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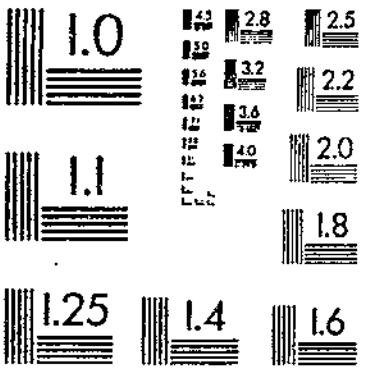

United States Department of Agriculture

Economic Research Service

Technical Bulletin Number 1697

A New Method To Assess Effects of Food Supply Shocks on Consumption in Developing Countries

Sovan Tun
Mervin J. Yetley

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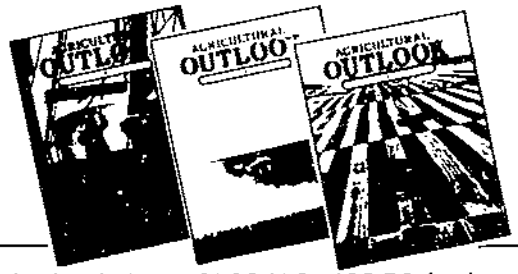

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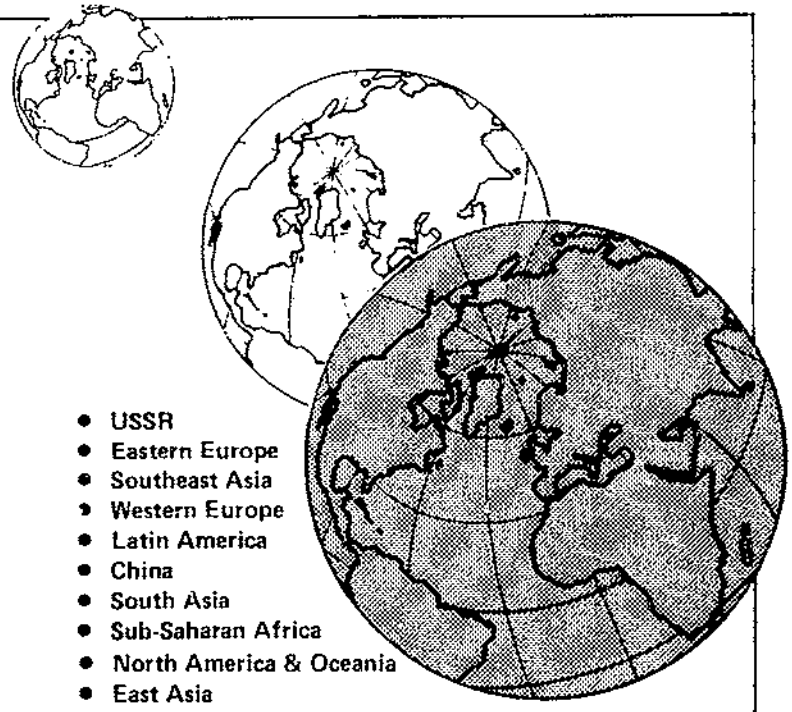

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A New Method to Assess Effects of Food Supply Shocks on Consumption in Developing Countries by Sovan Tun and Mervin J. Yetley. International Economics Division, Economic Research Service, U.S. Department of Agriculture, Technical Bulletin No. 1697.

ABSTRACT

The analytical procedure described here permits, for the first time, a priori assessment of how the demand for foods within specific consumer groups may be affected by shortrun market supply changes. The analysis suggests that some food aid donations (rice, for example) benefit the poor more than other food aid donations (other cereals). The procedure can also be used to project the specific benefits of food and agricultural policy options on targeted groups within a country's population.

Keywords: consumer demand, commodity demand, demand elasticities, food and agricultural policy, nutrient consumption, development programs, P.L. 480 food aid.

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Washington, D.C. 20250

January 1985

SUMMARY

This study demonstrates the use of an analytical procedure for addressing policy issues associated with shortrun shocks of food supplies in developing countries. The procedure can predict how shortrun food supply shocks will affect food consumption among different consumer groups, as well as how a shortrun supply shock will affect consumption of different foods within a country. Thus, the effects of an unusually large domestic supply, or a significant shortfall in supply, on food consumption can be assessed and the associated implications for exports or imports of specific commodities can be appraised.

The procedure is especially useful for assessing the effects of food and agricultural policy options in developing countries. In the short run, the information generated by the procedure can be used by food aid donor countries and agencies to develop food aid assistance programs and to derive the implications of providing food aid to a country. These include the distribution of benefits, targeting food aid through the market, estimating the efficiency of food aid programs, using food aid as a development tool, and estimating total food needs. This information may be further used to infer changes in the balance between short-term commercial and concessional food trade needs.

The empirical results presented in this study are based on a case study of Sri Lanka. The results suggest that the effects of shortrun supply shocks are not evenly distributed across consumer groups. Rather the nature and extent of the effects depend on both the food commodity and the consumer group being considered. The effects differ because the structure of food demand is different for different consumer groups. For example, a shortrun increase in the supply of rice was found to be quite evenly distributed throughout the population, whereas urban consumers benefited most from an increase in the supply of other cereals.

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A New Method To Assess Effects of Food Supply Shocks on Consumption in Developing Countries

Sovan Tun
Mervin J. Yetley

INTRODUCTION

Little analytical information is available to decisionmakers regarding which consumer groups will benefit (or suffer) if food supplies increase (or decrease). This paucity of information is primarily the result of two factors. The first is a scarcity of data on which to base the analyses. The second has been the lack of an appropriate procedure to analyze the data that do exist. This combination of factors has meant that little was known about the market demand of various consumer groups for specific food commodities in developing countries.

The analytical procedure described in this paper was used to assess changes in food consumption resulting from shortrun changes in market supply. Specifically analyzed were the changes in the consumption of specific foods for various consumer groups. Sri Lanka was used as a case study to describe the technical application of the procedure, with an assumed P.L. 480 food aid shipment serving as the market supply shock. The range of food and agricultural policy and program issues the procedure can address is also discussed.

Policymakers need the ability to anticipate the impacts of shortrun food supply shocks on various consumer groups in developing countries. The need for this capability arises from the marked interannual variability in food supplies in many developing countries. Changes in supply may also cause changes in prices; and if prices rise too rapidly, the poor will suffer.

Some sources of variability in food supplies are obvious and well known. Weather, diseases, and pestilence affect local production and levels of international stocks and surpluses. Other sources of food supply variability are less obvious. Changes in domestic policies and international economic conditions can influence the level of use of production inputs, and thus food supplies. Changes in pricing policy, as well as changes in monetary policies, can encourage production of some foods and discourage production of others. Changes in foreign exchange reserves can influence commercial trade, and thus the supply of food available within a country. Global weather and

economic conditions can affect the amount of concessional food aid available from donor countries, and hence the supply available to potential recipient countries.

ANALYTICAL FRAMEWORK

An underlying assumption of this analysis is that increased supplies of food commodities are distributed through a competitive market system within the recipient countries. The increased market supply affects the food commodities' own prices and the prices of other commodities. 1/ These changes in market prices in turn affect the quantities of foods demanded by specific consumer groups. Only shortrun consumption impacts were investigated in this report. Consumer disposable income and the demand structure were, therefore, assumed to be constant.

Consumer demand theory states that the quantity of a food purchased in the market is a function of its own price, the prices of other goods, and the buyer's income. Stated in equation form,

$$Q_{ih} = F(P_i, P_j, P_{j+1}, \ldots P_k, Y_h) \qquad (1)$$

where

Q_{ih} is the quantity of the ith food purchased by household h,

P_i is the price of the ith food, i = 1 to n,

$P_j, P_{j+1} \ldots P_k$ are the prices of other foods, $i \neq j$, and

Y_h is the household food expenditure.

This same equation may be used for each food or food group of interest, and if so used will result in a system of equations with n rows and n+1 columns. The parameters of this system may be simultaneously estimated by employing the "Seemingly Unrelated Regressions" technique; that is, by using quantity purchased, price, and expenditure information contained in a typical household survey. If theoretical constraints are applied, for example, that consumers' food budget limits are not violated, the resulting matrix of food demand parameters represent the structure of food demand. If these estimates can be made for specific consumer groups that are mutually exclusive and exhaustive, then the demand for each food commodity within each consumer group can be investigated. Further, the weighted sum of the parameters of each consumer group is an estimate of the aggregate, or country level, parameters. The weighted sums allow the investigation of total demand as well as the comparison of demand across groups.

If the data in equation 1 are transformed to logarithms, and the theoretical constraints applied, the statistical estimates of

1/ No attempt is made in this analysis to account for consumer price subsidies or for price ceilings in general. This issue can, however, be incorporated into the analysis on a country-by-country basis.

the parameters interrelate food prices and expenditures to quantities purchased. Shown in matrix form in equation 2 below, these parameters form an interrelated system where the values on the diagonal, that is, E_{11}, E_{22},...E_{kk} are own-price elasticities, the off-diagonal values are cross-price elasticities, and the last column contains expenditure elasticities.

$$\begin{matrix} E_{11} & E_{12} & \cdots & E_{1k} & E_{1y} \\ E_{21} & E_{22} & \cdots & E_{2k} & E_{2y} \\ \vdots & & & & \\ E_{k1} & E_{k2} & \cdots & E_{kk} & E_{ky} \end{matrix} \qquad (2)$$

Using brackets to express the equation in matrix form, the notation becomes

$$[Q_i] = [E_{ij}] [P_j] + [E_{iy}] Y \qquad (3)$$

However, the focus of this study is on shortrun supply shocks; that is, what happens when the quantity available on the market changes by a certain percentage, ΔQ_i. 2/ Since the interest lies in changes at the margin, equation 3 may be reformulated as

$$[\Delta Q_i] = [E_{ij}] [\Delta P_j] + [E_{iy}] \Delta Y, \qquad (4)$$

where Δ denotes a percentage change.

In the short run, $\Delta Y = 0$. Disposable income and the structure of food demand, as represented by the $[E_{ij}]$ and $[E_{iy}]$ matrices, remain constant; hence food expenditure does not change. In this study, the percentage quantity change $[\Delta Q_i]$ is the exogenous driving factor so that equation 4 is solved for $[P_j]$,

$$[\Delta P_j] = [E_{ij}]^{-1} [\Delta Q_i], \qquad (5)$$

where $[E_{iy}] \Delta Y = 0$, since $\Delta Y = 0$. Equation 5 relates a percentage change in the quantity of any food or combination of foods to the expected percentage change in the price of each food. The resulting changes represent new market-clearing prices at the aggregate level under open market conditions. 3/

To this point, the data needed for the analysis have been national aggregates. However, Pinstrup-Andersen et al., Yetley and Tun, and Chieruzzi et al., have reported on research that

2/ In this report, the Δ notation denotes percentage change and "d" is used to denote actual quantity change.

3/ A double-log demand system does not meet the additivity restriction. However, such a system, based on a generalized family of constant elasticity of substitution utility functions, does approximately satisfy the additivity restriction. Interested readers are referred to (5) in References at the end of this report.

shows how national aggregate data can be derived from household survey data (1, 4, 6). 4/ These researchers have estimated complete demand elasticity matrices for various consumer groups, then calculated the national aggregate elasticities as the weighted sum of the values derived for each consumer group. Hence,

$$E_{ij} = \frac{e_{ij(m)}\ P_m\ Q_{im}}{P_{(m)}\ Q_{i(m)}}$$

Where E_{ij} is the aggregate level own- and cross-price elasticity values,

$e_{ij(m)}$ is the own- and cross-price elasticity values specific to consumer group m,

$P_{(m)}$ is the population of consumer group m, and

$Q_{(m)}$ is the average daily per capita quantity purchased by group m.

Similarly, the inverse of the aggregate elasticity matrix $[E_{ij}]$, is the weighted average of the inverted elasticity matrix for each consumer group.

When an additional quantity of food is placed on the market, the appropriate elasticity values to use in relating prices and quantities are those in the national aggregate matrix, since consumer groups face approximately the same market.

However, the demand elasticity values appropriate for estimating consumption changes in specific consumer groups are those derived from the group itself. Therefore, to estimate consumption changes for group m, the percentage change in prices at the aggregate level resulting from changed market quantities are first calculated using equation 5, then the same percentage price change is inserted into equation 6 for each of the m groups. This provides an estimate of the change in consumption for each commodity for each consumer group m, based upon its own demand structure. This procedure assumes only that local markets reflect the aggregate level market by the same percentage of price change, as opposed to having the same price and same absolute change. Thus,

$$[\Delta q_i]_{(m)} = [e_{ij}]_{(m)}\ [\Delta P_j] \qquad (6)$$

where $[e_{ij}]_{(m)}$ are elasticities specific to a consumer group, m, $[\Delta q_j]_{(m)}$ is the change in percentage quantity demanded by consumer group, m, and $[\Delta P_j]$ is the percentage price change determined at the national level.

4/ Underscored numbers in parentheses refer to sources cited in the References at the end of this report.

Since in this study the change in quantity of each commodity is expressed as a percentage, the change in actual quantity terms, $dq_{i(m)}$, for each consumer group, m, is

$$dq_{i(m)} = \overline{Q}_{i(m)} \Delta q_i \ (m), \qquad (7)$$

where the operater "d" refers to the change in real quantity terms associated with a given percentage change. Once the change in real quantity is known, a change in calories or in protein can be calculated by taking into consideration the nutrient composition of each food commodity and the proportion that is edible. For a commodity group, the nutrient composition is a weighted sum of the individual commodities.

EMPIRICAL ANALYSIS: A CASE STUDY OF SRI LANKA

To illustrate the analytic procedure, this report is based upon the structure of food demand in Sri Lanka as estimated by the "seemingly unrelated regression" procedure, with the theoretical restrictions applied, and using the log-log transformation. Details of this estimation procedure, as applied to the household survey data used in this study, may be found in (1).

The sample of households used as the data base was selected using a two-stage sampling procedure, with census blocks as the first stage and specific households as the second stage. The survey was carried out in each quarter of a 1-year period in 1969/70 by the Department of Census and Statistics in Sri Lanka. A household was defined as two or more persons jointly occupying living quarters and providing themselves with food and other essentials. This definition included servants, but excluded paying boarders and single individual units. The total number of households interviewed was 9,694 in the rural, urban, and estate sectors.

In this study, rural and urban households were analyzed separately, omitting the estate households. The rural and urban households were then divided into five income levels, where income included income received "in kind." No value was imputed to the 2 pounds of free Government rice ration available weekly to each person. The rice ration was excluded from the demand analysis because it was deemed as being outside the market and therefore not influenced by economic factors. The rice ration is, of course, included in overall rice consumption for purposes of calculating levels of nutrient intake. 5/ Demand elasticity matrices were estimated for each income group (app. tables 1 and 2). Details of the computation of these demand elasticity matrices and aggregation to the national level are discussed in (1) and (6).

Sri Lanka, during the late sixties and early seventies, had a substantial food deficit. This deficit was largely covered by

5/ Because of the age of the data used and the substantial changes in Sri Lankan food policy and social welfare programs, information generated in this report cannot be directly applied to present-day Sri Lanka.

concessional food imports, with Public Law (P.L.) 480 food aid contributing a significant proportion to the total. The P.L. 480 shipments were primarily rice and wheat flour (the latter being the chief component in the "cereals" category of this report). These external injections of food commodities are good examples of shortrun supply shocks to the market system. The amount of food aid received is variable, and neither the amount nor the circumstances underlying the food aid agreements may be counted upon in succeeding years. Other sources of shortrun market shocks, such as variable domestic production due to weather, could be used; but the importance of food aid in managing food deficits makes it an obvious example for analysis. The focus of this study is on consumption impacts, as measured by changes in nutritional intake, resulting from changing market food quantities due to P.L. 480 shipments.

Changes in Prices of and Demand for Food Commodities

To illustrate the analysis, assume a P.L. 480 shipment of commodities arrives in Sri Lanka. The commodities are placed into the market system for consumers to buy. With a 3-percent increase in the national supply of the commodities due to the P.L. 480 shipment, the percentage changes in aggregate market prices, shown in table 1, can be calculated using equation 5. If rice alone were shipped into the country, a 3-percent increase in the total market supply of rice would generate a 6.74-percent decline in the price of rice, a 3.28-percent decline in the price of cereals, a 1.21-percent decline in the price of spices, a 12.40-percent decline in the price of cooking oil, and so forth (as shown in table 1).

If other cereals, namely wheat flour, were shipped into Sri Lanka, market price changes would be similar to those found for rice. A 3-percent increase in cereals would reduce the price of cereals by 12.67 percent but increase the price of rice by 1.24 percent. The increase in cereals supply would also raise the price of food purchased away from home by 13.11 percent, the price of animal products by 3.81 percent, fruits by 1.21 percent, sugar by 2.9 percent, and nonalcoholic beverages by 3.39 percent (table 1).

Similarly, the combined effects of shipments of both rice and cereals into Sri Lanka, at 3 percent above current local supply for each commodity, would lower the market price of rice by 5.49 percent, cereals by 15.95 percent, oil by 13.37 percent, and so forth (table 1).

These changes in market prices, resulting from increased supplies of staple foods, clearly show the impact of commodity substitution as determined by the estimated cross-elasticity values. The changes in price for the major food commodities are quite logical and fairly small. The larger percentage changes, some of which appear questionable, occur for commodities that have a very small budget share and therefore have little impact on overall food expenditures.

Each consumer group is assumed to face the same relative price changes enumerated above.

Table 1—Percent change in market price due to 3-percent increase in national supply of rice and cereals

Food items	Rice alone	Cereals alone	Rice & cereals
		Percent change	
Rice	-6.74	1.24	-5.49
Cereals	-3.28	-12.67	-15.95
Food away from home 1/	10.50	13.11	23.62
Spices	-1.21	.71	-.62
Vegetables	-.36	.65	.29
Fish	1.80	.85	2.65
Animal products	2.34	3.81	6.15
Fruits	-2.34	1.21	-1.13
Sugar	-.98	2.90	1.92
Oil	-12.40	-.98	-13.37
Alcohol, tobacco, chewing nuts, and betel	1.18	1.03	2.22
Nonalcoholic beverages	5.25	3.39	8.64

1/ Foods purchased and consumed away from home consist mainly of rice or bread with curry, and tea or soft drinks.

The combined effects for rice and cereals are discussed here, with the separate effects for each presented in appendix tables 3-12.

From both economic theory and direct observation, changes in food prices would be expected to elicit differing market behavior between rich and poor consumers as well as between rural and urban residents. Accordingly, full demand elasticity matrices were estimated for the five income groups in both rural and urban areas of Sri Lanka. 6/ Equation 6 was used to calculate the percentage change in quantities demanded for each food group for consumers in each income-residence area. The results, summarized in table 2, do not support the expectation that rice consumption would increase in all income-residence groups. Rice consumption actually declined in rural income groups I and IV and also in urban income groups I and II. However, the pattern of rice consumption did consistently increase from the poorest to the richest urban groups as urban I rice consumption declined by 1.63 percent and urban group V rice consumption rose by 4.87 percent. Rural groups did not show this pattern.

6/ The income groups are defined, for both rural and urban areas, as follows: I (lowest), 0-200 rupee per month food expenditure; II (low), 201-400 rupee per month, III (middle), 401-600 rupee per month; IV (high), 601-800 rupee per month; and V (highest) 801 + rupee per month. The average 1969-70 exchange rate was $1 U.S. = 5.95 rupee.

Table 2--Change in quantity demanded of food items
due to 3-percent increase in national supply of rice and cereals, Sri Lanka

Food items	Rural I	Rural II	Rural III	Rural IV	Rural V	Urban I	Urban II	Urban III	Urban IV	Urban V
					Percent					
Rice	0.73	0.34	3.50	-0.69	1.03	-1.63	-0.49	2.03	2.32	4.87
Cereals	4.50	8.41	1.94	4.24	8.96	11.48	10.59	5.10	5.25	10.42
Food away from home	.35	-.73	2.42	-3.53	7.97	-3.78	-3.61	-2.45	-4.39	.92
Spices	- .93	1.29	1.31	4.81	3.37	-.43	-1.09	3.80	4.55	4.42
Vegetables	.62	-1.57	-2.20	4.75	-1.43	3.64	.86	1.85	4.48	2.83
Fish	-2.91	3.77	-.33	-1.91	-.41	-4.69	2.65	.47	-.07	3.96
Animal products	1.77	-5.60	-4.21	-8.24	-.41	-6.98	-4.80	-3.19	3.07	.33
Fruits	.22	-2.24	-.33	4.55	1.84	-2.04	-.50	3.38	4.89	6.55
Sugar	-2.50	-.77	-1.38	-1.28	4.46	-1.38	-4.69	-2.14	1.57	1.21
Oil	10.45	1.39	9.40	-1.81	15.38	12.47	6.99	5.83	18.18	5.32
Alcohol, tobacco, chewing nuts, and betel	.79	3.35	3.90	-1.85	2.99	-3.39	-2.37	2.87	5.11	11.21
Nonalcoholic beverages	-6.92	-2.58	-9.06	-7.51	-14.32	-9.78	-10.00	-9.53	-5.58	-7.28

Consumption of cereals did show a pattern consistent with expectations. In every income-residence category, consumption of cereals rose substantially. Indeed, the percentage change in cereals consumption was larger than that for rice in every category except rural group III, suggesting that cereals are used as a substitute for rice. Further evidence of substitution is found in the change in consumption of sugar, the cheapest source of calories, which declined in all categories except rural group V and urban group IV and V. In contrast, the consumption of cooking oils, another calorie-rich food, rose sharply in all categories except rural IV.

The "cereals" category consists of wheat flour, other local food grains, bread, and bakery products. Wheat flour and bread account for most of the total consumption in this category for all consumer groups. In both rural and urban areas, consumption of bread increases sharply with income. Consumption of wheat flour is fairly constant across urban income groups, but declines with income among rural consumers. Because of the composite nature of this cereals food group, any increased supply in the group assumes each item increases by the same proportion. Given a P.L. 480 shipment of wheat flour, this assumption appears reasonable for wheat flour and bread, but is not strictly met because of the small component of local grains in the cereals food group.

These results suggest that the structure of food demand does not fully conform to a priori expectations, nor is the structure the same for rural and urban consumers. This finding has important implications for development planning and for identifying market potential for food commodities, discussed further in the "Implications" section of this report.

Changes in Nutrient Intake

Changes in the market quantities purchased, derived above, are in percentages. Using equation 7, these are multiplied by the average per capita quantity demanded by each income-residence group to derive the actual change in quantity. Then, using a table of nutrient composition, each food item was converted to calories or grams of protein consumed. The results are summarized in tables 3 through 6, with additional detail in appendix tables 13 through 42.

This discussion focuses on the net nutritional impact of an assumed P.L. 480 shipment. While the consumption of the commodity shipped may increase, the ensuing substitutions among the remaining food groups may either enhance or detract from the nutritional gains derived from the commodity itself. The overall change in caloric intake, resulting from a P.L. 480 commodity shipment is used in this report as the measure of net nutritional (or consumption) benefit.

On average, a shipment of rice and cereals increases the caloric intake of every income-residence group (table 3). The highest gains take place in the high-income groups in both rural and urban areas. Urban income group V has the largest average calculated gain of 156 calories per capita per day. This

Table 3--Change in caloric intake by product by consumer group due to 3-percent increase in national supply of rice and cereals

Food item	Rural I	Rural II	Rural III	Rural IV	Rural V	Urban I	Urban II	Urban III	Urban IV	Urban V
					Calories/capita/day					
Rice	-3	4	24	-5	7	-7	-2	10	11	25
Cereals	22	61	9	24	57	72	62	31	32	65
Food away from home	0	0	0	0	0	0	0	0	0	0
Spices	-1	1	1	3	2	0	-1	3	3	4
Vegetables	1	-2	-2	6	-2	3	1	2	4	3
Fish	-1	2	0	-1	0	-2	-1	0	0	2
Animal products	1	-2	-2	-6	0	-3	-2	-2	2	0
Fruits	-1	-8	-1	24	13	-5	-2	15	23	42
Sugar	-11	-4	-9	-8	46	-5	-25	-13	12	11
Oil	1	0	2	0	3	2	1	1	4	1
Alcohol, tobacco, chewing nuts, and betel	0	2	2	-1	1	-2	-1	1	1	3
Nonalcoholic beverages	0	0	0	0	0	0	0	0	0	0
Total	8	52	22	35	127	52	30	47	92	156

increase results mainly from increased consumption of cereals (65 calories per capita per day). Other income groups in rural areas also increased their caloric intake, but by lesser amounts. Although other consumer groups showed a loss of calories from rice, all increased their overall caloric intake because of increased consumption of cereals.

A more detailed look at the distribution of net changes in caloric intake across consumer groups reveals an interesting pattern. In the case of a 3-percent increase in rice alone, the net change in daily per capita caloric intake is remarkably similar within rural and urban income groups I through IV. Within these groups, the existing food demand structures distribute additional quantities of rice in such a way that the net effect on caloric intake is spread relatively evenly among consumers. In particular, the poorest receive some net nutritional benefit.

However, the distribution of net nutritional benefit from a shipment of cereals alone was quite different. 7/ In this case, rural income groups I through IV received no net caloric gain, while the same income groups in urban areas experienced caloric gains similar to that for rice (table 4). There is thus a distinct difference in the food demand structures among corresponding rural and urban income groups, except for the two highest income groups. From a policy viewpoint, both the kind and quantity of food aid shipments must be carefully considered if the nutritional needs of specific consumer groups are to be properly addressed.

Total consumption of protein is increased in all income groups by imports of rice and cereal (table 5). The highest gains in protein intake are found in the highest income groups. This is mainly the result of increased consumption of cereals. Rural income group I had a total increase of 0.16 gram per capita per day of protein. Note that cereal contributed 0.56 gram to this increase, but food substitution resulted in small losses from several other foods for a net increase of 0.16 gram. For urban income groups I and V, with gains of 0.88 and 3.76 grams per capita per day of protein, cereal is again the main contributor to the total increase.

In summary, a 3-percent increase in the national supply of rice and cereals, due to a P.L. 480 shipment of these commodities into the country, would improve the daily intake of calories and protein of the population. For rural income group II, the addition of 52 calories per capita per day would bring the daily consumption to 2,378 calories, which is 108 percent of the recommended level (table 6). The increased caloric intake in rural income group I and urban income groups I and II still leaves these groups below recommended minimums. For urban income group I, with an average daily consumption of 1,902 calories, or 86 percent of the recommended level, the increase

7/ If this increase is from P.L. 480, then cereals may be translated as "wheat flour."

Table 4--Net change in caloric intake by consumer group due to 3-percent increase in national supplies of rice and cereals

Consumer group	Rice alone	Cereals alone	Rice and cereals 1/
	Calories/capita/day		
Rural I	17	-9	8
Rural II	55	-3	52
Rural III	23	-1	22
Rural IV	36	-1	35
Rural V	61	66	127
Urban I	17	35	52
Urban II	17	11	30
Urban III	31	17	47
Urban IV	36	56	92
Urban V	66	90	156

1/ The combination of rice and cereals should equal the total of rice plus cereals, but may not due to rounding to whole numbers.

in calories resulting from the P.L. 480 shipment raises daily consumption to 89 percent, or 1,954 calories per capita per day. The intake in urban income group II increased from 94 to 95 percent of the recommended level on an increase of 30 calories per capita per day.

While the increase in protein brought about by the P.L. 480 shipment of rice and cereals raises the level of intake in all income groups, the increases are generally small, except in the highest income levels (table 5). The total protein intake of groups rural I, urban I, and urban II are below recommended levels. Given the size of the assumed P.L. 480 shipment, only for urban group II would intake exceed 100 percent of the recommended level (table 6). The daily protein consumption in rural and urban income groups I did increase, but still did not meet the recommended level of 48 grams per capita per day.

IMPLICATIONS FOR P.L. 480 FOOD AID

In this section, adequate food consumption is assumed to be a major goal of P.L. 480 programs. This is not to say that nutrition is, or should be, the only goal of these programs. However, the study was undertaken because of the lack of information regarding the impact of alternative P.L. 480 programs on food consumption. It is hoped that with the goal of improving the effectiveness of U.S. food aid assistance, the type of detailed food intake data presented here will illustrate how more fully informed and objective decisions can be made.

Table 5—Change in protein intake due to 3-percent increase in national supply of rice and cereals,

Food item	Rural I	Rural II	Rural III	Rural IV	Rural V	Urban I	Urban II	Urban III	Urban IV	Urban V
					Grams/capita/day					
Rice	-0.06	0.07	0.45	-0.08	0.14	-0.13	-0.04	0.18	0.20	0.47
Cereals	.56	1.51	.24	.60	1.42	1.81	1.55	.77	.80	1.63
Food away from home	0	0	0	0	0	0	0	0	0	0
Spices	-.05	.08	.07	.24	.18	-.02	-0.6	.23	.26	.29
Vegetables	.03	-.09	-.10	.24	-.07	.12	.03	.07	.18	.13
Fish	-.17	.34	-.03	-.18	-.04	-.42	-.22	.04	-.01	.38
Animal products	.05	-.20	-.18	-.57	-.03	-.28	-.20	-.17	.18	.03
Fruits	-.01	.14	-.02	.04	.22	.08	-.03	.25	.39	.71
Sugar	-.17	-.06	-.14	.12	.68	-.08	-.37	-.19	.17	.16
Oil	0	0	0	0	0	0	0	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0	0	0	0	0	0	0	0
Nonalcoholic beverages	-.02	-.01	-.04	-.04	-.08	-.04	-.04	-.04	-.02	-.04
Total	.16	1.50	0.25	.49	2.42	.88	.62	1.14	2.15	3.76

Table 6--Intake of calories and protein after a 3-percent increase in the national supply of rice and cereals, by income group

Consumer group	Calories--2,200 recommended daily allowance (RDA)				Protein--48 grams recommended daily allowance (RDA)			
	Daily consumption	Change due to increase	Total	Coverage	Daily consumption	Change due to increase	Total	Coverage
	--Calories/capita/day--			Percent of RDA	--Grams/capita/day--			Percent of RDA
Rural I	2,099	8	2,107	96	46.5	0.16	46.66	97
Rural II	2,326	52	2,378	108	52.0	1.50	53.50	111
Rural III	2,467	22	2,489	113	56.2	.25	56.45	118
Rural IV	2,598	35	2,633	120	59.0	.49	59.49	124
Rural V	2,736	127	2,863	130	63.9	2.42	66.32	138
Urban I	1,902	52	1,954	89	44.2	.88	45.08	94
Urban II	2,067	30	2,097	95	47.7	.62	48.32	101
Urban III	2,230	47	2,277	104	52.5	1.14	53.64	112
Urban IV	2,340	92	2,432	111	54.8	2.15	56.95	119
Urban V	2,473	156	2,629	120	60.9	3.76	64.66	135

Source: (5)

The first and most obvious point is that P.L. 480 food commodities, placed on the open market of a recipient country, will not, in general, be evenly distributed throughout the population. In particular, the "trickle down" theory (the assumption that any additional foods on the market will automatically benefit the poor) is not necessarily true. Specifically, the analysis clearly demonstrates that food commodities are selected differently in the market by different consumer groups. For example, if only cereals were included in a food aid shipment, rural income groups I, II, III, and IV would actually reduce their net caloric intake slightly, while urban residents would increase theirs (table 4). However, a shipment of rice alone would raise caloric intake relatively evenly throughout the population. Thus, both the type and quantity of food aid commodities must be considered if P.L. 480 shipments are to enhance nutrition.

Targeting Food Aid Through the Market

The above discussion implies the possibility of targeting food assistance through the open market. This becomes feasible because the market behavior of the various consumer groups can be anticipated. Thus, if a given consumer group is known to be nutritionally at risk, then food commodities of the kind and quantity that most nearly meet that group's needs can be programmed into the food aid assistance agreement. Within the context of this study, such programming means selecting commodities that already contribute substantially to the diet and that contribute to higher net nutrient intake in the target than in the nontarget consumer groups. When these conditions are met, additional quantities placed on the market will be purchased and consumed proportionally more by the target than by the nontarget groups. In this report, these commodities are cereals for the urban poor and rice for the rural poor. It should be noted, however, that the assumed P.L. 480 food shipments increased the average daily caloric intake for the highest income groups considerably more than for the poor in both rural and urban areas.

Allocating Food Aid

While this report is based upon a case study of Sri Lanka, one can easily visualize the usefulness of the type of detailed data derived here for comparative analyses of two or more countries. If such information were available, policy decisions regarding the overall allocation of donor countries' food assistance could be made on a more objective basis. For example, the question, "In which country(ies) will a given amount of food aid provide the most nutritional benefit?" could be directly answered. A part of the answer to this question involves estimating the consumption impact on consumer groups whose average diet is already above minimum recommended levels. Any increase in caloric intake for these groups as a result of a P.L. 480 program reduces the nutritional impact of the food aid to those most in need.

Estimating the Efficiency of Alternative Food Aid Programs

Questions of efficiency of alternative food aid programs are often raised. Frequently the definition of efficiency is left unstated, but even when rigorously defined, data are seldom available to derive estimates.

Using the procedure employed in this analysis, it is relatively simple to calculate the overall consumption impact of a commodity shipment on each consumer group. Assuming that the ideal is for the entire commodity shipment to benefit only the nutritionally needy, then a program falls short of this ideal in direct relationship to the proportion of increased consumption by groups that are not nutritionally needy. Thus, a program's efficiency, E_p, equals unity minus the proportion of benefit accruing to nonneedy groups, P_{nng}:

$$E_p = 1 - P_{nng}.$$

This value will vary among P.L. 480 program options for a country, as well as among countries. For example, in this study, $E_p = 0.72$ for a rice and cereals shipment, 0.84 for rice only shipment, and -0.27 for a shipment of cereals alone. 8/ The negative value derived for cereals means 27 percent more nutritional benefit accrues to nonneedy than to needy consumer groups. Alternatively, a positive value indicates that the major benefit accrues to needy consumers. Therefore, with this definition, the "rice only" option is the most efficient program in this study.

Using Food Aid as a Development Tool

An interesting possibility is raised by these findings, namely, that the net benefits from rice, but not from cereals, accrue mainly to the poor. Recall that in this case study, the cereals food group consisted mainly of wheat flour and bread, and that the proportion of bread within this category increased sharply as income rose. If the P.L. 480 shipment included both rice and cereals (wheat flour), a tax placed on bread would have the effect of benefiting the nutritionally needy, while generating revenue primarily from consumers who are relatively well off both financially and nutritionally. These revenues could then be "transferred" to the needy via an appropriate development project.

ADDITIONAL USES OF THE PROCEDURE

Although this report is based upon P.L. 480 food assistance, the procedure can also be used to evaluate the effect of any shortrun change in supply. The same price and consumption changes will occur regardless of whether the changes in market supplies derive from food assistance, commercial trade, or domestic production. The procedure facilitates the analysis of the impact on consumption of an increase or decrease in market supplies from any source. Once the change in market quantities by commodity is estimated, the distribution of nutritional impacts across consumer groups can be derived in exactly the same manner as was done for the P.L. 480 food aid shipment in this study.

8/ P_{nng} is calculated as:
(total change in caloric consumption by nonneedy groups) / (total change in caloric consumption by the population)
For simplicity, rural and urban income groups IV and V are considered to have achieved nutritional adequacy in this example.

This characteristic of the procedure makes it possible to investigate the potential effects of a shortrun change in domestic supply on shortrun changes in import or export levels. 9/ For example, if adverse weather is expected to reduce domestic production of a commodity by, say, 15 percent and if an assumption is made about the upper limit to which policymakers are willing to let domestic market prices rise, then an estimate of the potential increase in import demand (reduction in export supply) can be made. Further, if the concern is with the impact of the anticipated price rise on a particular group of consumers, say the urban poor, then the potential increase in import demand (reduction in export supply) can be estimated under the assumption that consumption of the commodity by the group would be reduced by no more than, say, 5 percent. Likewise, the procedure can be used to assess how unusually favorable weather, expected to increase domestic supplies by, say, 15 percent, would reduce import demand (increase export supply). Hence, given certain assumptions about the policies of a country relative to food consumption, the procedure can be used to assess how shortrun supply shocks are likely to affect shortrun changes in commercial trade.

Project and Policy Evaluation

There is likewise no reason why the procedure cannot be used to evaluate the consumption benefit of any factor that affects food availability. The same price and consumption changes will occur regardless of whether additional market supplies derive from food assistance, commercial imports, or increased domestic production. Thus, the impact of increased market supplies from a development project can be analyzed. Moreover, once the change in market quantities by commodity is estimated, the distribution of nutritional benefits across consumer groups can be derived for the increased domestic production flowing from the project in exactly the same manner as was done for P.L. 480 food aid shipments.

This analysis was initiated by a change in marketed quantities, and traced through commodity price changes to changes in consumption and nutritional intake. However, the analysis can also be initiated directly by a price change, and reach the same conclusion. Since changes in food and agricultural policy will affect virtually all food commodity quantities or prices, this analytical procedure can be used to evaluate the consumption impact of nearly all agricultural price and supply policy. For example, a proposed change in a retail food price ceiling can be analyzed for the distribution of nutritional benefits. Likewise, a change in agricultural policy with respect to production levels or inputs can be analyzed given the estimated changes in marketed quantities by commodity.

Evaluation of Development Strategies

If alternative development projects are evaluated *a priori*, this analytical approach can be useful in designing country development strategies. That is, it can be used to answer the question, "Which project will most nearly meet the nutritional

9/ In this discussion, it is assumed food aid is not a viable option.

needs of the poor or targeted groups?" With this information, and when combined with other criteria, decisions regarding development strategy can be made on a more rational basis.

If dietary adequacy is a major goal of the development strategy, then this analytical procedure can be used to define combinations of price and quantity changes, by commodity, that meet predetermined nutritional goals for specific groups. Used in this manner, a number of options can be identified involving food aid, commercial imports, domestic production, and the mix of food commodities that meets the nutritional targets. Again, this information along with other criteria can be used to design more rational development strategies.

But what if the needed food commodities are not available from donor countries? An obvious shortrun solution is to sell any available commodities and use the funds generated to purchase the specifically needed food(s). In the longer run, this same procedure can be used to fund agricultural development projects aimed specifically at increasing local production of the commodity most beneficial to the needy group. This procedure ties into the "transfer" idea discussed above and directly addresses the use of food aid as a developmental tool.

Generalization of the Analysis

There are two aspects to the topic of generalization: (1) the desire to apply the results of this study to other countries, and (2) the ability to apply the analytical procedures to other data sets or alternative food or consumer groups.

First, the results reported here are based upon a case study and a hypothetical P.L. 480 food aid shipment. The ability to apply these results to other countries depends on how consistent the estimated demand parameters are across countries. This question of consistency cannot be affirmatively answered by scientific empirical research at this time. More research is needed. However, the results of this study are certainly reasonable on the whole, and the consistency of the values across consumer groups provides considerable confidence in the overall procedure. Whether the results for a specific country can be directly applied to another country is a relevant but unanswered question. Similar analyses, using data from several developing countries, must be undertaken and the results compared before this question can be adequately answered. Such analyses are now being planned.

Regarding the second point, the procedure is sufficiently flexible to accommodate analyses of different consumer groups or food categories. For example, an analysis that focused on households with young children would provide information on the food purchase behavior of this group. Such information would be most useful to development planners in designing programs to encourage consumption of specific foods, such as milk and milk

products. 10/ Likewise, the food categories used in this report are only examples. They represent only one set of a large number of food groups that could be defined. For example, milk could be specifically investigated if its consumption were of special interest. The number of food groups included in an analysis can also be tailored to a specific study.

10/ It is worth noting that, if available, a current data set of the type analyzed in this report would contain detailed information on the use of infant formulas, and questions of quantities consumed and percentage of households purchasing these products could be answered.

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APPENDIX

Abbreviations used in appendix tables 1-2

Food Groups

RCE	Rice
CERES	Other grains, cereals, and bakery products
FOO	Food purchased and consumed away from home
SPI	Spices
VEG	Vegetables
FIS	Fish
ANIML	Other meats, milk, and eggs
FRU	Fruits
SUG	Sugar
OIL	Cooking oil, fats, and oil-bearing nuts
ATC	Alcohol, tobacco, and chewing nuts
NAL	Nonalcoholic beverages
Y	Total expenditures

Appendix table 1--National elasticities of food demand, Sri Lanka, 1969/70

FOOD	RCE	CERES	FOO	SPI
RCE	-0.64734	-0.04248	-0.16446	-0.01203
CERES	.06623	-.58486	-.02951	-.03314
FOO	-.41821	-.12237	-.18652	-.03976
SPI	.02419	-.07681	-.02694	-.70439
VEG	.04895	-.01365	-.02911	-.04769
FIS	.06295	-.18787	-.02794	-.06577
ANIML	-.16815	-.12802	-.03738	-.05272
FRU	-.06171	-.05338	-.05702	.03124
SUG	.11538	-.03769	.00182	.04378
OIL	-.42445	.16694	-.00813	-.04142
ATC	-.21987	-.12331	.02770	-.06648
NAL	.19446	-.12762	-.03333	.16280

	VEG	FIS	ANIML	FRU
RCE	-0.00245	0.0088	-0.07558	-0.03942
CERES	.02642	-.1209	-.01257	-.00076
FOO	-.04962	-.0468	-.03423	-.05650
SPI	-.05124	-.0571	-.03449	.02570
VEG	-.73089	.1684	-.08865	.03512
FIS	.13704	-1.0073	.14242	-.02746
ANIML	-.10437	.1426	-.79830	.00276
FRU	.03392	-.0116	.03525	-.83567
SUG	-.00313	.0342	.04821	-.03811
OIL	-.36375	-.0125	.09669	.20208
ATC	-.09532	-.0661	-.03232	-.00545
NAL	-.08079	.0805	-.09069	-.01829

	SUG	OIL	ATC	NAL	Y
RCE	0.01660	-0.05419	-0.14367	0.01741	1.15523
CERES	.01194	.06510	-.04833	-.01633	.81669
FOO	-.00830	-.00149	.07540	-.01223	.89852
SPI	.03251	-.00830	-.04969	.04254	.89930
VEG	-.01719	-.09102	-.07188	-.01684	.87065
FIS	.01231	-.00488	-.07863	.01621	1.07971
ANIML	.00318	.02254	-.00838	-.02286	1.12940
FRU	-.05782	.06327	.02984	-.00235	.89332
SUG	.95942	-.00707	.01142	.00029	.81558
OIL	-.06405	-.54514	.06175	-.10922	1.06385
ATC	-.01992	.00870	-.61411	-.01025	1.22888
NAL	-.01319	-.12757	-.03941	-.88082	.98138

Appendix table 2--Rural Income Group I: Elasticities of food demand, Sri Lanka, 1969/70

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.94248	0.04598	-0.15368	0.00099	0.01989	-0.0064	-0.20297
CERES	0.17471	-0.54221	-0.06574	0.09531	-0.04930	-0.0409	-0.10901
FOO	-0.39031	-0.15188	-0.16918	-0.03907	-0.04708	-0.1221	-0.01096
SPI	0.02585	0.06061	-0.02961	-0.84533	-0.13054	-0.0644	0.02342
VEG	0.04957	-0.10244	-0.03527	-0.12433	-0.76408	0.2096	-0.02255
FIS	-0.04144	-0.12480	-0.10253	-0.09261	0.19599	-1.2529	0.13871
ANIML	-0.36927	-0.17326	-0.00765	0.03147	-0.01545	0.1903	-0.59390
FRU	0.12667	0.02879	0.01312	0.03110	-0.00525	-0.0910	0.09342
SUG	0.17311	-0.00560	-0.01425	0.01309	0.03285	0.0190	0.12183
OIL	0.21691	0.10890	-0.09481	-0.10302	-0.14271	0.2285	-0.08240
ATC	-0.01981	-0.14208	0.03278	-0.07503	-0.19171	0.0332	-0.16635
NAL	0.01467	-0.15110	-0.13305	0.17546	-0.09984	0.0905	0.16360

	FRU	SUG	OIL	ATC	NAL	Y
RCE	0.03293	0.0522	0.0276	0.01491	-0.00114	1.11277
CERES	0.04128	0.0178	0.0351	-0.05706	-0.02196	0.52216
FOO	0.00957	-0.0222	-0.0282	0.10827	-0.04621	0.90983
SPI	0.01390	-0.0001	-0.0202	-0.04541	0.04167	0.97060
VEG	-0.01679	0.0097	-0.0277	-0.17004	-0.02271	1.01761
FIS	-0.10023	-0.0184	0.0480	0.04683	0.01410	1.28995
ANIML	0.07223	0.0958	-0.0158	-0.16348	0.04369	0.90576
FRU	-0.94154	-0.0246	0.0324	-0.08461	-0.00947	0.83143
SUG	-0.02433	-1.0983	-0.0095	-0.02431	-0.01125	0.82805
OIL	0.08652	-0.0529	-1.2208	-0.00438	-0.07024	1.13111
ATC	-0.09228	-0.0538	-0.0058	-0.69021	0.00511	1.36663
NAL	-0.04047	-0.0466	-0.0647	0.06831	-0.95037	0.97393

Continued

Appendix table 2—Rural Income Group II: Elasticities of food demand, Sri Lanka, 1969/70—Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.70302	-0.01986	-0.20110	-0.00568	-0.02327	0.0847	-0.02885
CERES	0.12566	-0.68475	0.02973	-0.11346	0.14390	-0.2618	0.06774
FOO	-0.89030	0.04675	-0.24625	0.02630	0.00994	0.1477	0.06337
SPI	0.08778	-0.15226	0.00533	-0.59768	-0.06115	-0.1163	-0.13307
VEG	0.04336	0.13012	-0.00310	-0.05627	-0.70310	0.1333	-0.20273
FIS	0.37269	-0.31009	0.07791	-0.11328	0.13336	-1.0282	0.18473
ANIML	-0.09458	0.02981	0.01728	-0.18638	-0.28108	0.1922	-0.82340
FRU	-0.33874	-0.05289	-0.11721	0.03310	0.12826	-0.0979	-0.06791
SUG	-0.02559	0.03054	0.00181	0.04536	-0.08012	0.0509	-0.04389
OIL	-0.85685	0.59022	0.09780	0.05851	-0.65211	-0.1433	0.21588
ATC	-0.38446	-0.09107	0.07221	-0.05458	-0.04598	-0.1344	0.06287
NAL	0.38557	-0.14513	0.05592	0.20037	-0.03825	0.1191	-0.29988

	FRU	SUG	OIL	ATC	NAL	Y
RCE	-0.10204	-0.03900	-0.08177	-0.21027	0.02272	1.30832
CERES	-0.01238	0.05455	0.15763	-0.07610	-0.02131	0.59104
FOO	-0.12942	0.02312	0.05217	0.19512	0.02758	0.67440
SPI	0.03133	0.04807	0.01878	-0.07116	0.04806	0.89285
VEG	0.10350	-0.07234	-0.17191	-0.05307	-0.00486	0.85773
FIS	-0.06758	0.05353	-0.03637	-0.17773	0.02943	0.88219
ANIML	-0.07840	-0.07866	0.06546	0.06821	-0.08375	1.25415
FRU	-0.60907	-0.20409	0.16048	0.18994	-0.01037	0.98710
SUG	-0.15280	-0.73882	-0.06384	0.05393	-0.00119	0.92437
OIL	0.44361	-0.23697	-0.44591	0.20239	-0.27804	1.00545
ATC	0.10809	0.03782	0.04190	-0.52665	-0.02212	0.93699
NAL	-0.03931	-0.01541	-0.34355	-0.14928	-0.77949	1.05004

Continued

Appendix table 2--Rural Income Group III: Elasticities of food demand, Sri Lanka, 1969/70--Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.51184	-0.24453	-0.11969	-0.03406	0.06985	-0.10483	-0.02017
CERES	-0.19713	-0.25736	-0.11921	-0.06774	-0.04021	-0.04231	-0.03496
FOO	-0.25994	-0.31423	-0.16416	-0.09389	-0.11864	-0.03984	-0.07702
SPI	-0.02408	-0.12986	-0.06722	-0.68169	0.10841	0.06246	0.02193
VEG	0.17423	-0.07139	-0.09030	0.09557	-0.91392	0.17029	-0.12374
FIS	-0.19390	-0.12811	-0.03791	0.01209	0.10619	-0.98399	0.06028
ANIML	-0.08702	-0.15157	-0.08767	-0.02659	-0.16003	0.05608	-0.84276
FRU	0.03450	-0.07333	-0.06493	0.01433	0.05426	-0.00367	-0.00630
SUG	0.28443	-0.08717	0.02079	0.01103	-0.01255	0.04488	0.09573
OIL	-0.03330	-0.18540	-0.12476	-0.04241	-0.22952	0.14244	-0.03925
ATC	-0.31219	-0.11744	0.05515	-0.07208	-0.05024	-0.03920	-0.00661
NAL	0.25110	-0.11690	-0.05328	0.05640	-0.01057	0.08176	-0.02256

	FRU	SUG	OIL	ATC	NAL	Y
RCE	0.00819	0.0959	-0.00236	-0.20184	0.02574	1.04031
CERES	-0.02511	-0.0515	-0.01413	-0.04505	-0.01663	0.91192
FOO	-0.06717	-0.0128	-0.02741	0.08432	-0.02143	1.11299
SPI	0.02652	0.0042	-0.00326	-0.05896	0.01518	0.72691
VEG	0.05361	-0.0218	-0.04302	-0.03061	-0.00411	0.80579
FIS	-0.01959	-0.0070	0.02245	-0.04814	0.00721	1.21127
ANIML	-0.03169	0.0293	-0.01180	-0.02937	-0.01758	1.36168
FRU	-0.87806	-0.0087	0.04511	-0.05842	0.00251	0.94336
SUG	0.01116	-1.0300	0.03497	-0.02346	0.01325	0.63738
OIL	0.16745	0.1114	-0.71582	-0.14222	-0.01950	1.11170
ATC	-0.04954	-0.0495	-0.02267	-0.49529	-0.00374	1.16416
NAL	0.02192	0.0390	-0.01010	0.02546	-0.99213	0.73044

Continued

Appendix table 2--Rural Income Group IV: Elasticities of food demand, Sri Lanka, 1969/70--Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.21243	0.09682	-0.09184	-0.13632	-0.11040	-0.09299	0.0550
CERES	0.13589	-0.45479	-0.06509	-0.03845	-0.07676	0.01571	-0.1421
FOO	-0.21439	-0.17317	-0.20118	-0.05177	-0.03436	-0.11569	-0.3108
SPI	-0.25139	-0.08892	-0.02230	-0.65640	-0.15777	0.04635	0.2332
VEG	-0.13782	-0.09845	0.02547	-0.11447	-0.43332	0.21809	0.0809
FIS	-0.15449	-0.03436	-0.07366	0.01785	0.13858	-0.95703	0.1390
ANIML	-0.00515	-0.21942	-0.20801	0.10838	-0.00732	0.09232	-1.2478
FRU	-0.16965	0.01233	0.10585	0.06088	-0.15142	0.09189	0.1072
SUG	0.08129	-0.13164	-0.00144	0.07527	0.11612	-0.17172	-0.0266
OIL	-0.95612	-0.16391	-0.04221	-0.28788	-0.46541	-0.23419	-0.0917
ATC	-0.28725	-0.03971	-0.15758	-0.03525	-0.01254	-0.04435	0.1674
NAL	0.03485	-0.06352	0.00357	-0.13405	-0.45167	-0.06046	0.1523

	FRU	SUG	OIL	ATC	NAL	Y
RCE	-0.0829	0.04563	-0.14110	-0.21670	0.01561	0.87202
CERES	0.0216	-0.06586	-0.01656	0.01272	0.00125	0.67278
FOO	0.0588	-0.03361	-0.01224	-0.24804	-0.00049	1.33763
SPI	0.0539	0.07288	-0.07378	-0.02995	-0.03470	0.90933
VEG	-0.0990	0.11940	-0.09995	0.04168	-0.11031	0.60804
FIS	0.0447	-0.13930	-0.04460	-0.04905	-0.01058	1.12346
ANIML	0.0276	-0.05071	-0.01772	0.13002	0.02757	1.37097
FRU	-1.0833	0.07136	0.08955	-0.08961	0.06001	0.89537
SUG	0.0654	-0.99494	0.04341	0.03045	0.02582	0.88900
OIL	0.2601	0.12380	0.58978	-0.07887	0.07020	1.27701
ATC	-0.0674	0.00234	-0.01134	-0.62892	-0.01181	1.12693
NAL	0.1428	0.05156	0.06165	-0.07289	-0.93524	1.27171

Continued

Appendix table 2--Rural Income Group V: Elasticities of food demand, Sri Lanka, 1969/70--Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.0217	-0.13741	-0.16876	0.07904	0.47587	-0.13265	-0.21174
CERES	-0.1060	-0.66387	-0.05303	-0.04383	-0.06001	-0.08249	-0.11583
FOO	-0.2488	-0.10362	0.23801	-0.07809	-0.08359	-0.16943	-0.06517
SPI	0.1196	-0.17648	-0.11453	-0.78570	-0.08815	0.32723	0.01743
VEG	0.7815	-0.18249	-0.09562	-0.06925	-0.41164	-0.17784	-0.02434
FIS	-0.1861	-0.24693	-0.15342	0.20045	-0.13408	-0.73479	0.45710
ANIML	-0.2761	-0.50203	-0.07379	-0.00587	-0.04175	0.37712	-0.99572
FRU	-0.1238	-0.17028	-0.25035	-0.10525	-0.08868	0.03112	0.53110
SUG	-0.0487	-0.24921	0.08685	0.00514	0.04246	0.00854	0.24848
OIL	-1.5057	-0.26101	-0.08081	-0.12121	-0.80952	0.78185	0.83787
ATC	-0.0376	-0.33747	-0.05094	-0.10043	-0.05195	-0.19874	-0.08387
NAL	0.2952	-0.21041	-0.19962	0.67819	-0.19739	0.03020	-0.46670

	FRU	SUG	OIL	ATC	NAL	Y
RCE	-0.06580	-0.0047	-0.27097	0.01236	0.06333	0.38336
CERES	-0.05885	-0.0460	-0.02016	-0.07027	-0.01447	1.33563
FOO	-0.20773	0.0632	-0.02104	-0.03285	-0.04597	0.75551
SPI	-0.13144	0.0100	-0.04391	-0.12823	0.24347	0.75115
VEG	-0.08988	0.0503	-0.24597	-0.03652	-0.05645	0.55860
FIS	0.01344	0.0096	0.16417	-0.16038	0.00878	0.76264
ANIML	0.30863	0.1224	0.14917	-0.07010	-0.09247	1.10117
FRU	-0.74346	0.1979	0.02957	0.11605	-0.01146	0.58787
SUG	0.21952	-1.2064	0.04468	0.01677	-0.03162	0.86409
OIL	0.09808	0.1382	0.23571	-0.03773	0.10168	0.62293
ATC	0.07069	0.0042	-0.01517	-0.22821	-0.00203	1.03215
NAL	-0.05385	-0.0899	0.09481	-0.00017	-0.78391	0.90404

Continued

Appendix table 2--Urban Income Group I: Elasticities of food demand, Sri Lanka, 1969/70--Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.43293	-0.02314	-0.18824	-0.08233	-0.16082	-0.04250	-0.20822
CERES	0.02736	-0.76868	-0.07156	0.03313	-0.03278	0.08095	0.13885
FOO	-0.25645	-0.10221	-0.27128	-0.02438	-0.03350	-0.11649	-0.05440
SPI	-0.10348	-0.00413	-0.02953	-0.80271	0.03695	-0.02925	-0.12839
VEG	-0.24587	-0.05890	-0.03009	0.06433	-0.64826	0.01494	0.23741
FIS	-0.05597	0.02186	-0.11173	-0.03603	-0.01175	-0.84203	0.07452
ANIML	-0.27800	0.10558	-0.05478	-0.12760	0.18285	0.10519	-0.82861
FRU	0.35342	-0.06865	-0.02614	0.04614	-0.10137	-0.06270	-0.08798
SUG	0.30533	-0.10583	0.03599	0.09812	-0.01685	0.02151	0.03393
OIL	-0.62302	-0.04074	-0.07831	0.04245	-0.20882	0.04818	0.16353
ATC	-0.26595	-0.01853	-0.09960	-0.09951	-0.05595	-0.13836	-0.04955
NAL	0.26189	-0.08531	0.01326	0.11075	-0.02423	-0.00106	-0.22070

	FRU	SUG	OIL	ATC	NAL	Y
RCE	0.16101	0.1329	-0.09551	-0.12369	0.04506	1.01881
CERES	-0.02903	-0.0722	0.00514	0.12928	-0.01060	0.57039
FOO	-0.02005	0.0120	-0.01060	-0.00624	0.00661	0.87738
SPI	0.02443	0.0491	0.01561	-0.00647	0.02765	0.95058
VEG	-0.08007	-0.0232	-0.04820	0.04670	-0.00155	0.77301
FIS	-0.04965	-0.0145	0.01323	-0.04329	-0.00112	1.05688
ANIML	-0.06342	0.0077	0.04441	0.05486	-0.05089	0.90309
FRU	-0.98518	0.0362	0.06372	-0.00781	-0.01449	0.85514
SUG	0.04692	-1.0576	0.02656	-0.05914	0.01316	0.65812
OIL	0.16718	0.0449	-0.70412	-0.04880	-0.00110	1.23918
ATC	-0.07319	-0.1233	-0.02374	-0.92383	-0.03165	1.90385
NAL	-0.05160	0.0145	0.00377	-0.05442	-0.98458	1.01818

Continued

Appendix table 2--Urban Income Group II: Elasticities of food demand, Sri Lanka, 1969/70--Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.31305	-0.08565	-0.08921	-0.04547	-0.10551	-0.24954	-0.15713
CERES	-0.06870	-0.64090	-0.02496	-0.00067	-0.02581	0.01843	0.03969
FOO	-0.14828	-0.07246	-0.19039	-0.09775	-0.08923	-0.17854	-0.07677
SPI	-0.06272	-0.03051	-0.08064	-0.70420	0.02651	-0.09087	-0.03159
VEG	-0.13121	-0.04030	-0.06153	0.04658	-0.74534	0.29621	-0.02067
FIS	-0.29578	-0.03726	-0.13706	-0.09079	0.17650	-0.79191	0.02207
ANIML	-0.23509	-0.01531	-0.07801	-0.05311	-0.05722	0.02263	-0.70381
FRU	0.16482	0.01589	-0.06800	0.02435	-0.08867	0.24333	-0.00510
SUG	0.24991	0.01755	-0.04133	0.04281	0.03011	0.03251	0.01381
OIL	-0.11032	-0.08682	-0.02648	0.06238	-0.16469	-0.17201	0.06935
ATC	-0.16191	-0.07619	-0.08405	-0.08814	-0.06717	-0.14921	-0.05811
NAL	-0.07263	-0.00369	-0.07023	0.11940	-0.06758	0.07979	-0.02811

	FRU	SUG	OIL	ATC	NAL	Y
RCE	0.0822	0.1228	-0.01650	-0.05181	-0.00957	0.91874
CERES	0.0253	0.0179	-0.01012	0.03564	0.00884	0.62559
FOO	-0.0666	-0.0569	-0.00765	-0.03403	-0.01783	1.03686
SPI	0.0133	0.0185	0.01491	-0.01865	0.03221	0.91417
VEG	-0.0611	0.0243	-0.03382	0.02137	-0.00993	0.71573
FIS	0.1179	-0.0112	-0.03277	-0.07380	0.01305	1.14147
ANIML	-0.0257	-0.0228	0.01003	-0.00648	-0.00891	1.17427
FRU	-1.0526	-0.0324	-0.04626	0.00729	-0.00800	0.84571
SUG	-0.0220	-1.0132	0.00818	-0.00791	-0.02045	0.71032
OIL	-0.1624	0.0101	-0.38343	-0.06929	0.06472	0.96922
ATC	-0.0531	-0.0747	-0.02803	-0.83422	-0.02369	1.69920
NAL	-0.0386	-0.0889	0.05711	-0.04483	-0.89919	1.05792

Continued

Appendix table 2--Urban Income Group III: Elasticities of food demand, Sri Lanka, 1969/70--Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.43219	-0.14427	-0.13635	-0.10141	-0.02798	-0.08042	-0.07841
CERES	-0.05976	-0.41210	-0.05610	-0.06300	-0.06956	-0.08802	-0.06752
FOO	-0.21850	-0.19948	-0.27692	-0.04810	-0.07542	-0.10550	-0.05142
SPI	-0.12272	-0.17336	-0.03729	-0.67377	0.00031	-0.04926	0.01989
VEG	-0.00441	-0.14559	-0.04593	0.01973	-0.82475	0.23853	0.07480
FIS	-0.05566	-0.15190	-0.05345	-0.02533	0.17094	-0.72716	0.05704
ANIML	-0.10220	-0.21248	-0.04983	-0.00799	0.01526	0.01095	-0.86380
FRU	0.10460	-0.15688	-0.02712	0.11090	0.01640	0.09816	-0.00039
SUG	0.18697	-0.09032	-0.01542	0.12360	0.02745	0.06907	-0.00001
OIL	-0.37404	-0.26933	-0.04380	-0.18838	-0.07412	-0.29281	0.15178
ATC	-0.18951	-0.19541	0.02958	-0.10281	-0.06700	-0.10332	-0.02968
NAL	0.18832	-0.05492	-0.01383	0.15606	-0.19480	-0.12596	-0.06620

	FRU	SUG	OIL	ATC	NAL	Y
RCE	0.0596	0.0896	-0.085135	-0.14694	0.03588	1.04834
CERES	-0.0478	-0.0431	-0.024999	-0.04669	-0.00442	0.98341
FOO	-0.0298	-0.0327	-0.012692	0.08590	-0.00369	0.96860
SPI	0.0891	0.0781	-0.052565	-0.08561	0.04002	0.96743
VEG	0.0285	0.0197	-0.013113	-0.02182	-0.04534	0.71986
FIS	0.0712	0.0339	-0.060314	-0.04225	-0.02048	0.80373
ANIML	-0.0208	-0.0356	0.033410	-0.01774	-0.01826	1.26946
FRU	-1.0293	0.0378	-0.054057	-0.05403	0.00622	0.94800
SUG	0.0570	-1.0191	0.018355	-0.04281	0.00436	0.68111
OIL	-0.1588	0.0184	0.013297	0.04989	0.01608	1.15223
ATC	-0.0639	-0.0695	0.006928	-0.58360	-0.01364	1.38229
NAL	0.0163	-0.0064	0.022746	-0.03043	-0.89915	1.00858

Continued

Appendix table 2--Urban Income Group IV: Elasticities of food demand, Sri Lanka, 1969/70--Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.14118	-0.25768	-0.08565	0.08045	-0.11242	0.15465	-0.18687
CERES	-0.11706	-0.45427	-0.06371	-0.08126	-0.07704	-0.11444	-0.12193
FOO	-0.13104	-0.19148	-0.33784	-0.00661	-0.04422	-0.16338	0.02572
SPI	0.10348	-0.25063	-0.00013	-0.64946	-0.02345	0.01626	-0.06333
VEG	-0.15996	-0.23334	-0.03796	-0.02360	-0.70803	0.26910	-0.03691
FIS	0.13964	-0.27075	-0.11236	0.00842	0.18512	-0.97667	0.21209
ANIML	-0.20719	-0.39536	-0.00491	-0.06911	-0.05133	0.15759	-0.63602
FRU	0.06198	-0.24921	-0.01112	0.05622	0.15242	0.09466	0.05454
SUG	0.08920	-0.18265	0.04920	0.13701	0.14840	0.10680	0.02741
OIL	-0.17798	-0.28537	0.00546	-0.12238	-0.10230	-0.06030	0.25281
ATC	-0.19801	-0.39202	-0.01314	-0.04876	-0.02538	-0.10703	0.01384
NAL	0.01482	-0.18370	0.01400	0.22395	-0.01127	0.11796	-0.06500

Food	FRU	SUG	OIL	ATC	NAL	Y
RCE	0.04518	0.04706	-0.03425	-0.13212	0.00711	0.61615
CERES	-0.06827	-0.06893	-0.02136	-0.08269	-0.01721	1.28907
FOO	-0.01335	0.02473	0.00646	0.03684	0.00500	0.78972
SPI	0.05076	0.10304	-0.03259	-0.00316	0.06742	0.68228
VEG	0.13690	0.11508	-0.02665	0.02880	-0.00043	0.67746
FIS	0.05782	0.04967	-0.00809	-0.04561	0.02617	0.73505
ANIML	0.00827	-0.01987	0.05042	0.03768	-0.01746	1.14808
FRU	-0.90990	0.03439	0.00806	-0.00577	-0.00620	0.72042
SUG	0.04945	-0.96540	0.04840	0.02784	0.00603	0.45862
OIL	0.00546	0.09666	-0.78400	0.12229	0.01870	1.03167
ATC	-0.04194	-0.03316	0.02038	-0.61726	-0.00933	1.45282
NAL	-0.02504	-0.00190	0.02450	0.00612	-0.95690	0.84304

Continued

Appendix table 2--Urban Income Group V: Elasticities of food demand, Sri Lanka, 1969/70—Continued

Food	RCE	CERES	FOO	SPI	VEG	FIS	ANIML
RCE	-0.22994	-0.13036	-0.004794	0.14201	0.04836	-0.01802	0.04612
CERES	-0.05433	-0.74949	-0.047118	-0.04467	-0.04512	-0.06386	-0.07690
FOO	-0.00775	-0.17246	-0.065113	-0.03922	-0.00638	-0.03423	-0.01314
SPI	0.16064	-0.20698	-0.044045	-0.64486	0.04526	-0.07621	0.05113
VEG	0.04656	-0.23368	-0.013016	0.04269	-0.66616	0.14789	0.05315
FIS	-0.02609	-0.25693	-0.031861	-0.05689	0.10569	-0.66048	0.19616
ANIML	-0.00244	-0.33687	-0.028337	0.00678	0.00984	0.10972	-0.81490
FRU	-0.08282	-0.28660	-0.074923	0.06758	0.08043	0.26022	0.13548
SUG	0.07934	-0.17357	0.000570	0.15337	0.04805	0.13299	0.15383
OIL	-0.31113	-0.28565	0.010138	-0.30750	0.10172	-0.22054	-0.07744
ATC	-0.08935	-0.74910	0.011694	0.03580	-0.06796	-0.08207	0.04359
NAL	-0.01314	-0.15739	-0.097969	0.14340	-0.02862	0.10935	-0.02274

	FRU	SUG	OIL	ATC	NAL	Y
RCE	-0.05286	0.0663	-0.10444	-0.05732	0.00040	0.29470
CERES	-0.03990	-0.0388	-0.01727	-0.07777	-0.01345	1.26930
FOO	-0.05932	0.0045	0.01021	0.07491	-0.03303	0.34123
SPI	0.07536	0.1388	-0.12622	0.10502	0.05640	0.46590
VEG	0.08497	0.0409	0.04559	-0.05752	-0.00928	0.51814
FIS	0.18750	0.0829	-0.06355	-0.04512	0.03051	0.53841
ANIML	0.05480	0.0498	-0.01888	0.05452	-0.00847	0.92491
FRU	-0.82208	-0.0144	-0.04674	0.05393	0.01553	0.71474
SUG	-0.00596	-1.0711	0.07560	0.09626	0.05461	0.45620
OIL	-0.10798	0.1533	0.11065	0.18299	0.03994	0.71183
ATC	0.01199	0.0270	0.04038	-0.50489	0.01249	1.31103
NAL	0.04382	0.1255	0.04621	0.09190	-0.85622	0.61620

Appendix table 3—Rural income group I:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	3.63	-4.36	-0.73
Cereals	-1.25	5.75	4.50
Food away from home	1.40	-1.05	.35
Spices	.71	-1.64	-.93
Vegetables	.44	.19	.62
Fish	-2.49	-.42	-2.91
Animal products	1.86	-.09	1.77
Fruits	.89	-1.10	-.22
Sugar	.16	-2.65	-2.50
Oil	12.19	-1.74	10.45
Alcohol, tobacco, chewing nuts, and betel	.32	.47	.79
Nonalcoholic beverages	-4.60	-2.33	-6.92

Appendix table 4—Rural income group II:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1960/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	3.95	-3.61	0.34
Cereals	-.70	9.11	8.41
Food away from home	3.65	-4.38	-.73
Spices	0	1.29	1.29
Vegetables	1.21	-2.78	-1.57
Fish	-1.50	5.27	3.77
Animal products	-1.44	-4.16	-5.60
Fruits	.61	-2.85	-2.24
Sugar	1.98	-2.75	-.77
Oil	8.78	-7.39	1.39
Alcohol, tobacco, chewing nuts, and betel	2.09	1.26	3.35
Nonalcoholic beverages	-2.15	-.43	-2.58

Appendix table 5--Rural income group III:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	2.58	0.92	3.50
Cereals	1.00	.94	1.94
Food away from home	1.46	.96	2.42
Spices	.82	.50	1.31
Vegetables	-1.28	-.92	-2.20
Fish	-.60	.26	-.33
Animal products	-1.56	-2.65	-4.21
Fruits	.72	-1.05	-.33
Sugar	-.53	-.85	-1.38
Oil	7.92	1.47	9.40
Alcohol, tobacco, chewing nuts, and betel	2.93	.98	3.90
Nonalcoholic beverages	-6.98	-2.08	-9.06

Appendix table 6--Rural income group IV:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	2.04	-2.74	-0.69
Cereals	- .10	4.34	4.24
Food away from home	-1.21	-2.32	-3.53
Spices	3.73	1.08	4.75
Vegetables	3.22	1.53	4.81
Fish	-.62	-1.30	-1.91
Animal products	-3.81	-4.42	-8.24
Fruits	4.18	.37	4.55
Sugar	-.18	-1.09	-1.28
Oil	-1.35	-.46	-1.81
Alcohol, tobacco, chewing nuts, and betel	.26	-2.11	-1.85
Nonalcoholic beverages	-5.56	-1.95	-7.51

Appendix table 7--Rural income group V:
Change food in quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	1.69	-0.65	1.03
Cereals	2.26	6.70	8.96
Food away from home	4.59	3.39	7.97
Spices	2.15	1.22	3.37
Vegetables	-2.94	1.51	-1.43
Fish	-2.21	1.80	-.41
Animal products	-2.16	1.75	-.41
Fruits	1.48	.36	1.84
Sugar	2.60	1.86	4.46
Oil	11.16	4.22	15.38
Alcohol, tobacco chewing nuts, and betel	.15	2.84	2.99
Nonalcoholic beverages	-10.26	-4.06	-14.32

Appendix table 8--Urban income group I:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	1.38	-3.01	-1.63
Cereals	2.20	9.28	11.48
Food away from home	-.89	-2.89	-3.78
Spices	.84	-1.28	-.43
Vegetables	3.13	.51	3.64
Fish	-2.25	-2.44	-4.69
Animal products	-1.32	-5.65	-6.98
Fruits	-1.37	-.67	-2.04
Sugar	-.73	-.65	-1.38
Oil	12.23	.24	12.47
Alcohol, tobacco, chewing nuts, and betel	-.09	-3.30	-3.39
Nonalcoholic beverages	-7.16	-2.62	-9.78

Appendix table 9--Urban income group II:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	0.51	-1.00	-0.49
Cereals	2.57	8.02	10.59
Food away from home	-.94	-2.67	-3.61
Spices	.19	-1.28	-1.09
Vegetables	1.58	-.72	.86
Fish	-0.53	-2.12	-2.65
Animal products	-0.80	-4.00	-4.80
Fruits	1.59	-2.09	-.50
Sugar	-1.32	-3.37	-4.69
Oil	5.97	1.02	6.99
Alcohol, tobacco, chewing nuts, and betel	-.38	-1.99	-2.37
Nonalcoholic beverages	-5.58	-4.42	-10.00

Appendix table 10--Urban income group III:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	2.60	-0.57	2.03
Cereals	1.33	3.77	5.10
Food away from home	-.67	-1.79	-2.45
Spices	2.25	1.54	3.80
Vegetables	.72	1.13	1.85
Fish	-.50	.98	.47
Animal products	-1.59	-1.60	-3.19
Fruits	2.57	.81	3.38
Sugar	-.55	-1.59	-2.14
Oil	3.36	2.47	5.83
Alcohol, tobacco, chewing nuts, and betel	1.49	1.38	2.87
Nonalcoholic beverages	-6.80	-2.73	-9.53

Appendix table 11--Urban income group IV:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	0.83	1.48	2.32
Cereals	1.55	3.70	5.25
Food away from home	-2.25	-2.14	-4.39
Spices	1.33	3.22	4.55
Vegetables	2.06	2.42	4.48
Fish	-2.57	2.50	-.07
Animal products	.86	2.20	3.07
Fruits	2.41	2.48	4.89
Sugar	.84	.73	1.57
Oil	12.71	5.47	18.18
Alcohol, tobacco, chewing nuts, and betel	1.49	3.62	5.11
Nonalcoholic beverages	-4.82	-.77	-5.58

Appendix table 12--Urban income group V:
Change in food quantity demanded due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Percent	
Rice	3.10	1.77	4.87
Cereals	2.28	8.13	10.42
Food away from home	-.19	1.11	.92
Spices	1.55	2.81	4.42
Vegetables	-.03	2.86	2.83
Fish	.36	3.61	3.96
Animal products	-.82	1.15	.33
Fruits	4.05	2.50	6.55
Sugar	.96	.25	1.21
Oil	2.05	3.26	5.32
Alcohol, tobacco, chewing nuts, and betel	2.03	9.19	11.21
Nonalcoholic beverages	-5.63	-1.66	-7.28

Appendix table 13—Rural income group I:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Calories/capita/day	
Rice	17	-21	-3
Cereals	-6	29	22
Food away from home	0	0	0
Spices	0	-1	-1
Vegetables	0	0	1
Fish	-1	0	-1
Animal products	1	0	1
Fruits	3	-3	-1
Sugar	1	-12	-11
Oil	1	0	1
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	0	0	0
Total	17	-9	8

Appendix table 14—Rural income group II:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Calories/capita/day	
Rice	44	-40	4
Cereals	-5	66	61
Food away from home	0	0	0
Spices	0	1	1
Vegetables	2	-4	-2
Fish	-1	2	2
Animal products	-1	-2	-2
Fruits	2	-10	-8
Sugar	11	-15	-4
Oil	2	-1	0
Alcohol, tobacco, chewing nuts, and betel	1	1	2
Nonalcoholic beverages	0	0	0
Total	55	-3	52

Appendix table 15--Rural income group III:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereas alone	Rice and cereals
	Calories/capita/day		
Rice	18	6	24
Cereals	5	5	9
Food away from home	0	0	0
Spices	1	0	1
Vegetables	-1	-1	-2
Fish	0	0	0
Animal products	-1	-1	-2
Fruits	3	-5	-1
Sugar	-4	-6	-9
Oil	1	0	2
Alcohol, tobacco, chewing nuts, and betel	1	0	2
Nonalcoholic beverages	0	0	0
Total	23	-1	22

Appendix table 16--Rural income group IV:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Calories/capita/day		
Rice	13	-18	-5
Cereals	-1	25	24
Food away from home	0	0	0
Spices	2	1	3
Vegetables	4	2	6
Fish	0	-1	-1
Animal products	-3	-3	-6
Fruits	22	2	24
Sugar	-1	-7	-8
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	-1	-1
Nonalcoholic beverages	0	0	0
Total	36	-1	35

Appendix table 17--Rural income group V:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Calories/capita/day	
Rice	12	-5	7
Cereals	14	43	57
Food away from home	0	0	0
Spices	1	1	2
Vegetables	-4	2	-2
Fish	-1	1	0
Animal products	-2	1	0
Fruits	10	3	13
Sugar	27	19	46
Oil	2	1	3
Alcohol, tobacco, chewing nuts, and betel	0	1	1
Nonalcoholic beverages	0	0	0
Total	61	66	127

Appendix table 18--Urban income group I:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Calories/capita/day	
Rice	6	-13	-7
Cereals	14	59	72
Food away from home	0	0	0
Spices	1	-1	0
Vegetables	2	0	3
Fish	-1	-1	-2
Animal products	-1	-3	-3
Fruits	-3	-2	-5
Sugar	-3	-3	-5
Oil	2	0	230
Alcohol, tobacco, chewing nuts, and betel	0	-2	-2
Nonalcoholic beverages	0	0	0
Total	17	35	52

Appendix table 19--Urban income group II:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Calories/capita/day		
Rice	2	-5	-2
Cereals	15	47	62
Food away from home	0	0	0
Spices	0	-1	-1
Vegetables	1	-1	1
Fish	0	-1	-1
Animal products	0	-2	-2
Fruits	5	-7	-2
Sugar	-7	-18	-25
Oil	1	0	1
Alcohol, tobacco, chewing nuts, and betel	0	-1	-1
Nonalcoholic beverages	0	0	0
Total	17	12	30

Appendix table 20--Urban income group III:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Calories/capita/day		
Rice	12	-3	10
Cereals	8	23	31
Food away from home	0	0	0
Spices	2	1	3
Vegetables	1	1	2
Fish	0	0	0
Animal products	-1	-1	-2
Fruits	11	4	15
Sugar	-3	-10	-13
Oil	1	0	1
Alcohol, tobacco, chewing nuts, and betel	0	0	1
Nonalcoholic beverages	0	0	0
Total	31	17	47

Appendix table 21--Urban income group IV:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Calories/capita/day	
Rice	4	7	11
Cereals	9	23	32
Food away from home	0	0	0
Spices	1	2	3
Vegetables	2	2	4
Fish	-1	1	0
Animal products	1	1	2
Fruits	11	12	23
Sugar	6	5	12
Oil	3	1	4
Alcohol, tobacco, chewing nuts, and betel	0	1	1
Nonalcoholic beverages	0	0	0
Total	36	56	92

Appendix table 22--Urban income group V:
Change in caloric intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Calories/capita/day	
Rice	16	9	25
Cereals	14	51	65
Food away from home	0	0	0
Spices	1	2	4
Vegetables	0	3	3
Fish	0	2	2
Animal products	-1	1	0
Fruits	26	16	42
Sugar	9	2	11
Oil	1	1	1
Alcohol, tobacco, chewing nuts, and betel	0	2	3
Nonalcoholic beverages	0	0	0
Total	66	90	156

Appendix table 23--Rural income group I:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Grams/capita/day		
Rice	0.32	-0.38	-0.06
Cereals	-.16	.71	.56
Food away from home	0	0	0
Spices	.04	-.09	-.05
Vegetables	.02	.01	.03
Fish	-.14	-.02	-.17
Animal products	.05	0	.05
Fruits	.05	-.06	-.01
Sugar	.01	-.18	-.17
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.02	-.01	-.02
Total	.17	-.02	.16

Appendix table 24--Rural income group II:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Grams/capita/day		
Rice	0.81	-0.74	0.07
Cereals	-.13	1.64	1.51
Food away from home	0	0	0
Spices	0	.08	-.08
Vegetables	.07	-.16	-.09
Fish	-.13	.47	.34
Animal products	-.05	-.15	-.20
Fruits	.04	-.18	-.14
Sugar	.16	-.23	-.06
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.01	0	-.01
Total	.76	.73	1.50

Appendix table 25--Rural income group III:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Grams/capita/day	
Rice	0.33	0.12	0.45
Cereals	.12	.11	.24
Food away from home	0	0	
Spices	.04	.03	.07
Vegetables	-.06	-.04	-.10
Fish	-.05	.02	-.03
Animal products	-.07	-.11	-.18
Fruits	.05	-.08	-.02
Sugar	-.05	-.09	-.14
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.03	-.01	-.04
Total	.28	-.05	.25

Appendix table 26--Rural income group IV:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Grams/capita/day	
Rice	0.25	-0.33	-0.08
Cereals	-.01	.62	.60
Food away from home	0	0	0
Spices	.19	.05	.24
Vegetables	.16	.08	.24
Fish	-.06	-.12	-.18
Animal products	-.26	-.30	-.57
Fruits	.37	.03	.40
Sugar	-.02	-.11	-.12
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.03	-.01	-.04
Total	.59	-.09	.49

Appendix table 27--Rural income group V:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Grams/capita/day		
Rice	0.22	-0.09	0.14
Cereals	.36	1.06	1.42
Food away from home	0	0	0
Spices	.12	.07	.18
Vegetables	-.15	.08	-.07
Fish	-.21	.17	-.04
Animal products	-.16	.13	-.03
Fruits	.18	.04	.22
Sugar	.39	.28	.68
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.06	-.02	-.08
Total	.69	1.72	2.42

Appendix table 28--Urban income group I:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Grams/capita/day		
Rice	0.11	-0.25	-0.13
Cereals	.35	1.46	1.81
Food away from home	0	0	0
Spices	.05	-.07	-.02
Vegetables	.10	.02	.12
Fish	-.20	-.22	-.42
Animal products	-.05	-.23	-.28
Fruits	-.06	-.03	-.08
Sugar	-.04	-.04	-.08
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.03	-.01	-.04
Total	.23	.63	.88

Appendix table 29--Urban income group II:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Grams/capita/day	
Rice	0.04	-0.08	-0.04
Cereals	.38	1.17	1.55
Food away from home	0	0	0
Spices	.01	-.07	-.06
Vegetables	.06	-.03	.03
Fish	-.04	-.18	-.22
Animal products	-.03	-.16	-.20
Fruits	.09	-.12	-.03
Sugar	-.10	-.26	-.37
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.02	-.02	-.04
Total	.39	.25	.62

Appendix table 30--Urban income group III:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
		Grams/capita/day	
Rice	0.23	-0.05	0.18
Cereals	.20	.57	.77
Food away from home	0	0	0
Spices	.14	.10	.23
Vegetables	.03	.04	.07
Fish	-.04	.09	.04
Animal products	-.09	-.09	-.17
Fruits	.19	.06	.25
Sugar	-.05	-.14	-.19
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.03	-.01	-.04
Total	.58	.57	1.14

Appendix table 31--Urban income group IV:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Grams/capita/day		
Rice	0.07	0.13	0.20
Cereals	.24	.56	.80
Food away from home	0	0	0
Spices	.07	.18	.26
Vegetables	.08	.09	.18
Fish	-.22	.22	-.01
Animal products	.05	.13	.18
Fruits	.19	.20	.39
Sugar	.09	.08	.17
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.02	0	-.02
Total	.55	1.59	2.15

Appendix table 32--Urban income group V:
Change in protein intake due to 3-percent increase
in national supply of rice and cereals, Sri Lanka, 1969/70

Food item	Rice alone	Cereals alone	Rice and cereals
	Grams/capita/day		
Rice	0.30	0.17	0.47
Cereals	.36	1.27	1.63
Food away from home	0	0	0
Spices	.10	.19	.29
Vegetables	0	.13	.13
Fish	.03	.35	.38
Animal products	-.08	.12	.03
Fruits	.44	.27	.71
Sugar	.13	.03	.16
Oil	0	0	0
Alcohol, tobacco, chewing nuts, and betel	0	0	0
Nonalcoholic beverages	-.03	-.01	-.04
Total	1.25	2.52	3.76

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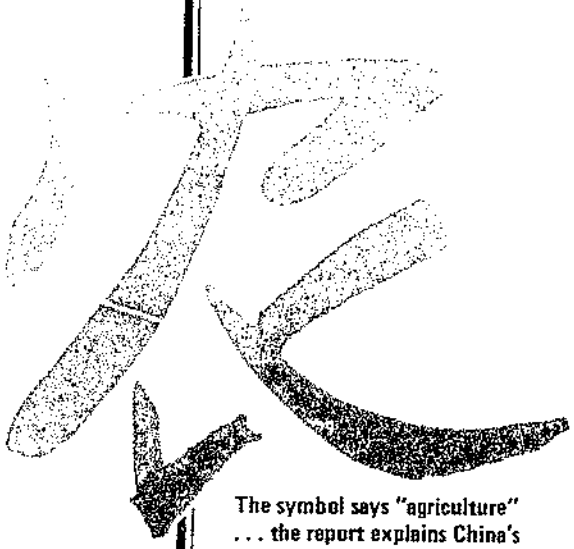

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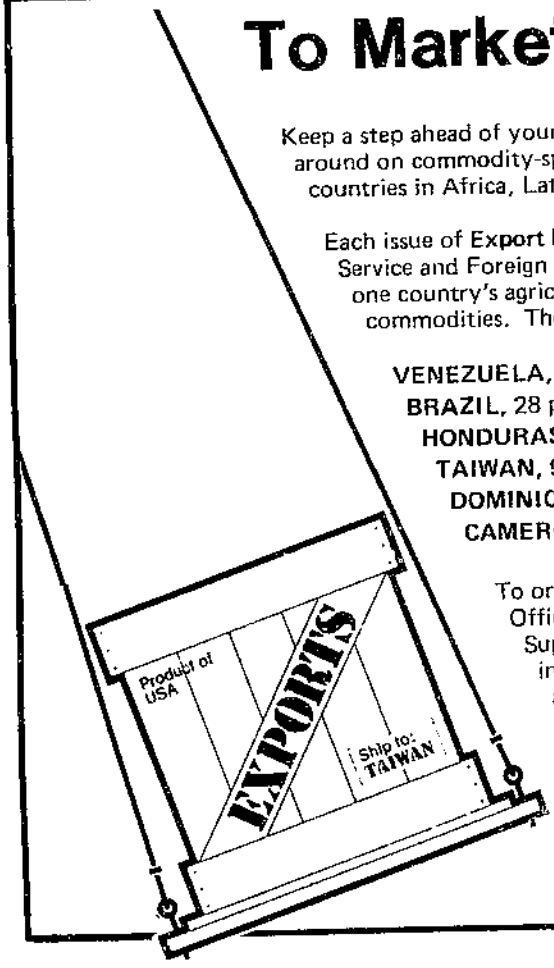

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