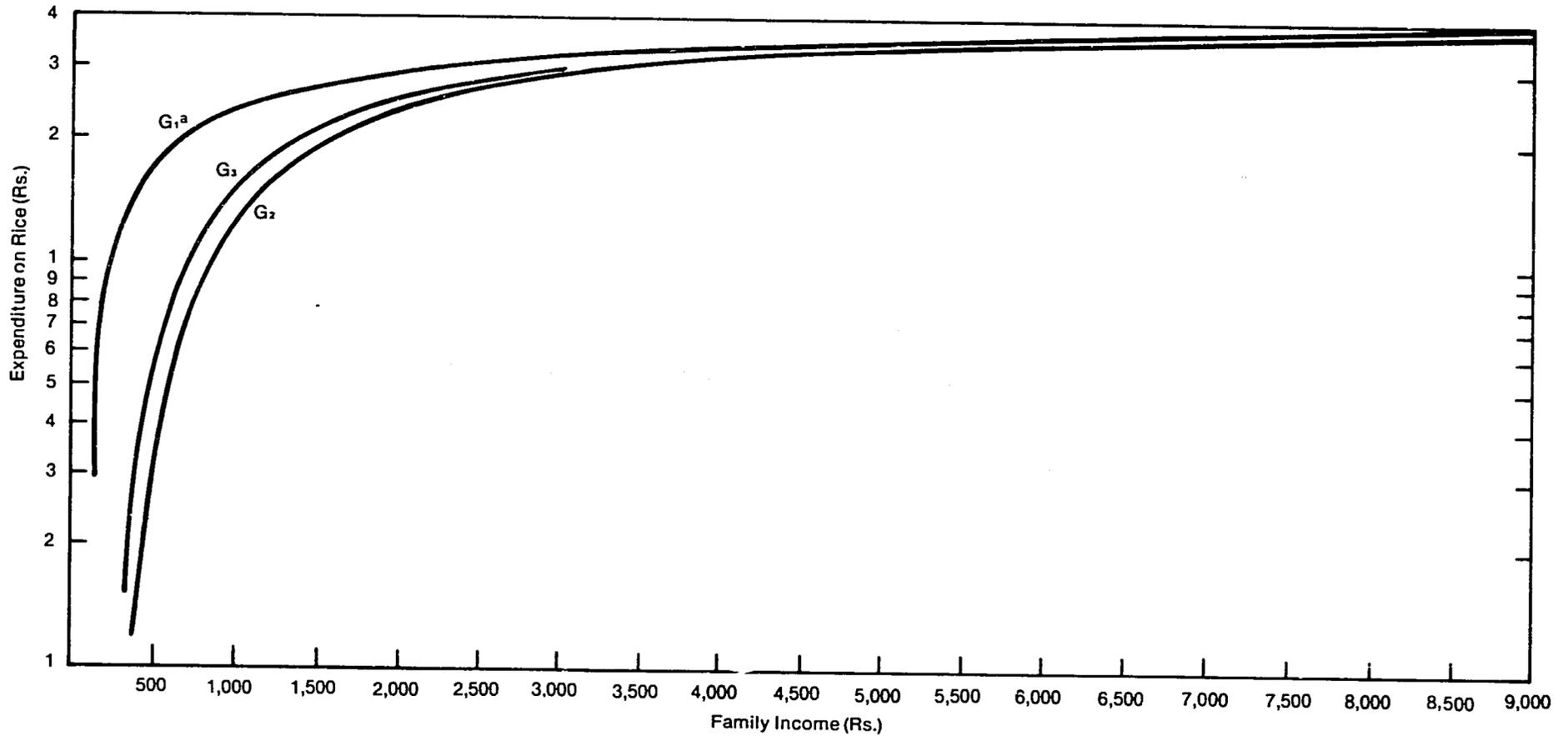
When the consumers are compensated for the loss in ration income by means of cash income, a new level of expenditure on rice is obtained from each of these curves. In fact, G_1 implies that the ration income has a zero weight in the consumer realized income, and G_2 and G_3 assume that the weight of ration income is one. In reality, the implied consumer weight may be between zero and one.

⁵⁵ The term "realized income" is used to represent the sum of cash income and imputed value of ration income.

⁵⁶ See Davis, "The Fiscal Role."

⁵⁷ This functional form is particularly suitable for determining the expenditure elasticities at different income levels. See J.W. Mellor, "Agricultural Price Policy and Income Distribution in Low Income Countries," World Bank Staff Working Paper 214 (Washington, D.C.: World Bank, September 1975).

Figure 7—Expenditure on rice as a function of income, 1974/75



^aThis curve pertains only to cases in which the prices are given. It is possible that in the absence of rationing, the curve would shift upward.

G_1 = Actual family income

G_2 = Open market price level in Kerala added to actual income

G_3 = National free market price level added to actual income

However, in the absence of any satisfactory approach to determine this weight, the results obtained from the assumed weights of zero and one could be considered as the two extreme limits. In particular, since G_1 lies above G_2 and G_3 at all income levels, the consumption levels obtained from G_1 will provide the upper limit of the expenditures on rice under the new income levels.

Since the ration income depends on the assumed price levels, the new expenditure levels and the corresponding quantities of rice consumed were estimated using the same price levels used earlier. The estimated consumption levels given in Table 23 indicate that these levels were below those under rationing in all cases, except for marginal increases in the two bottom income groups for S_2 .

Thus, compensating ration income with money income will contribute to higher consumption levels of the lowest income groups only if the rice prices are sufficiently low.⁵⁸

Since the consumption levels of rice obtained from the curves corresponding to different ration incomes (incomes corresponding to different levels) using a unit weight for ration income would be less than the consumption levels reported in Table 23, the general conclusion that consumption of rice under cash payments would be below the levels obtained under rationing is still valid. However, the estimated consumption corresponding to the national free market price needs further consideration since the observed increase in consumption levels for the lowest income groups is

Table 23—Estimated weekly consumption levels when ration income loss is compensated by cash income^a

Income Group	Actual Weekly Consumption	Estimated Weekly Consumption When Prices Correspond to		Change in Actual Consumption When Prices Correspond to	
		Open Market Price Level in Kerala (S_1)	National Free Market Price Level (S_2)	Open Market Price Level in Kerala (S_1)	National Free Market Price Level (S_2)
(Rs.)	(kg)		(kg)		(percent)
Up to 600	8.40	6.93	8.64	-17	3
601-1,200	9.43	7.87	10.32	-16	9
1,201-2,400	13.47	8.77	11.76	-35	-13
2,401-3,600	13.89	9.65	11.93	-31	-14
3,601-4,800	12.00	9.99	11.95	-17	-1
More than 4,800	13.42	10.85	13.05	-19	-2

^a The estimated consumption values were determined based on the relationship between rice expenditures and income assuming a zero weight for ration income in the consumers realized income.

⁵⁸ For these values, it was assumed that the consumer income had gone up to the extent of the loss in ration income at different price levels. The estimated consumption under the new income level will be influenced by the gap between the open market and ration prices, the income elasticity, and the price elasticity. When the open market price falls, the ration income falls causing a drop in the consumption level through income effect. At the same time, the consumption level increases as a result of the price effect. Probably in the lowest income groups, as the price falls to S_2 , the reduction in consumption through income effect will be more than offset by the increases in consumption through price effect.

likely to disappear when ration income has some influence on realized income. In Figure 7, C_3 corresponds to the case in which ration income obtained from prices corresponding to the national free market price is used to determine the realized income. The consumption levels estimated from this curve found in Table 24 indicate that rice consumption in all income groups will fall when rationing is substituted with a cash subsidy.

In summary, the analysis on the relative efficiency of income transfer and ration distribution leads to two conclusions. First, the ration system provides realized income opportunities for low income groups. While the ration income accounted for only a small portion of the realized income of consumers belonging to upper income categories, about half the realized income of the low income families was accounted for by ration income. Thus the removal of rationing would have a very serious impact on these low income consumers. Second, replace-

ment of ration income with cash income to the consumers would involve substantial government expense.⁵⁹ Compensation with the same amount of cash income as the loss in ration income would not be sufficient to retain the rice consumption at the current levels achieved under rationing. In other words, in order to retain the current consumption level of rice, the required increase in income would be much higher than the ration income derived by the consumers. Thus the objective of increasing the consumption level of the target group of consumers can be achieved more effectively through rationing than through a general income transfer.

These conclusions are based on the observed rice consumption pattern from the cross-section data. However, the existence of possible substitutes for rice, especially tapioca, makes it possible to infer that the consumers in different income groups will respond differently to the abolition of rationing. The choice com-

Table 24—Estimated weekly consumption levels when ration income corresponding to the national free market level (S_2) has the same weight as money income

Income Group	Estimated Weekly Consumption	Percentage Change from Actual Consumption
(Rs.)	(kg)	
Up to 600	6.53	-22
601-1,200	9.14	- 3
1,201-2,400	11.23	-17
2,401-3,600	12.96	- 7
3,601-4,800	11.62	- 3
More than 4,800	12.77	- 5

* The estimated consumption values were determined based on the relationship between rice expenditure and income assuming that the ration income has the same weight as money income

⁵⁹ In addition to being financially infeasible, large scale income transfers are politically infeasible as well

binations involving substitution among open market rice, ration rice,⁶⁰ wheat, and tapioca available to the consumers belonging to different income groups, though significantly different in terms of quantities consumed, may lead to a smaller amount of variations in calorie consumption levels. Because of this, it was considered appropriate to determine the effect of an income transfer on calorie intake. For this purpose the calorie consumption data according to monthly per capita expenditure groups obtained from 1971/72 NSS data were used. The estimated relationship between calorie consumption levels and the monthly per capita expenditures are provided the following regression equations:

rural areas

$$\log C = 4.96 + \frac{2.739}{x} + .722 \log x;$$

$$R^2 = .97, \text{ and}$$

urban areas

$$\log C = 4.64 + \frac{4.954}{x} + .759 \log x;$$

$$R^2 = .97,$$

where C is the daily calorie intake per adult unit and x is the monthly per capita expenditure in rupees.

The marginal values obtained from these equations provide the monthly increases in calorie intake as a result of one rupee increase in monthly per capita expenditure. These values are presented in Table 25.

During 1971/72, the ration rice price in Kerala was Rs. 1.08 per kilogram and the open market rice price was Rs. 1.55 per kilogram. Therefore, for each kilogram of rice purchased from the ration shop, the consumers had an implied ration income of Rs. 0.47. Since the Central Government obtained rice at below market price, the subsidy involved in distributing one kilogram of rice would be less than Rs. 0.47, which implies that one rupee provided by the government could subsidize at least two kilograms of rice distributed through ration shops. The calorie contribution of the rice so distributed would be much higher than the additional cal-

Table 25—Estimated increases in monthly calorie intake from one rupee increase in monthly per capita expenditure, 1971/72

Expenditure Group	Additional Calorie Intake for One Rupee Increase in Expenditure	
	Rural	Urban
(Rs.)		
Up to 15	1,270	975
15-21	1,166	870
21-24	1,370	998
24-28	1,040	977
28-34	1,165	1,037
34-43	1,170	977
43-55	1,060	922
55-75	927	850
75-100	855	737

⁶⁰ Since the ration rice was usually raw rice (instead of the locally favored parboiled rice, and more inferior than local varieties, the consumers consider this a different commodity.

ories obtained from an increase of one rupee in monthly expenditures reported in Table 25. Thus, the evidence from estimated consumption levels of rice corresponding to the situation where income supports are provided for loss in ration income (obtained from cross-section data) and the evidence from NSS data suggests that increasing consumption levels of the target group of consumers can be achieved more effectively through rationing than general income transfer.⁶¹

Rationing is also operationally efficient. One of the major problems in implementation of target-oriented programs is the identification of target groups. Since rationing provides an opportunity to choose the commodity composition and the quality of grains to be channeled through the ration system, these can be chosen in such a way that only the needy will make use of the ration facilities. Thus rationing of food commodities can

lead to self-targeting even in situations where administrative methods cannot effectively determine the target groups.⁶² However, since cash income transfers do not provide an opportunity for such self-targeting, implementation of cash income transfers could provide larger organizational problems in identifying the target groups. Again, in the absence of large-scale opportunities of resale of ration foodgrains, most consumers are likely to make use of the ration quota only to the extent of their own personal consumption. In many situations, this might often lead to a reduced ration offtake. This is not true for cash transfers where the entire quota will be utilized. A ration system might also be better able to reduce the possibility of leakages than a direct cash transfer could. Thus foodgrain rationing may provide higher operational efficiency and political feasibility over direct cash transfers.

⁶¹ This result is also consistent with the experience of food stamps in the United States. R.B. Rees, J.G. Feaster, and G.B. Perkis, *Bonus Food Stamps and Cash Income Supplements—Their Effectiveness in Expanding Demand for Food*, Marketing Research Report No. 1034 (Washington, D.C.: U.S. Department of Agriculture/Economics Research Service, October 1974), reported that on the average, participants of the U.S. food stamp program spent 50 cents of each subsidized dollar on food. However, they found that a direct income transfer would provide only 20 cents worth of food consumption for every dollar. Similar results are also available in S. Lane, "Food Distribution and Food Stamp Program Effects on Food Consumption and Nutritional Achievement of Low Income Persons in Kern County, California," *American Journal of Agricultural Economics* 60 (1978): 108-116 and D.A. West and D.W. Price, "The Effects of Income, Assets, Food Stamps and Household Size on Food Consumption," *American Journal of Agricultural Economics* 58 (November 1976): 725-729.

⁶² The experience of food distribution in Pakistan also indicates that distribution of low quality foodgrains through ration shops can introduce self targeting. See D. McCarthy, "Consumption Planning in Pakistan: Preliminary Analysis of Some Options" mimeo, International Nutrition Planning Program, Massachusetts Institute of Technology, December 1975 and B.L. Rogers and F.J. Levinson "Subsidized Food Consumption Systems in Low Income Countries: The Pakistan Experience," Discussion Paper No. 6, International Nutritional Planning Program, Massachusetts Institute of Technology, April 1976. A detailed analysis of target group policies is also available in S. Reutlinger and M. Selowsky, "Malnutrition and Poverty: Magnitude and Policy Options," World Bank Occasional Paper 23 (Baltimore: Johns Hopkins University Press, 1976), and P. S. George and J. Gavan, "Market Intervention in Food Distribution," IFPRI Working Paper 78/5 (Washington, D.C.: International Food Policy Research Institute, 1977). Ahluwalia points out that direct provision of consumption goods financed through the fiscal system as an instrument of redistribution derives importance because it operates directly to provide additional consumption and it can operate selectively in terms of the type of consumption good provided and in defining the beneficiaries of these schemes (See M.S. Ahluwalia "The Scope for Policy Intervention" in H. Chenery, M.S. Ahluwalia, C.I. Bell, J.H. Duloy, and R. Jolly *Redistribution with Growth* (New York: Oxford University Press, 1974).

7

ECONOMIC VIABILITY OF RATIONING WITHOUT CENTRAL GOVERNMENT SUBSIDY

The analysis of the impact of rationing on consumers and producers in Kerala indicated that the ration system in Kerala resulted in substantial gains to the state. Also, rationing in Kerala was maintained partially at a cost to the Central Government and partially at a cost to surplus states. Therefore, it is natural to ask whether rationing would be socially and economically viable in Kerala or in any food deficit country with characteristics similar to those of Kerala but without the aid of the Central Government or other surplus states. In order to provide a partial answer to this question, a hypothetical situation was analyzed in which Kerala was considered a separate nation directly importing foodgrains for public distribution from the international market.⁶³ In this analysis it was assumed that the past realized levels of production, procurement, ration distribution, and prices within the state would be the same⁶⁴ and that the Kerala government would incur the cost of subsidizing food distribution previously met by the Central Government. Since the cost of subsidizing imported rice and wheat incurred in the past reflected the prices actually paid by the Government of India in the inter-

national market, it was not necessary to determine the international market price.⁶⁵ Further, since this analysis assumed that all foodgrains used for the public distribution system were purchased from the international market, it was not necessary to estimate the transfer payments from other states to Kerala.

Estimated Impact of Rationing

Based on these criteria, the possible impact of rationing in Kerala was estimated for 1973/74, 1974/75, and 1975/76. As before, the implied ration income of the consumers was estimated using the relationship:

$$R = P_r Q_r$$

where:

R = ration income,

P_r = gap between open market and ration price, and

Q_r = quantity of ration rice offtake.

The gains to the consumers were determined based on the producer loss from levy sales of paddy, and the government cost of subsidizing imported rice and

⁶³ The analysis is only partial because the full impact of this assumption on various aspects of the national economy is not traced out. Such a complete analysis of the Kerala economy was beyond the reach of this analysis.

⁶⁴ This is quite realistic because the quantities entering the Kerala market remained the same. The assumption is only in relation to the mode of import. Thus, the analysis in this section uses the historical data with the modification that the incidence of subsidy incurred by the Central Government on supplying grains to Kerala is transferred from the Central Government to the Kerala government.

⁶⁵ As noted in Chapter 2, the subsidy incurred by the Central Government was the difference between landed cost of grains (the purchase price from foreign markets, ocean freight, port clearance, and domestic transport costs), and the issue price. Therefore, the use of subsidy rates avoids the necessity of estimating foreign market price, freight charges, and related costs of imports directly.

wheat. The loss to the producers in Kerala was estimated using the relationship:

$$L = P_f Q_l,$$

where:

L = loss of producers in Kerala on account of levy,

P_f = gap between farm level price (open market) and levy price, and

Q_l = quantity of rice sold under the levy operations.

Government subsidies of rice (S_r) and wheat (S_w) were based on the rates of actual imported rice and wheat subsidies incurred by the Central Government in the past. Thus, the total cost was defined as:

$$C = L + S_r + S_w.$$

The economic viability of rationing was determined through a comparison of R and C. When the estimated value of R exceeds the estimated value C, it implies that the possible gains to the consumers in the state exceeds the possible costs incurred by the state government and the local producers in maintaining the public distribution system, and therefore that rationing is an economically viable proposition. The estimated values of R and C, and the actual data used in obtaining the elements for 1973/74, 1974/75, and 1975/76 appear in Table 26.

The estimated values indicate that for all three years, the gains to the consumers (R) exceeded the costs (C) even when Kerala was considered to be an independent entity. Since the gap between R and C is fairly large, this conclusion

Table 26—Estimated rationing gains derived from ration income and ration costs based on state importation of foodgrains from international markets, 1973/74 -1975/76

	Symbol	Unit	Year		
			1973/74	1974/75	1975/76
Ration rice offtake	Q_r	1,000 tons	774	650	717
Open market retail price		Rs./ton	2,400	3,490	3,810
Ration rice price		Rs./ton	1,340	1,360	1,480
Retail rice price gap	P_r	Rs./ton	1,060	2,130	2,330
Ration income	R	million Rs.	820.4	1,384.5	1,670.6
Local levy procurement of paddy	Q_l	1,000 tons	80.9	60.3	60.0
Procurement price of paddy		Rs./ton	630	740	740
Farm level price of paddy		Rs./ton	1,885	2,462	1,830
Farm price gap	P_f	Rs./ton	1,255	1,722	1,090
Loss in farm income	L	million Rs.	101.5	103.8	65.4
Subsidy rate on rice		Rs./ton	388.2	276.6	886.1
Total rice subsidy	S_r	million Rs.	300.5	168.7	629.1
Ration wheat offtake		1,000 tons	192	338	354
Subsidy rate on wheat		Rs./ton	587.1	533.3	408.2
Total wheat subsidy	S_w	million Rs.	112.7	180.3	144.5
Total cost = $L + S_r + S_w$	C	million Rs.	514.7	452.8	839.0
Gains	R-C	million Rs.	305.7	931.7	831.6

will be valid even after making adjustments for any possible overestimation of R or underestimation of C.⁶⁶ However, the results of this analysis cannot be used to establish the relative merits of rationing over other alternative policy options such as open market operations of government imports. Since the income distribution aspects of rationing were discussed earlier, this chapter is only concerned with the question of whether such redistribution would be justified if Kerala had to incur consumer subsidies on food distribution.

Sensitivity of Estimated Gains

Close examination of the estimated rationing gains in Kerala presented in Table 26 indicates that the large gains (R - C) were obtained as a result of the high proportion of cereals imported from outside the state and the large retail rice price gap (P_r). The actual contribution made by these two factors is represented in Figure 8. The ration income is divided into its four components: loss in farm income (L), wheat subsidy (S_w), rice subsidy (S_r), and excess ration income (R - C). The excess ration income is sensitive to the retail price gap (P_r), the quantity of ration (Q_r), the share of ration quantities between supplies from within the state and imports, and government subsidy (S_r and S_w). The break-even levels of these variables can be estimated by assuming that when $R = C$,

$$Q_r P_r = Q_l (P_f - M) + (Q_r - b.Q_l) R_s + S_w \quad (1)$$

where:

Q_r, P_r, Q_l, P_f , and S_w are defined accord-

ing to Table 25,

M = marketing margin on levy rice,

b = conversion ratio from paddy to rice, and

R_s = subsidy rate on imported ration rice.

We further assume that $\frac{P_f - M}{b} = P_r$.

Therefore, equation (1) can be rewritten as:

$$Q_r P_r = b.Q_l P_r + (Q_r - b.Q_l) R_s + S_w,$$

or

$$(Q_r - b.Q_l) P_r = (Q_r - b.Q_l) R_s$$

$$+ S_w \quad (2)$$

If equation (2) contains only one unknown variable, the break-even level of that particular variable can be determined. To illustrate the procedure, the break-even levels of retail price gap (P_r) are estimated for 1974/75. Substituting the actual values for all variables other than P_r in equation (2), $P_r = Rs. 572$ per ton. Therefore, with other things being held constant at the levels existing during 1974/75, the net gains from rationing in Kerala will be positive as long as the retail price gap is more than Rs. 572 per ton. This holds true if at the given level of ration price (Rs. 1,360 per ton), the retail price in Kerala does not fall below Rs. 1,932 per ton, or the ration price does not exceed Rs. 2,918 per ton at the given open market retail price level.

Given the levels of the retail price, ration price, levy price, quantities of levy, and wheat subsidy, the maximum subsidy rate for rice (S) that Kerala can afford without incurring welfare losses is Rs. 1,803 per ton. Therefore, if the other variables remain at the levels prevailing during 1974/75, the net gains from rationing in Kerala will be positive as long

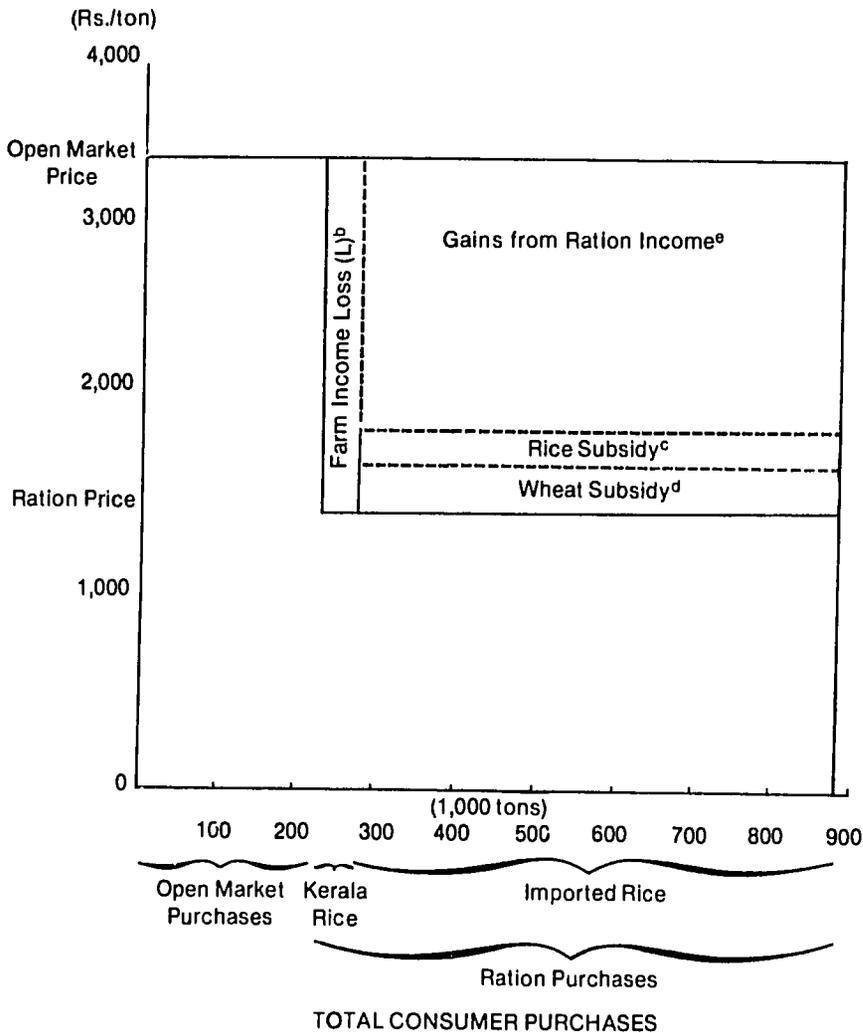
⁶⁶ For example, one could argue that the movement restrictions have raised the open market price in Kerala, and when this price is used to evaluate ration income (R) it may also provide the movement restriction effect. However, the conclusion obtained in this section is valid even when the national market price is used in the place of retail price in Kerala. (During 1974/75, the national price of Rs. 2500/ton gives ration income of Rs. 741 million compared to the total cost of Rs. 466.1 million.)

as the subsidy rate on rice remains below Rs. 1,803 per ton.

It is possible to extend this analysis further to cover situations where simultaneous changes in the levels of different variables occur. For example, if the retail price gap were to fall by 50 percent⁶⁷ and

government subsidy were to double,⁶⁸ the entire rationing gains in Kerala during 1974/75 would be eliminated. Thus, the framework discussed in this section provides a basis for determining the critical levels of the variables that are sensitive to the gains of rationing in a given region.

Figure 8—Components of the gains of rationing, 1974/75^a



^aFor simplicity in this diagram, the marketing margins on levy rice were not included.

^bL = Rs. 103.8 million.

^cS_r = Rs. 168.7 million.

^dS_w = Rs. 180.3 million.

^eR - C = Rs. 931.7 million.

⁶⁷ A fall in retail price gap by 50 percent would imply only 30 percent fall in the retail price of rice in the open market.

⁶⁸ Doubling of government subsidy on rice would imply a 17 percent increase in the landed cost of imported rice.

8

CONCLUSIONS AND POLICY IMPLICATIONS

This study has focused primarily on an analysis of the past performance of public distribution of foodgrains in Kerala, India. The analysis emphasized the factors influencing procurement, ration offtake, and general performance of public distribution; the impact of public distribution on the consumption levels, gains to the producers and consumers, and income redistribution; and relative efficiency of public distribution and income transfers.

The procurement level of paddy in Kerala was mainly influenced by the gap between the open market price and the procurement price. As the gap between these two prices increased, there was a fall in the procurement volume. Thus, for a given procurement price, the procurement level increased as the open market price fell; and for a given open market price, the procurement level increased as the procurement price increased. The procurement level was negatively related to the production level. It is usual for procurement volume to increase with production levels,⁶⁹ however, since the levy system of procurement in Kerala is based on the size of holdings, the negative relationship between procurement and production levels might be the result of the reduction in the average size of holdings over the year.

This study also indicated that public distribution in Kerala was influenced by the small proportion of food produced

within the state, the large difference between the open market price and ration price, a fairly comprehensive distribution network covering both rural and urban areas, the high level of public awareness of the ration system, the flexibility in the administrative arrangements for rationing, and the limited quantities made available through the public distribution system.

Since the amount of rice sold by the ration shops was determined by the availability of rice, which in turn was determined by the supply allotted by the Central Government, ration offtake of rice was not explained by usual demand variables. This study indicated that the shortfall in rice availability was compensated through an increased wheat supply. Therefore, the wheat offtake from the public distribution system was explained by rice offtake, open market price of rice, and price of tapioca relative to wheat price.

Ration rice accounted for a major share of the rice consumption of consumers belonging to the low income groups. Consumers in the low income groups obtained about two-thirds of their household consumption of rice from the ration shops, while consumers belonging to upper income groups obtained about one-third of their rice from the ration shops. The consumers belonging to the low income groups supplemented their rice ration with tapioca, a cereal sub-

⁶⁹ This is particularly true for wheat procurement in India. The elasticity of internal procurement of wheat with respect to production of wheat was about 3.4. Production level of wheat explained about 99 percent of the variations in procurement. P. S. George, "Government Interventions in Foodgrain Markets," Working Paper 78/31 (Washington, D.C.: International Food Policy Research Institute, 1978).

stitute. As the income levels increased, tapioca purchases were replaced by rice purchases from the open market.

The public distribution system had an impact on the consumption level of the low income families, income redistribution among producers and consumers in Kerala, and some Central Government transfer payments to Kerala through food subsidies. Thus, procurement and distribution of foodgrains had an impact on reducing the intra- and interstate disparities in income distribution.

This study also found that eliminating rationing and movement restrictions led to reduced consumption levels of rice in Kerala and an overall net loss to the producers and consumers in the state. The decline in consumption levels in the absence of rationing was maximum for the consumers belonging to the low income groups. The open market prices in Kerala remained much higher than the prices in other areas and levy accounted for a small portion of production, thus indicating that a return to free market would reduce the incomes of farmers in Kerala. The consumer expenditure on rice in the absence of rationing was higher than the expenditure levels under rationing.

While the Kerala government recovered the operating costs of public distribution from the consumers, the Central Government had to incur consumer subsidies to supply rice and wheat to the distribution system. However, the partial analysis of the gains to the producers and consumers in Kerala indicated that the gains in Kerala were much greater than the expenditures incurred by the Central Government on ration distribution in Kerala.

A comparative analysis of rationing and

direct income transfers indicated that rationing may be superior to income transfers for achieving certain short-term objectives because of the food consumption levels that can be achieved at lower costs, the organizational feasibility that exists for reducing leakages, and the political feasibility of rationing.⁷⁰ However, this study did not consider the relative merits of rationing and direct income transfer from the point of view of long-term impact of employment and growth linkages.⁷¹

The ration distribution in Kerala can be viewed as a consumer price subsidy system. The financial burden of this subsidy to Kerala was mainly carried by the Central Government (through the consumer subsidies incurred by the Central Government) and to a lesser extent by the farmers in Kerala (through sales to the government at prices below open market level). However, when the possibility of extending a system of subsidizing consumers through a dual pricing mechanism is considered in areas where opportunities for such transfer do not exist, it is important to analyze the economic feasibility of the system. In this analysis it was assumed that Kerala obtained its entire supply of foodgrains required for maintaining the public distribution from the international markets. The estimated costs and gains corresponding to the actual levels of operations from 1973/74 to 1975/76 indicated that the two price systems in Kerala would result in positive net gains to the consumers in Kerala even after meeting the consumer subsidies resulting from direct purchases from the international markets.

Consumer price subsidy programs are often viewed with scepticism because of their high budgetary requirements,

⁷⁰ While it is recognized that the most direct approach to solving the food problem is to provide increased income to the poor, in many countries there are strong political pressures against a direct income transfer.

⁷¹ John W. Mellor, *The New Economics of Growth: A Strategy for India and the Developing World* (Ithaca: Cornell University Press, 1976).

large administrative opportunity costs, depressing effects on domestic agricultural prices, and leakages to the non-target groups. The experience of the public distribution system in Kerala indicates that, under certain circumstances, these obstacles can be overcome through appropriate policies of procurement, pricing, and distribution. While it may be possible to take a position that the long-term answer to achieving increased consumption levels of the poor is to provide increased income opportunities, this cannot be a short-term solution. The short-term solution for areas such as Kerala is an effective public distribution system. However, this is not necessarily true for all countries since the financial burdens of a consumer subsidy program may be beyond the budgetary constraints of many countries. While it was established that a food subsidy scheme might be more cost-effective in achieving the consumption objective than a general income transfer, it is still possible that the reduced financial requirements also may use a substantial portion of the national budget and thereby introduce severe limitations on funds for development activities. If this is indeed so, the options open to national governments include reduced expenditures (through reduced coverage of population, smaller per capita quantities, or reduced subsidies) and financing food subsidies through international aid.

Finally, a word of caution should be added. This case study of rationing in Kerala provides some empirical evidence that indicates:

1. Subsidized public distribution reduced the skewness in consumption levels among the different groups of consumers;
2. Procurement of rice through graded

levy at price levels below open market price reduced the income disparities among farmers;

3. Subsidized public distribution was better than direct income transfer for raising the consumption levels of low income consumers, from the point of view of feasibility and cost effectiveness; and
4. The partial gains to the producers and consumers in Kerala exceeded the direct cost of government subsidy.

While this study established the viability and effectiveness of public distribution in achieving certain income and consumption objectives of the poor with some empirical evidence, it should be remembered that the estimates of income transfers provide only part of the picture. In fact, the analytical procedures used in the paper and the empirical estimates should not be used to measure efficiency losses of rationing or to determine the trade-off between such efficiency losses and distributional gains. Further, the analysis does not discuss alternative short- and long-term strategies for increasing the consumption levels of the poor. In addition, while rationing has produced the desired effects under the socio-economic conditions in Kerala, it is important to analyze the specific conditions for other areas before establishing its feasibility in those areas. The Kerala experience offers some preconditions and guidelines for extending such coverage. When determining the feasibility in other areas, the economic conditions in each area should be analyzed to provide the justification for extended coverage and to judge whether some of the organizational and administrative requirements of an efficient rationing system can be developed in the area.

**APPENDIX
SUPPLEMENTARY TABLES**

**Table 27 — Daily per capita availability of calories for India, 1960/63
and Kerala, from 1961/62-1970/71**

Source	India (Average 1960-63)		Kerala (Average 1961/62 to 1970/71)	
	(calories)	(percent)	(calories)	(percent)
Rice	701	34.8	920	39.3
Wheat	255	12.6	81	3.5
Other cereals	390	19.3	5	0.2
Tapioca	11	0.5	628	26.8
Sweet potatoes	7	0.4	7	0.3
Potatoes	8	0.4	—	—
Coconut	6	0.3	254	10.6
Pulses and oilseeds	210	10.4	33	1.4
Vegetables	2	0.2	—	—
Fruits	27	1.3	70	3.0
Fish	3	0.1	39	1.7
Milk	108	5.4	22	0.9
Meat	6	0.3	6	0.3
Eggs	1	0.1	3	0.1
Oils and fat	93	4.6	172	7.4
Sugar	188	9.3	100	4.3
Total	2,016	100.0	2,340	100.0

Source: U.N. Department of Economic and Social Affairs, *Poverty, Unemployment and Development Policy: A Case Study of Selected Issues with Reference to Kerala* (New York: United Nations, 1975), pp. 26 and 161.

Table 28—Levy rates of paddy, 1975/76

Area Under Paddy	Rate Applicable for	Levy Rates in Category ^a		
		A	B	C
(acres)		(quintal/acre)		
Up to 2		nil	nil	nil
2-3	area in excess of two acres	3	2.5	2
3-5	area in excess of one acre	3	2.5	2
5-10	the first 5 acres	3	2.5	2
	every acre in excess of 5 acres	7	5	3.5
More than 10	the first 10 acres	7	5	3.5
	every acre in excess of 10 acres	9	7	5.5

Source: Government of Kerala, Department of Food, *Annual Report 1975/76* (Trivandrum: Kerala Government Press, 1977), pp. 35-38.

^a The average yields assumed for the three categories were as follows:

Category A: 2,500 kg/hectare.

Category B: 2,000-2,500 kg/hectare.

Category C: less than 2,000 kg/hectare.

Table 29—Cumulative percentage of producers and gross farm income from rice sales, 1974/75

Size of Holding	Producers	Farm Income From Rice Sales	
		With Levy Procurement	Without Levy Procurement
(acres)		(percent)	
Up to 2	69.9	31.6	28.3
2-5	91.4	77.5	74.4
5-10	98.6	94.5	93.8
More than 10	100.0	100.0	100.0

Table 30—Cumulative percentage of households and realized household income, 1974/75

Income Group	Households	Actual Household Income	Household Income When Ration Rice is Valued At	
			Market Price in Kerala	National Open Market Price
(Rs.)			(percent)	
Up to 600	20	4.4	7.7	6.5
601-1,200	43	15.0	21.8	19.0
1,201-2,400	73	39.9	49.2	45.4
2,401-3,600	83	55.0	63.7	60.2
3,601-4,800	93	75.8	80.9	78.9
More than 4,800	100	100.0	100.0	100.0

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