

WORKING PAPER

BRAZIL 2 - CONSUMPTION
ANALYSIS OF CONSUMPTION PATTERNS BY
REGION AND INCOME CLASS WITH EMPHASIS
ON FOOD CATEGORIES

C. Williamson, and F.D. McCarthy

February 1981
WP-81-16

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WITHOUT PERMISSION
OF THE AUTHOR

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INTERNATIONAL INSTITUTE FOR APPLIED SYSTEMS ANALYSIS
A-2361 Laxenburg, Austria

THE AUTHORS

D. McCARTHY is a research scholar at the International Institute of Applied Systems Analysis, Schloss Laxenburg, 2361 Laxenburg, Austria.

C. WILLIAMSON is a research assistant at the International Institute for Applied Systems Analysis, Schloss Laxenburg, 2361 Laxenburg, Austria. Her home institute is Harvard University, Cambridge, Mass. USA.

FOREWORD

Understanding the nature and dimensions of the world food problem and the policies available to alleviate it has been the focal point of the IIASA Food and Agriculture Program since it began in 1977.

National food systems are highly interdependent, and yet the major policy options exist at the national level. Therefore, to explore these options, it is necessary both to develop policy models for national economies and to link them together by trade and capital transfers. For greater realism the models in this scheme are being kept descriptive, rather than normative. In the end it is proposed to link models to twenty countries, which together account for nearly 80 percent of important agricultural attributes such as areas, production, population, exports, imports and so on.

This work analyses the demand sector for the Brazil Planning Model.-BPM.

Kirit S. Parikh
Acting Program Leader
Food and Agriculture Program

PREFACE

This paper discusses consumption patterns in Brazil. Most of the results are based on the ENDEF National Household Expenditure Survey 1974/75.

It provides estimates of expenditure shares and elasticities for seven broad expenditure classes both at the national and regional level and by income class. Food consumption is then analysed under seventeen separate commodity headings. This is also done at the regional level and by income class.

This analysis also provides the basis for the consumption module of the Brazil general equilibrium planning model - BPM.

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BRAZIL 2 - CONSUMPTION

C. Williamson, and F.D. McCarthy

1. INTRODUCTION

1.1. Growth of Consumption Expenditure

This paper discusses private household expenditure patterns in Brazil with particular emphasis on food consumption. At the aggregate level annual growth rate of private food consumption expenditure over the period 1965 to 1977 has averaged 8.3 percent at constant prices. Few countries have achieved a record like this over an extended period. Inevitably such rapid growth has induced rather dramatic changes. These are best understood by trying to disaggregate, at least by region and income class.

There is an extensive literature on income distribution in Brazil particularly during the period of rapid expansion of the sixties and early seventies. These range from the rather critical assessments of scholars such as Bacha and Taylor (1978) Fishlow (1972) and Syvrud (1974) to the less critical views of Langoni (1973) and Fields (1977). Analysis of private

household expenditure provides another input to this debate. In particular caloric intake is one possible measure that may be used to assess whether low income groups are better off, in absolute terms. Here again one is faced with aggregation difficulties so that significant differences can only be identified by consideration of regional and income differences.

1.2. Demand at the Macro Level

At the macro level the principal factors effecting demand are population growth, per capita income and increasing urbanization. During the period 1960-70 the average population growth rate for Brazil has been close to 2.9 percent per year. Regionally this varied from 5.6 percent for center-west region to 2.4 percent for the relatively depressed northeast.

The pace of urbanization has followed along the lines of a rapidly industrialising economy. The percentage of population living in rural area in 1940 was 69 percent. This had fallen to 44 percent by 1970 and official estimates suggest a figure of 33 percent by 1980. In view of the major differences in urban and rural consumption patterns this imposes a number of features on the changing macro demand situation. These spatial variations are captured to some extent in the analysis by considering seven urban and three rural regions separately.

1.3. Food Demand

There have been a number of studies of food demand in recent years from that of rural population of the State of Sao Paulo by the Fundacao Getulio Vargas in 1963 to the extremely elaborate ENDEF, national study of 1974-75. Some of the results of the regional studies are summarized in Tables 1.1, 1.2 and 1.3. These studies have to be interpreted rather judiciously because of both the limited sample and the method of investigation used. Often they are conducted at a specific time of the year which gives rise to seasonality

TABLE 1.1

ESTADO DE SAO PAULO - ESTIMATED HOUSEHOLD FOOD CONSUMPTION (KGS PER CAPUT PER YEAR)

BRASIL '79

| Items | Average | INCOME PER HOUSEHOLD PER YEAR IN Cr \$ | | | | | |
|--------------------------------|---------------|--|---------------|---------------|---------------|---------------|---------------|
| | | UP TO 100 | 100- 249 | 250- 499 | 500- 799 | 800- 1199 | 1200 OVER |
| NUMBER OF HOUSEHOLDS | 480 | 4 | 54 | 169 | 113 | 51 | 89 |
| AVERAGE SIZE OF HOUSEHOLD | 5.9 | 4.5 | 4.8 | 5.2 | 6.1 | 7.4 | 6.6 |
| INCOME | 154.4 | 17.5 | 41.4 | 70.3 | 98.7 | 129.6 | 421.3 |
| TOTAL EXPENDITURE | 102.1 | 42.1 | 65.0 | 80.1 | 93.8 | 105.6 | 164.8 |
| TOTAL FOOD EXPENDITURE | 57.1 | 32.6 | 40.4 | 49.5 | 54.6 | 57.9 | 81.2 |
| CEREALS | 155.36 | 80.00 | 156.14 | 139.41 | 171.35 | 150.98 | 165.26 |
| RICE | 91.65 | 47.78 | 82.23 | 86.22 | 87.64 | 94.99 | 107.83 |
| WHEAT FLOUR | 13.50 | 0.00 | 9.26 | 12.65 | 13.71 | 14.91 | 15.91 |
| MILLET | 35.42 | 0.00 | 44.97 | 27.74 | 54.85 | 25.11 | 27.62 |
| OTHER FLOURS | 14.79 | 32.22 | 19.68 | 12.80 | 15.15 | 15.97 | 13.90 |
| STARCHY ROOTS | 31.67 | 16.66 | 21.23 | 25.02 | 35.31 | 35.75 | 39.80 |
| POTATOES | 14.80 | 1.33 | 8.29 | 9.12 | 17.44 | 14.92 | 23.41 |
| CASSAVA | 11.07 | 3.33 | 8.43 | 9.53 | 10.11 | 15.12 | 13.31 |
| CASSAVA FLOUR | 5.80 | 12.00 | 4.51 | 6.37 | 7.76 | 5.71 | 3.08 |
| SUGAR AND SWEETS | 41.51 | 41.11 | 40.46 | 41.81 | 38.77 | 42.19 | 44.29 |
| SUGAR | 41.29 | 40.00 | 40.46 | 41.47 | 38.63 | 42.05 | 44.06 |
| SWEETS | 0.22 | 1.11 | 0.00 | 0.34 | 0.14 | 0.14 | 0.23 |
| BEANS | 33.05 | 41.33 | 31.37 | 31.32 | 29.53 | 30.87 | 41.68 |
| FRUIT (DOZENS) | 20.14 | 5.17 | 14.27 | 16.33 | 14.87 | 30.03 | 28.67 |
| BANANAS (DOZENS) | 9.87 | 0.28 | 6.75 | 8.94 | 6.83 | 12.99 | 14.46 |
| ORANGES (DOZENS) | 10.27 | 4.89 | 7.52 | 7.39 | 8.04 | 17.04 | 14.21 |
| MEAT | | | | | | | |
| BEEF | 7.80 | 2.67 | 3.31 | 6.25 | 7.06 | 9.06 | 12.33 |
| PORK | 11.70 | 3.33 | 6.36 | 11.39 | 11.81 | 10.23 | 15.59 |
| POULTRY (NUMBERS) | 6.59 | 1.39 | 3.60 | 6.41 | 6.39 | 5.78 | 9.10 |
| SALTED MEAT | 1.14 | 0.00 | 0.69 | 0.98 | 1.04 | 2.07 | 1.12 |
| EGGS (DOZENS) | 7.31 | 3.56 | 4.14 | 5.29 | 7.12 | 6.13 | 12.86 |
| MILK AND DAIRY PRODUCTS | | | | | | | |
| FRESH MILK (LITERS) | 74.15 | 38.89 | 47.77 | 67.04 | 74.14 | 72.97 | 98.33 |
| MILK POWDER (LITERS) | 0.62 | 0.00 | 0.41 | 0.58 | 0.77 | 0.35 | 0.77 |
| CONDENSED MILK (LATAS) | 0.23 | 0.00 | 0.00 | 0.05 | 0.02 | 0.13 | 0.90 |
| CHEESE | 0.78 | 0.00 | 0.16 | 0.38 | 0.74 | 1.08 | 1.54 |
| FATS AND OILS | 15.23 | 11.95 | 10.37 | 12.40 | 15.99 | 16.32 | 14.12 |
| MARGARINE | 0.39 | 0.00 | 0.10 | 0.16 | 0.33 | 0.63 | 0.77 |
| LARD | 9.32 | 6.67 | 5.99 | 7.34 | 9.36 | 11.85 | 12.18 |
| BACON | 5.52 | 5.28 | 4.28 | 4.90 | 6.30 | 3.84 | 1.17 |
| COFFEE | 10.42 | 15.78 | 8.60 | 9.59 | 9.94 | 10.31 | 12.95 |

SOURCE OF DATA: FUNDACAO GETULIO VARGAS - CENTRO DE ESTUDOS AGRICOLAS - ORCAMENTOS FAMILIARES RURAIS, SAO PAULO :
PAGE 263 - QUADRO F

FAO (1979) Review of Food Consumption Surveys, Vol. 2: Africa, Latin America, Near East, Far East.

TABLE 1.2

| RIO DE JANEIRO - ESTIMATED HOUSEHOLD FOOD CONSUMPTION (KGS PER CAPUT PER 3 MONTHS) | | | | | | | | | | | BRAZIL 1968 |
|--|--------------|--|--------------|--------------|---------------|----------------|----------------|----------------|----------------|------------------|-------------|
| Items | Average | INCOME PER HOUSEHOLD PER 3 MONTHS IN Cr \$ | | | | | | | | | |
| | | UP TO 315 | 315 - 469 | 470 - 704 | 705 - 1099 | 1100 - 1649 | 1650 - 3519 | 2520 - 3779 | 3780 - 5669 | 5670 and over | |
| NUMBER OF HOUSEHOLDS | 192 | 9 | 12 | 13 | 45 | 41 | 33 | 22 | 12 | 5 | |
| AVERAGE SIZE OF HOUSEHOLD | 4.2 | 2.6 | 3.7 | 2.3 | 4.4 | 4.4 | 5.0 | 4.2 | 3.7 | 5.0 | |
| INCOME | 406.4 | 66.1 | 111.6 | 240.3 | 196.4 | 305.0 | 394.0 | 714.2 | 1254.7 | 1286.4 | |
| TOTAL EXPENDITURE | 348.9 | 183.2 | 135.2 | 284.2 | 202.1 | 281.3 | 344.1 | 539.6 | 889.8 | 964.8 | |
| TOTAL FOOD EXPENDITURE | 153.25 | 41.37 | 77.87 | 146.82 | 107.44 | 140.49 | 159.54 | 248.95 | 256.51 | 261.17 | |
| CEREALS AND CEREAL PRODUCTS | 22.90 | 12.61 | 19.94 | 23.42 | 22.39 | 23.70 | 22.27 | 27.82 | 23.45 | 24.00 | |
| RICE | 10.28 | 5.09 | 9.50 | 12.27 | 11.41 | 10.16 | 10.95 | 10.85 | 8.55 | 7.12 | |
| FLOURS | 1.69 | 0.94 | 1.28 | 1.27 | 1.49 | 1.81 | 0.77 | 2.20 | 2.33 | 1.71 | |
| BREAD | 8.44 | 5.50 | 7.63 | 6.68 | 7.72 | 9.23 | 7.74 | 11.48 | 8.56 | 11.68 | |
| OTHER BAKERY PRODUCTS | 2.49 | 1.08 | 1.55 | 3.20 | 1.77 | 2.50 | 2.81 | 3.30 | 4.02 | 3.49 | |
| STARCHY ROOTS | 10.62 | 4.87 | 8.11 | 10.67 | 9.61 | 10.28 | 11.39 | 15.29 | 11.77 | 11.34 | |
| POTATOES | 7.60 | 3.02 | 5.99 | 7.63 | 6.55 | 7.08 | 8.04 | 12.14 | 8.27 | 9.34 | |
| OTHER N.E.S. | 3.02 | 1.85 | 2.12 | 3.03 | 3.06 | 3.20 | 3.35 | 3.16 | 3.50 | 2.00 | |
| SUGAR AND SWEETS | 10.16 | 6.26 | 8.62 | 12.56 | 9.55 | 9.82 | 11.38 | 11.61 | 12.60 | 8.40 | |
| SUGAR | 9.28 | 6.26 | 8.52 | 12.20 | 9.02 | 9.08 | 10.34 | 9.90 | 9.81 | 7.32 | |
| SWEETS | 0.89 | 0.00 | 0.10 | 0.36 | 0.53 | 0.74 | 1.04 | 1.71 | 2.79 | 1.08 | |
| PULSES | 5.83 | 2.41 | 6.20 | 7.84 | 6.15 | 6.07 | 5.94 | 6.40 | 4.82 | 3.46 | |
| VEGETABLES | 15.79 | 5.68 | 10.06 | 18.78 | 12.40 | 15.24 | 16.98 | 22.25 | 30.57 | 18.70 | |
| VEGETABLES (KG) | 9.26 | 0.64 | 2.92 | 15.07 | 4.80 | 7.13 | 9.53 | 13.87 | 26.88 | 15.64 | |
| VEGETABLES (MOLHO) | 4.32 | 2.26 | 2.92 | 5.56 | 3.42 | 3.49 | 5.20 | 6.84 | 6.68 | 3.12 | |
| VEGETABLES (PE) | | | | | | | | | | | |
| FRUIT | 6.43 | 1.69 | 4.63 | 5.73 | 6.91 | 5.89 | 6.67 | 8.02 | 3.31 | 5.20 | |
| BANANAS (DZ) | 7.10 | 1.08 | 9.60 | 6.88 | 6.07 | 5.49 | 6.82 | 12.31 | 8.78 | 7.80 | |
| CITRUS FRUIT (DZ) | 3.10 | 0.00 | 0.25 | 2.36 | 1.11 | 2.72 | 3.03 | 5.59 | 9.93 | 7.24 | |
| OTHER FRUIT | | | | | | | | | | | |
| MEAT | 14.66 | 5.32 | 6.45 | 13.93 | 11.09 | 13.03 | 16.05 | 24.05 | 26.00 | 19.58 | |
| BEEF | 8.88 | 3.70 | 4.68 | 8.53 | 6.88 | 7.84 | 10.08 | 14.22 | 14.09 | 11.96 | |
| PORK | 0.42 | 0.00 | 0.00 | 0.43 | 0.27 | 0.33 | 0.41 | 1.10 | 0.95 | 0.48 | |
| POULTRY | 2.36 | 0.52 | 0.30 | 1.42 | 1.72 | 1.74 | 2.56 | 4.71 | 5.79 | 3.18 | |
| OFFALS | 0.69 | 0.02 | 0.43 | 1.35 | 0.39 | 0.61 | 0.68 | 0.87 | 2.49 | 0.60 | |
| PROCESSED MEAT | 2.30 | 1.09 | 1.05 | 2.21 | 1.83 | 2.51 | 2.34 | 3.15 | 2.68 | 3.35 | |
| EGGS (DZ) | 4.74 | 7.52 | 1.97 | 5.03 | 2.97 | 4.58 | 3.46 | 8.59 | 8.38 | 11.96 | |
| FISH | 3.34 | 2.04 | 1.69 | 3.16 | 1.92 | 2.07 | 1.95 | 3.69 | 5.11 | 2.25 | |
| MILK AND DAIRY PRODUCTS | 15.78 | 6.08 | 12.38 | 16.30 | 13.96 | 14.11 | 10.81 | 23.84 | 35.35 | 32.56 | |
| FRESH MILK (LITERS) | 0.30 | 0.02 | 0.16 | 0.04 | 0.20 | 0.37 | 0.59 | 0.29 | 0.19 | 0.00 | |
| MILK POWDER | 0.82 | 0.13 | 0.07 | 0.20 | 0.36 | 0.50 | 0.96 | 1.27 | 3.54 | 2.50 | |
| CHEESE | | | | | | | | | | | |
| FATS AND OILS | 3.70 | 2.24 | 2.57 | 3.86 | 3.05 | 3.20 | 3.80 | 5.05 | 4.44 | 3.55 | |
| BUTTER | 0.11 | 0.69 | 2.00 | 1.15 | 1.63 | 1.76 | 1.92 | 1.82 | 2.03 | 1.76 | |
| MARGARINE | 0.61 | 0.58 | 0.31 | 0.86 | 0.61 | 0.49 | 0.51 | 1.03 | 0.80 | 0.66 | |
| OILS | 1.37 | 0.98 | 0.26 | 1.85 | 0.81 | 0.95 | 1.38 | 2.20 | 1.62 | 1.14 | |
| CHOCOLATE | 0.04 | 0.00 | 0.00 | 0.01 | 0.01 | 0.04 | 0.04 | 0.05 | 0.28 | 0.08 | |
| SPICES | 1.36 | 0.63 | 1.16 | 1.72 | 1.26 | 1.24 | 1.60 | 1.65 | 1.64 | 0.98 | |
| BEVERAGES | 2.00 | 1.57 | 1.20 | 3.67 | 1.90 | 1.60 | 2.00 | 3.31 | 2.24 | 1.32 | |
| COFFEE | 6.26 | 3.95 | 0.13 | 5.90 | 2.62 | 5.16 | 6.71 | 13.50 | 10.87 | 10.87 | |
| NON ALC. DRINKS (BOTTLE) | 2.40 | 3.13 | 0.00 | 6.83 | 1.28 | 1.04 | 2.86 | 5.09 | 5.61 | 2.80 | |
| ALCOHOLIC DRINKS (BOTTLE) | | | | | | | | | | | |

SOURCE OF DATA: FUNDAÇÃO GETULIO VARGAS, CENTRO DE ESTATÍSTICA ECONÔMICA - PESQUISA SOBRE ORÇAMENTOS FAMILIARES: CIDADE DE RIO DE JANEIRO 1967/68 - TOMO IV - VOL. I

FAO (1979) Review of Food Consumption Surveys, Vol. 2: Africa, Latin America, Near East, Far East.

TABLE 1.3

BRAZIL 1973

RIO DE JANEIRO (Conjunto Vertical *) - ESTIMATED HOUSEHOLD FOOD CONSUMPTION (GRS/caput/day)

| Items | Average | Income per household (in number of minimum salaries per month ^{1/}) | | | | | |
|----------------------------|---------|---|-------------|-------------|-------------|-------------|-------------|
| | | Up to 1.00 | 1.00 - 1.49 | 1.50 - 2.24 | 2.25 - 3.49 | 3.50 - 5.24 | 5.25 - 7.99 |
| Number of households | 214 | 5 | 20 | 34 | 80 | 51 | 24 |
| Average size of households | 4.9 | 3.8 | 4.6 | 4.3 | 4.7 | 5.1 | 6.1 |
| Income | 6.86 | 1.91 | 2.90 | 4.56 | 6.42 | 8.78 | 10.7 |
| Total expenditure | 7.41 | 4.20 | 4.75 | 6.73 | 7.50 | 8.46 | 8.63 |
| Total food expenditure | 3.65 | 2.56 | 2.55 | 3.21 | 3.58 | 4.33 | 4.32 |
| Cereals | 215 | 142 | 224 | 224 | 211 | 216 | 222 |
| Starchy roots and tubers | 41.2 | 53.2 | 37.4 | 36.6 | 38.9 | 44.2 | 41.5 |
| Sugar | 69.8 | 73.9 | 65.8 | 64.7 | 69.2 | 71.4 | 75.4 |
| Pulses and nuts | 45.6 | 43.9 | 50.0 | 50.5 | 43.8 | 47.1 | 42.3 |
| Pulses | 44.6 | 43.9 | 50.0 | 50.5 | 42.2 | 45.8 | 41.4 |
| Nuts | 1.0 | - | - | - | 1.6 | 1.3 | 0.9 |
| Vegetables | 107 | 99.6 | 81.1 | 108 | 107 | 107 | 125 |
| Fruits | 76.1 | 101 | 31.1 | 75.1 | 73 | 79.6 | 94.7 |
| Meat | 75.6 | 51.2 | 60.6 | 79.5 | 72.7 | 75.7 | 90.4 |
| Beef | 42.2 | 17.3 | 21.7 | 53.1 | 42.0 | 37.5 | 56.6 |
| Pork | 11.3 | 12.7 | 8.3 | 9.6 | 9.8 | 15.1 | 11.1 |
| Poultry | 21.2 | 21.2 | 30.6 | 16.8 | 18.4 | 23.1 | 22.8 |
| Other | 0.9 | - | - | - | 2.5 | - | - |
| Eggs | 14.1 | 5.8 | 11.1 | 13.5 | 15.5 | 15.3 | 11.9 |
| Fish | 20.3 | 16.1 | 12.3 | 20.4 | 21.6 | 19.7 | 23.4 |
| Milk | 152 | 187 | 13.4 | 176 | 153 | 155 | 138 |
| Fats and oils | 32.6 | 29.1 | 28.3 | 34.6 | 31.1 | 33.5 | 36.0 |
| Vegetable origin | 24.4 | 20.9 | 22.4 | 26.4 | 23.5 | 21.8 | 30.3 |
| Animal origin | 8.2 | 8.2 | 5.9 | 8.2 | 7.6 | 11.7 | 5.7 |
| Other | 48.4 | 43.0 | 30.3 | 39.9 | 40.8 | 55.7 | 76.4 |
| Alcoholic beverages | 14.1 | 15.2 | 9.1 | 9.5 | 8.6 | 16.3 | 36.3 |
| Non alcoholic beverages | 3.9 | - | 1.0 | 0.6 | 1.4 | 8.6 | 8.4 |

* Conjunto Vertical = Multistore houses

^{1/} No information is available on value of minimum salary, however the average monthly household income, in cruzeiros, for the six income groups is as follows: 1053 (average); 218; 400; 588; 905; 1343; 1950.

Source: Instituto Brasileiro de Economia - "Pesquisa sobre Consumo Alimentar" - Vol. I, 1975.

FAO (1979) Review of Food Consumption Surveys, Vol. 2: Africa, Latin America, Near East, Far East.

problems. The techniques to assess quantities may be of limited value. For instance interview techniques can yield quite misleading information about food consumption levels. Similarly if one is interested in extending the analysis to nutrient intake it is desirable to obtain information about intrafamily distribution. Nevertheless some of these surveys do give an indication of consumption patterns by income class.

In Table 1.1 one observes that cereals consumption, and millets in particular tends to fall at upper income levels. One finds a similar pattern for cassava flour. Beans consumption tends to be reasonably constant across income groups. Among the meat categories beef exhibits high income elasticity. The total consumption of fats and oils tends to be constant across income groups but this obscures two opposite effects: consumption of lard rises with incomes while bacon falls.

It is interesting to compare the situation in Rio de Janeiro 1968 to that in 1973 - Tables 1.2 and 1.3 respectively even though the groups are not strictly comparable. Cereal consumption in 1973 seems to have fallen from 90 to around 80 kgs (caput/year) while consumption of starchy roots has increased. Across income groups in the 1968 survey one observes the relatively inelastic demand for cereals and starchy roots while meat consumption is much more elastic. It is also notable that even the poorest groups (up to the 704 Cr \$ category) tends to have relatively high meat consumption by international standards up to around 35 kg/caput/year.

Macro Estimates of Food Intake

At the macro level estimates of consumption are often given by a Food Balance Sheet. This provides a detailed supply and utilisation account for each commodity. The balance for the years 1972-74 is given in Table 1.4. For example one notes that for wheat, domestic production was 1958 thousand tons while

TABLE 1.4
(page 3 of 3)

FOOD BALANCE SHEET

BRAZIL

(INFORMATION AVAILABLE AS AT 30/12/75)

POPULATION 103702
(THOUSANDS)

YEAR AVERAGE 1972-74

WEIGHT (MGT) THOUSAND METRIC TONS
NUMBERS(NGS) THOUSAND UNITS

| COMMODITY | PRODUCTION | | IM- PORTS | STOCK CHANG- ES | EX- PORTS | DOMES- TIC SUPPLY | DOMESTIC UTILIZATION | | | | KILO- GRAMS /YEAR | PER CAPUT SUPPLY | | | | | |
|---------------------------|------------|--------|--------------|-----------------------|--------------|-------------------------|----------------------|------|-------------|--------------------|-------------------------|------------------|------|---------|---------------------|------------------------|--------------|
| | INPUT | OUTPUT | | | | | FEED | SEED | MANUFACTURE | | | WASTE | FOOD | PER DAY | | | |
| | | | | | | | | | FOOD USE | NON FOOD USE | | | | GRAMS | CALO RIES NOS | PRO- TEINS GRAMS | FAT GRAMS |
| CERESAL/FROZEN WHOLE | 32 | 32 | | | | 8 | | | | | 24 | .2 | .6 | | .1 | | |
| CERESAL/CURED | 50 | 17 | 33 | | | 50 | | | | | 50 | .5 | 1.3 | 2 | .5 | | |
| PELAGIC FRESH WHOLE | | 203 | | | | 203 | | 106 | | | 97 | .9 | 2.6 | 2 | .3 | | |
| PELAGIC/CURED | 41 | 14 | | | | 14 | | | | | 14 | .1 | .4 | 1 | .1 | | |
| PELAGIC/CANNED | 61 | 38 | 1 | | | 38 | | | | | 38 | .4 | 1.0 | 2 | .2 | | |
| PELAGIC/PEALS | 4 | 1 | 1 | | | 2 | 2 | | | | | | | | | | |
| MARINE FRESH WHOLE | | 76 | | | | 76 | | | | | 76 | .7 | 2.0 | 1 | .2 | | |
| CRUSTACEANS FRESH | | 87 | | | | 87 | | 56 | | | 31 | .3 | .8 | | .1 | | |
| CRUSTACEANS/FROZEN | 31 | 17 | | | | 10 | 7 | | | | 10 | .1 | .3 | | | | |
| CRUSTACEANS/CURED | 25 | 8 | | | | 8 | | | | | 8 | .1 | .2 | | .1 | | |
| CRUSTACEANS/CANNED | 2 | 1 | | | | 1 | | | | | 1 | | | | | | |
| MOLLUSCS FRESH | | 4 | | | | 4 | | | | | 4 | | .1 | | | | |
| CEPHALOPODS FRESH | | 1 | | | | 1 | | | | | 1 | | | | | | |
| CEPHALOPODS/FROZEN | | | 1 | | | 1 | | | | | 1 | | | | | | |
| /AQUATIC MAMMALS MEAT | 1 | 1 | | | | 1 | | | | | 1 | | | | | | |
| /AQUATIC MAMMALS MEALS | 4 | | | | | | | | | | | | | | | | |
| MILK | | | | | | | | | | | | | | 101 | 5.6 | 5.2 | |
| CONDENSED/MILK(MGT) | 9833 | 7343 | | | | 7344 | | 2152 | 367 | 4824 | 46.5 | 127.5 | 83 | 4.2 | 4.5 | | |
| COND MILK/EVAPORATED COND | 140 | 29 | | | 1 | 28 | | | | 28 | .3 | .7 | 1 | .1 | .1 | | |
| COND MILK/DRIED | 178 | 20 | | | | 20 | | | | 20 | .2 | .5 | 3 | .1 | .1 | | |
| SPE GOATS(INCS)/MILK(MGT) | 3096 | 93 | | | | 93 | | | 5 | 88 | .9 | 2.3 | 2 | .1 | .1 | | |
| COND MILK/COND SKIM MILK | 1264 | 1304 | | | | 1306 | | 730 | 511 | 65 | .6 | 1.7 | 1 | .1 | | | |
| COND SKIM MILK/DRIED | 653 | 56 | 15 | | | 72 | | | | 72 | .7 | 1.9 | 7 | .7 | | | |
| COND MILK/CHEESE | 470 | 45 | 1 | | | 49 | | | | 49 | .5 | 1.3 | 5 | .3 | .4 | | |
| COND SKIM MILK/CHEESE | 37 | 3 | | | | 3 | | | | 3 | | .1 | | | | | |
| GILS AND FATS | | | | | | | | | | | | | | 198 | 22.4 | | |
| VEGETABLE GILS AND FATS | | | | | | | | | | | | | | 159 | 18.0 | | |
| RICE BRAN/GIL | 24 | 4 | | | | 4 | | | | 4 | | .1 | 1 | | .1 | | |
| PAIZES/GIL | 5 | 2 | | | | 2 | | | | 2 | | .1 | | | .1 | | |
| SOYBEANS/GIL | 3136 | 505 | 1 | 60 | 72 | 374 | | | | 374 | 3.6 | 9.9 | 87 | 9.9 | | | |
| GROUNDNUTS SHELLS/OIL | 230 | 87 | | | 51 | 37 | | | | 37 | .4 | 1.0 | 9 | 1.0 | | | |
| COCONUT LIL | 2 | 1 | 2 | | | 3 | | | | 3 | | .1 | 1 | | .1 | | |
| PALM KERNELS/GIL | | 95 | | | 2 | 93 | | | | 93 | .9 | 2.5 | 22 | 2.5 | | | |
| /PALM OIL | | 6 | 1 | | | 7 | | | | 7 | .1 | .2 | 2 | .2 | | | |
| OLIVES/OIL | | | 15 | | | 15 | | | | 15 | .1 | .4 | 3 | .4 | | | |
| CASTOR BEANS/GIL | 252 | 163 | | | 139 | 24 | | 24 | | 24 | | | | | | | |
| TUNGNUTS/GIL | 10 | 2 | | | | 2 | | 2 | | 2 | | | | | | | |
| CUTTUNSEED/GIL | 500 | 144 | | | 1 | 142 | | | | 142 | 1.4 | 3.8 | 33 | 3.8 | | | |
| LINSEED/GIL | 10 | 3 | 6 | | | 10 | | | 10 | 10 | | | | | | | |
| /VEGETABLE GILS RES | | 14 | | | | 13 | | | 3 | 3 | | | | | | | |
| COCOA BEANS/BITTER | 69 | 31 | | | 27 | 4 | | | | 4 | | .1 | 1 | | .1 | | |
| ANIMAL GILS AND FATS | | | | | | | | | | | | | | 39 | 4.4 | | |
| CATTLE(NGS)/FAT(MGT) | 10555 | 66 | | | | 66 | | 66 | | 66 | | | | | | | |
| /TALLOW | | 85 | 52 | | | 141 | | | 141 | 141 | | | | | | | |
| SHEEP(NGS)/FAT(MGT) | 2277 | 1 | | | | 1 | | | | 1 | | | | | | | |
| GOATS(NGS)/FAT(MGT) | 1962 | 1 | | | | 1 | | | | 1 | | | | | | | |
| PIGS(NGS)/FAT(MGT) | 10523 | 393 | | | | 393 | | 143 | 251 | 143 | | | | | | | |
| MILK/WATER | 143 | 114 | 4 | | | 118 | | | | 118 | 1.1 | 3.1 | 28 | 3.1 | | | |
| MILK/BUTTER | 1364 | 57 | 3 | | 1 | 59 | | | | 59 | .6 | 1.6 | 11 | 1.6 | | | |
| /AQUATIC MAMMALS GIL | | 1 | 1 | | | 2 | | | 2 | 2 | | | | | | | |
| SPICES | | | | | | | | | | | | | | | | | |
| PEPPER WHITE BLACK | | 23 | | 4 | 15 | 5 | | | 1 | 4 | | .1 | | | | | |
| CINNAMON CANELLA | | | 1 | | | 1 | | | | 1 | | | | | | | |
| ANISE GALIANG FENNEL | | | 1 | | | 1 | | | | 1 | | | | | | | |
| STIMULANTS | | | | | | | | | | | | | | 8 | 1.2 | | |
| COFFEE GREEN | | 1371 | 1 | -218 | 936 | 655 | | 120 | 12 | 523 | 5.0 | 13.8 | 6 | .9 | | | |
| /COFFEE EXTRACTS | 120 | 40 | | | 36 | 3 | | | | 3 | | .1 | | | | | |
| COCOA BEANS | | 194 | | -12 | 105 | 101 | | 89 | 2 | 11 | | | | | | | |
| COCOA BEANS/POWDER | 69 | 31 | | | 26 | 4 | | | | 4 | | .1 | | | | | |
| COCOA BEANS/PASTE | 89 | 71 | | | 2 | 69 | | 69 | | | | | | | | | |
| TEA | | 6 | | | 5 | 2 | | | | 1 | | | | | | | |
| MATE | | 175 | | | 18 | 86 | | | | 81 | .8 | 2.1 | 1 | .2 | | | |
| HOPS | | | 2 | | | 2 | | 2 | | | | | | | | | |
| ALCOHOLIC BEVERAGES | | | | | | | | | | | | | | 42 | .1 | | |
| BARLEY MALT/BEEF | 157 | 1043 | | | 2 | 1042 | | | | 1042 | 10.6 | 27.5 | 10 | .1 | | | |
| GRAPES/WINE | 240 | 169 | 4 | | 1 | 175 | | 2 | | 171 | 1.7 | 4.5 | 3 | | | | |
| VERMOUTH WINE APERITIFS | 2 | 2 | | | | 2 | | | | 2 | | | | | | | |
| /DISTILLED ALCOHOL | | 662 | 7 | | 6 | 663 | | 293 | | 370 | 3.6 | 9.8 | 29 | | | | |

imports were 2382 thousands tons. After allowing for various conversion factors and losses this resulted in flour consumption of 27.2 kgs. per caput per year.

The table also summarises the overall calorie situation and estimates a national average of 2537 cal/caput/day while the protein intake is put at 63.2 grams per day. Of this latter figure about one third comes from animal sources the remainder coming from vegetable sources. The Food Balance Sheet is primarily a production oriented measure but it does afford some check on the quantities obtained by demand estimate approaches.

The rise of aggregate demand in Brazil since 1964 has been about 8.6 percent annually. This may be decomposed into an average per capita annual increase of around 5.6 and a population growth rate close to 3 percent.

The composition of this demand has changed due to structural change - increasing urbanisation and a smaller share of the workforce in the agriculture sector.

At the macro level, as measured by Food Balance Sheet for example, the average supply of food is adequate. However certain classes and regions have done better than others so that inevitably one must obtain disaggregated estimates to analyse this. A few surveys of limited coverage have highlighted the important role of income and regional location in determining behavior as consumers.

This study seeks to address some of these issues by using the comprehensive ENDEF survey of 1974/75.

Section 2 discusses general features of consumption patterns. Sections 3 and 4 discuss consumption by broad expenditure categories, first by shares (3) and then by elasticity estimates (4).

Sections 5 and 6 analyse food commodity expenditures first in terms of shares and then by elasticity measures.

Section 7 provides a brief discussion on some of the policy issues.

2. CONSUMPTION PATTERNS OVER TIME BY REGION AND INCOME CLASS

Consumption patterns at the National level tend to mask many effects. These effects may be considered under a number of headings but typically one should at least consider temporal, income and regional variations.

- Temporal Effects

Consumption patterns change over time due to a wide variety of factors. At one level there are the rather evident effects due to changes in income and production structure. As income increases the food consumption patterns for most populations tend to reflect higher shares of processed foods and higher levels of animal protein. If production structure in agriculture changes from staples to cash crops this will effect the diet. Similarly increasing urbanization changes food demand patterns towards more 'convenience foods'.

At another level there are more subtle effects which may be classified under the general heading of taste changes. These includes a whole plethora of phenomena that are often attributed to psychological effects, snob values, advertising. In a country such as Brazil undergoing rapid change such phenomena inevitably play a major role. Some of these effects may be analysed by introducing quality indices but inevitably this is not a very satisfactory approach.

- Income

If one discounts temporal and regional effects then there is still a strong variation across income classes. Total expenditure on food tends to rise with income but not as rapidly as caloric intake. There are two major effects; one is the substitution within goods the other is between foods. The poor may be willing to purchase rice from a bulk container with little processing while the rich may prefer the highly polished variety wrapped in an expensive package. The rich may opt for less cassava but more fillet steak.

- Region

Brazil is a highly diverse country with a mixture of many traditions and living patterns. Regions have also developed economically in a great variety of ways so consequently consumption patterns exhibit strong spatial variation.

Choice of Variable for Analysis

Inevitably one is faced with the problem of choosing an appropriate model. This largely reflects the objective of the study and the data available. This particular study is concerned with the national situation and is also being used as part of an overall general equilibrium planning model. The major data source available with broad national coverage is based on the ENDEF - National Household Expenditure survey conducted over the period 1974-1975. A number of studies with more limited coverage have also been reported in recent years see for example, Campino (1978) and Ward and Sanders (1980).

The ENDEF survey, used in this work has been discussed and used by a number of authors. These include Campino (1979) and Knight (1979).

ENDEF Survey (Estudo Nacional da Despesa Familiar (1974-75))

This survey was conducted during the period August 18th 1974 to August 15th 1975 by Fundacao Instituto Brasileiro de Geografia e Estatistica (IBGE). Particular emphasis was placed on food and nutrition data but many other socio-economic variables were also included such as family size, expenditure, prices. The survey covered 55,000 families in seven zones.

The present analysis is largely based on the tables prepared by IBGE from the survey results. Some further details of the survey are given in Appendix A.

Categories of Expenditure

Twenty four expenditure categories were analysed. These are listed in Table 2.1 where the sub-components are identified. This provides a mapping from the ENDEF categories to the classification chosen. The categories, have seventeen food commodities, tobacco and six non agriculture groups. These groups are chosen to match the requirements for the Brazil Planning Model (BPM).

Data Classification

In order to simplify the analysis and reduce the computation needs, ten representative sub regions were selected from the twenty two available. These are given in Table 2.2. It is seen that these represent 79% of the rural and 66% of the urban population. This data was then analysed for the twenty four categories listed above by expenditure class.

The ENDEF data tabulations on total expenditure and food expenditure are broken down by 9 expenditure classes for each region. Unfortunately the class breakdowns for the two sets of data are not the same, the former being based on "global" expenditure per family and the latter on "current" or "ordinary"

TABLE 2.1. Categories of Expenditure

-
1. Wheat - bread, biscuits, flour, other derived products
 2. Rice
 3. Maize
 4. Roots - potatoes, cassava, cassava flour, other roots
 5. Sugar - refined sugar, other sugars + sweets
 6. Pulses - beans, other pulses
 7. Vegetables
 8. Fruits + nuts
 9. Bovine + ovine meats - beef, offals, canned meats, other meats
 10. Pork - meat and pork fat
 11. Poultry + eggs
 12. Fish - fresh, salted and canned fish
 13. Dairy - fresh + canned milk, cheese + other derived products, butter
 14. Vegetable oil - oils, + margarine
 15. Coffee, cocoa, tea
 16. Beverages - alcoholic + carbonated
 17. Condiments
 18. Tobacco
 19. Manufacturing - clothing articles, shoes, furniture, home appliances, home cleaning items, medicines + treatments, books (school + other), school uniforms, journals + newspapers, recreation articles, automobiles + other vehicles, 1/2 "diverse expenditures"
 20. Services - clothing services, rent + taxes (for home), 1/2 "maintenance of home", restaurants, hygiene + personal care, doctors + dentists, hospitalization + surgery, other health expenses, education costs, 1/2 "diverse expenditures"
 21. Transportation services - 1/2 "costs of own vehicles" urban transport, long distance travel
 22. Energy - 1/2 "home maintenance" 1/2 "costs of own vehicle"
 23. Investment - diminution of indebtedness, own home, apartment, land, estate, ranch, home improvements, credits, other investments
 24. Taxes - income taxes, worker contributions, pensions
-

TABLE 2.2- Population of Selected Subregions¹.
(million inhabitants)

| | 1975 | | % of Total 1975 | |
|--|------------|------------------|-----------------|------------------|
| | Population | Rural Population | Population | Rural Population |
| <u>RURAL</u> | | | | |
| Region III - Rural South | 10.23 | 23.8 | | |
| Region IV - Rural Southeast | 6.01 | 13.9 | | |
| Region V - Rural Northeast | 17.74 | 41.2 | | |
| | 33.98 | 78.9 | | |
| Total Rural Population | 43.05 | 100.0 | | |
| <u>URBAN</u> | | | | |
| Region I - Rio de Janeiro | 8.33 | 13.0 | | |
| Region II - Sao Paulo | 10.04 | 15.7 | | |
| Region III - Urban non-metropolitan ² . | 6.18 | 9.6 | | |
| Region IV - Urban non-metropolitan ³ . | 6.24 | 9.7 | | |
| Region V - Urban non-metropolitan ⁴ . | 9.42 | 14.7 | | |
| Region VI - Salvador | 1.40 | 2.2 | | |
| Region VII - Belem | .80 | 1.3 | | |
| | 42.41 | 66.2 | | |
| Total Urban Population | 64.09 | 100.0 | | |
| Total 1975 Brazilian Population | 107.14 | | | |
| % Rural | 40.2 | | | |
| % Urban | 59.8 | | | |

1. Population figures are taken from Anuario Estatístico do Brasil, 1978, pp. 81-83
 2. All urban areas other than Curitiba and Porto Alegre.
 3. All urban areas other than Belo Horizonte.
 4. All urban areas other than Fortaleza, Recife, and Salvador

expenditure (global expenditure minus savings and investment). This results in significant differences near the upper end of the income distribution, where savings and investment become a nonnegligible part of global expenditure. A two-stage process was used to adjust for this.

Adjustment:

First the elasticity of expenditure on a particular item with respect to total food expenditure was estimated, and then it was multiplied by the elasticity of food expenditure with respect to global expenditure was estimated.

3. HOUSEHOLD EXPENDITURE SHARES - BROAD CATEGORIES OF EXPENDITURE

Expenditure by seven categories are given in Table 3.1 at the national level and also for urban and rural sectors. It is seen that the share of food at 24 percent puts Brazil close to most of the industrialized countries which typically at highest income levels drop to around 20 percent. The share on "investment" (see Table 2.1 for composition) at 20 percent is primarily saving but also includes home improvement and credit payments. It is typical of industrialised countries while "taxes" at 5.3 percent includes income taxes and worker contributions. However Brazil generates significant government revenues through value added and other indirect taxes.

Urban - Rural Differences

There are vast urban-rural differences. The average annual per capita urban global expenditure at 7,900 \$Cr. is more than three times higher than the corresponding rural figure at 2,366 \$Cr. The breakdown by category follows the typical patterns observed in international comparison studies. In urban areas housing (as reflected in the services category) and transportation are more expensive. In rural areas a much bigger share of expenditure at 45 percent goes to food - than in urban areas at close to twenty percent.

TABLE 3.1-BREAKDOWN OF TOTAL EXPENDITURE IN BRAZIL, 1974-1975

| A. Percentage Breakdown of Total Consumption | | | | | | | | (in percent) | |
|--|--------------------------|----------------------|-----------------|-----------------------|---------------|--------------|-------------------|--|--|
| | <u>Food</u> ¹ | <u>Manufacturing</u> | <u>Services</u> | <u>Transportation</u> | <u>Energy</u> | <u>Taxes</u> | <u>Investment</u> | <u>Total</u> | |
| Total Brazil ² | 24.07 | 18.81 | 24.90 | 3.16 | 3.42 | 5.32 | 20.34 | 100.00 | |
| Urban | 19.79 | 18.69 | 26.68 | 3.35 | 3.64 | 5.92 | 21.93 | 100.00 | |
| Rural | 45.31 | 19.40 | 16.00 | 2.19 | 2.28 | 2.38 | 12.44 | 100.00 | |
| B. Value of Total Consumption | | | | | | | | (in Cr'000,000,000) | |
| | | | | | | | | <u>Total</u> | <u>1975 Population (million) Persons</u> |
| Total Brazil | 146.36 | 114.38 | 151.40 | 19.19 | 20.77 | 32.37 | 123.68 | 608.15 | 107.14 |
| Urban | 100.21 | 94.62 | 135.10 | 16.96 | 18.45 | 29.95 | 111.01 | 506.30 | 64.09 |
| Rural | 46.15 | 19.76 | 16.30 | 2.23 | 2.32 | 2.42 | 12.67 | 101.85 | 43.05 |
| C. Average per Capita Expenditure | | | | | | | | (in Cr'000,000,000) | |
| | | | | | | | | <u>Average per capita Global Expenditure</u> | |
| Total Brazil | 1,366 | 1,068 | 1,413 | 179 | 194 | 302 | 1,154 | 5,676 | |
| Urban | 1,564 | 1,476 | 2,108 | 265 | 288 | 467 | 1,732 | 7,900 | |
| Rural | 1,072 | 459 | 379 | 52 | 54 | 56 | 294 | 294 | |

1. Including tobacco

2. All figures are aggregated from basic ENDEF data published in IBGE, Estudo Nacional da Despesa Dados Preliminares 6 Volumes, Rio de Janeiro, 1978.

3. All figures denominated in cruzieros are evaluated in August 1974 cruzieros.

Thus the cost of living index for rural areas is strongly influenced by food prices while rents and transportation costs (and energy) exert a relatively bigger influence in urban areas. Most of the household savings, 83 percent, are generated in the urban area but it is possible that some agricultural investment such as land improvement may not be adequately represented here. These are highly aggregated estimates. To gain a little more insight one should look at some disaggregated estimates.

Regional Dissagregation

Allocation of expenditure in different regions is given in Table 3.2. The regional breakdown highlights the differences between expenditure patterns in the northeast and in smaller towns in general from those in other regions or in larger cities. In general, as areas become more urbanized the share of total expenditure going to food falls and that going to services rises. The expenditure share on transportation, energy and taxes is higher in urbanized areas as well, resulting in a reduced share of the total for savings and investment. These differences are evident in a comparison of different regions with similar per capita expenditure levels, such as the rural south and the nonmetropolitan urban northeast.

Income Variations

The allocation of expenditure shows strong variation across income classes. The pattern is summarized in Table 3.3.

The most obvious changes appear in the share of total expenditure going to food, rising from a low of 12.6% for the highest urban income group (20% of the urban population) to 64.8% for the lowest rural income group (60% of the rural population). This does not imply that the poor spend more on food in absolute terms; on the contrary, the 12.6% figure for the upper income class translates to 2,685 \$Cr. per capita per year compared with 725 \$CR. per capita for the lowest rural

TABLE 3.2 - SPATIAL VARIATIONS - ALLOCATION
OF TOTAL PRIVATE EXPENDITURE IN SEVEN URBAN
AND THREE RURAL REGIONS 1974 - 1975

| | Food ¹ | Manufacturing | Services | Transportation | Energy | Taxes | Savings and Investment | Total | Average per Capital Global Expenditure | Population million Inhabitants |
|----------------|-------------------|---------------|----------|----------------|--------|-------|------------------------------|-------|--|--------------------------------------|
| URBAN: | | | | | | | | | | |
| Rio de Janeiro | 19.4 | 16.9 | 29.8 | 4.0 | 3.8 | 7.3 | 18.8 | 100.0 | 9,503 | 8.33 |
| Sao Paulo | 17.4 | 17.4 | 26.9 | 3.8 | 3.7 | 6.4 | 24.4 | 100.0 | 10,902 | 10.04 |
| Nonmet Urban | | | | | | | | | | |
| South | 26.4 | 21.7 | 23.8 | 2.4 | 3.6 | 4.6 | 17.5 | 100.0 | 5,919 | 6.18 |
| Nonmet Urban | | | | | | | | | | |
| Southeast | 24.9 | 23.3 | 22.6 | 2.5 | 3.6 | 4.3 | 18.8 | 100.0 | 5,568 | 6.24 |
| Nonmet Urban | | | | | | | | | | |
| Northeast | 28.7 | 22.6 | 19.5 | 2.5 | 3.3 | 4.5 | 10.5 | 100.0 | 3,028 | 9.42 |
| Salvador | 19.2 | 18.8 | 27.1 | 3.6 | 3.7 | 5.9 | 21.7 | 100.0 | 7,406 | 1.40 |
| Belera | 31.2 | 17.5 | 27.6 | 2.9 | 4.6 | 5.7 | 10.5 | 100.0 | 4,788 | .80 |
| RURAL: | | | | | | | | | | |
| South | 41.3 | 20.1 | 18.2 | 2.5 | 2.3 | 2.0 | 13.6 | 100.0 | 3,343 | 10.23 |
| Southeast | 44.0 | 20.2 | 15.1 | 2.4 | 2.4 | 3.3 | 12.6 | 100.0 | 2,474 | 6.01 |
| Northeast | 56.8 | 18.3 | 13.4 | 1.5 | 1.9 | 2.1 | 6.0 | 100.0 | 1,416 | 17.74 |

1. Including tobacco

TABLE 3.3 - INCOME VARIATION - ALLOCATION OF
TOTAL PRIVATE EXPENDITURE BY INCOME CLASS
1974-75

| | | Food | Manufacturing | Services | Transportation | Energy | Taxes | Savings and Investment | Total | Average per Capital Global Expenditure | Population million Inhabitants |
|-----------------|-----|------|---------------|----------|----------------|--------|-------|------------------------------|-------|--|--------------------------------------|
| SEVEN | | | | | | | | | | | |
| URBAN | | | | | | | | | | | |
| AREAS: | | | | | | | | | | | |
| Lowest | 20% | 48.4 | 14.6 | 27.4 | 2.1 | 2.6 | 2.9 | 2.0 | 100.0 | 1,540 | |
| Lowest | 40% | 44.3 | 16.5 | 27.6 | 2.7 | 2.6 | 3.7 | 2.6 | 100.0 | 2,125 | |
| Middle | 40% | 28.8 | 20.2 | 27.6 | 3.6 | 3.3 | 5.3 | 11.2 | 100.0 | 5,750 | |
| Upper | 20% | 12.6 | 18.9 | 24.7 | 3.4 | 4.2 | 6.8 | 29.4 | 100.0 | 21,313 | |
| THREE | | | | | | | | | | | |
| RURAL | | | | | | | | | | | |
| REGIONS: | | | | | | | | | | | |
| Lower | 60% | 64.8 | 15.1 | 15.2 | 1.0 | 1.5 | 1.0 | 1.4 | 100.0 | 1,119 | |
| Middle | 30% | 55.0 | 19.3 | 16.3 | 1.5 | 1.5 | 1.7 | 4.7 | 100.0 | 2,116 | |
| UPPER | 10% | 28.2 | 22.7 | 16.0 | 3.5 | 3.4 | 3.7 | 22.5 | 100.0 | 6,391 | |

income group. In comparison, of the total expenditure of the poorest 20% in urban areas, 48.4% or 745 \$Cr. per capita per year goes to food, a per capita amount very close to that for the poorest 60% in rural areas.

Thus in Brazil the share of expenditure on food by the urban upper income group is similar to that found among the richest country of the world while the rural low income share at 65% is typical of the very poorest countries.

The falling share going to food as incomes rise is counteracted by rising shares going to manufacturing, transportation, energy, taxes, and -- most of all -- saving and investment. About two-thirds of all private savings and investment in Brazil is done by the richest 20% of the urban population (12% of the entire Brazilian population). Although the savings rate of the richest 10% of the selected rural population is high (22.5%), their contribution in absolute terms to total savings is much less because their average per capita incomes (6,391 \$Cr.) are much lower, lower in fact than the average per capita income for all income groups in the seven urban areas taken together (7,900 \$Cr.).

The rising share going to taxes as incomes rise indicates the presence of some progressivity in the tax system, but at 6.8% the average rate paid by the richest urban income group is still quite small. The share going to transportation services does not change dramatically as incomes rise. However the proportion spent on one's own vehicle rises substantially while that spent on public transport falls. Similarly, although the share of expenditure going to services is almost constant across income classes, a further disaggregation reveals that the more basic services such as home rental and maintenance and the provision of food outside of the home are proportionately more important to the poorer groups, while medical, educational and recreational services are proportionately more important for the wealthier groups. Within the category of manufactured products, the rise in budget share as incomes rise results

primarily from an increase in expenditure on automobiles, with some increase occurring also in the clothing share until incomes reach a middle level where the share begins to decline.

Budget Share as a Welfare Measure?

In the previous section the allocation of expenditure between broad categories of expenditure was considered. One could also consider the share of expenditure by a family as a measure of welfare. In particular the share going to food is one indication of the purchasing power of incomes. Thus if family i , belonging to class k , spends a share S_{ik} of its income on food then \bar{S}_k is the average of these shares for the class k where

$$\bar{S}_k = \frac{1}{N_k} \sum_{i=1}^{N_k} S_{ik}$$

N_k is the number of families in class k .

For example if the class chosen encompasses all families in the urban area then \bar{S}_k equals 34 percent (see Appendix B) rather than the 20 percent obtained by the method used in the previous section. Details are given in Appendix B.

4. HOUSEHOLD EXPENDITURE ELASTICITIES BY BROAD CATEGORIES OF EXPENDITURE

The elasticity estimates for broad categories of expenditure classes are given in Table 4.1.

These are computed with respect to per capita income ("global" expenditure) for the seven urban and three rural regions taken together and individually. It also shows similar elasticities for different urban and rural income classes. All estimates reported in Tables 4.1 and 4.2 were

TABLE 4.1.-EXPENDITURE ELASTICITIES FOR BROAD
CATEGORIES OF EXPENDITURE FOR URBAN AND
RURAL BRAZIL, (1974 - 1975)

(standard errors in parentheses)

| | Food | Tobacco | Manufacturing | Services | Transportation | Energy | Taxes | Savings and Investment |
|---------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------------------|
| <u>URBAN: 7 Regions</u> | .487 (.016) | .477 (.032) | 1.12 (.020) | .908 (.011) | 1.15 (.049) | 1.22 (.026) | 1.27 (.030) | 2.08 (.348) |
| Rio de Janeiro | .489 (.039) | .359 (.060) | 1.09 (.049) | .958 (.018) | .838 (.061) | 1.19 (.055) | 1.27 (.032) | 2.02 (.125) |
| Sao Paulo | .446 (.043) | .354 (.077) | 1.04 (.051) | .880 (.020) | .945 (.068) | 1.23 (.088) | 1.10 (.029) | 3.01 (.119) |
| Nonmet Urban South | .442 (.033) | .614 (.060) | 1.18 (.054) | .882 (.050) | 1.53 (.102) | 1.26 (.060) | 1.22 (.053) | 2.15 (.103) |
| Nonmet Urban Northeast | .571 (.038) | .613 (.075) | 1.26 (.046) | .949 (.022) | 1.57 (.062) | 1.21 (.076) | 1.66 (.040) | 2.08 (.059) |
| Salvador | .492 (.034) | .421 (.045) | 1.13 (.048) | .903 (.013) | 1.00 (.043) | 1.13 (.036) | 1.15 (.030) | 2.37 (.079) |
| Belem | .532 (.048) | .428 (.051) | 1.19 (.045) | 1.03 (.034) | .679 (.072) | 1.36 (.087) | 1.44 (.053) | 2.25 (.137) |
| <u>RURAL: 3 Regions</u> | .533 (.040) | .769 (.044) | 1.30 (.045) | .871 (.040) | 1.70 (.054) | 1.41 (.092) | 1.80 (.093) | 2.65 (.102) |
| South | .438 (.048) | .711 (.064) | 1.28 (.086) | .816 (.057) | 1.64 (.124) | 1.44 (.117) | 1.54 (.063) | 2.64 (.198) |
| Southeast | .520 (.067) | .910 (.096) | 1.26 (.083) | .932 (.058) | 1.74 (.096) | 1.69 (.148) | 1.91 (.135) | 2.50 (.217) |
| Northeast | .635 (.076) | .701 (.049) | 1.36 (.070) | .871 (.088) | 1.71 (.061) | 1.14 (.162) | 1.97 (.216) | 2.80 (.112) |

TABLE 4.2 - EXPENDITURE ELASTICITIES FOR BROAD
 CATEGORIES OF EXPENDITURE FOR URBAN AND RURAL BRAZIL
 (1974-1975)
 (standard errors in parentheses)

| | Food | Tobacco | Manufacturing | Services | Transportation | Energy | Taxes | Savings and Investment |
|-----------------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---------------------------|
| <u>SEVEN URBAN AREAS:</u> | | | | | | | | |
| Lowest 20% | 1.01 (.050) | .943 (.239) | 1.53 (.060) | .549 (.076) | 2.14 (.225) | .641 (.105) | 2.16 (.268) | 2.15 (.273) |
| Lower 40% | .829 (.033) | 1.15 (.078) | 1.51 (.026) | .784 (.041) | 1.72 (.111) | .895 (.060) | 1.77 (.097) | 2.12 (.144) |
| Middle 40% | .386 (.013) | .416 (.036) | 1.07 (.022) | .948 (.016) | 1.24 (.096) | 1.38 (.053) | 1.27 (.063) | 2.26 (.095) |
| Upper 20% | .218 (.021) | .153 (.047) | .875 (.037) | .817 (.043) | .612 (.064) | .849 (.066) | 1.08 (.057) | 1.63 (.023) |
| <u>THREE RURAL REGIONS:</u> | | | | | | | | |
| Lower 60% | .987 (.034) | .787 (.110) | 1.63 (.055) | .382 (.060) | 1.66 (.185) | .389 (.056) | 1.05 (.287) | 2.95 (.390) |
| Upper 40% | .366 (.025) | .648 (.066) | 1.12 (.055) | .920 (.061) | 1.67 (.099) | 1.74 (.103) | 1.69 (.091) | 2.36 (.083) |
| Upper 10% | .265 (.023) | .395 (.086) | .909 (.106) | .623 (.099) | 1.28 (.243) | 1.46 (.250) | 1.43 (.110) | 1.95 (.081) |

made using the log-log form of the demand equation*

$$\ln X_i = \ln \alpha_i + \beta_i \ln X$$

where X_i = expenditure on category i

X = total expenditure

β_i = elasticity of X_i with respect to X

For estimates which included different regions dummy intercept variables were included. In addition each data point used in each estimation was weighted by the square root of the number of observations (in this case the represented population) to correct for heteroscedasticity.

Elasticities for all categories of expenditure except services are higher in rural than in urban areas. In all regions food is a "necessity" (elasticity less than one) and manufactures are luxuries (elasticity greater than one). Services fall between these two, with elasticities generally slightly less than one. Transportation services are "necessities" only in large urban areas, and energy elasticities are greater than one in all cases because of the rapid rise in car ownership and housing expenditures as incomes grow. Savings and investment are particularly sensitive to income levels, with elasticities of between two and three everywhere. Taxes are progressive (the percentage take rising with incomes) but are more progressive in the northeast and southeast than elsewhere.

The income-specific elasticity estimates in Table 4.2 indicate the differential impact by income class on total demand that income generation policies can have. Increasing the incomes of the poorest persons in Brazil will lead to large marginal increases in their demand for food, manufactured items, and transportation services. The elasticity of food

*The log-log quadratic form

$$\ln X_i = \ln \alpha_i + \beta_i \ln X + \gamma_i (\ln X)^2$$

was estimated as well because it allows elasticities to change with incomes. The only commodities for which its fit was slightly better than the log-log form were food and tobacco (see Appendix C for aggregated urban/rural estimates).

expenditure among poor groups is very high, close to one. This parameter is particularly important for analysing the impact of income generation policies.* Income generation among middle income persons will have quite different results, stimulating the demand for energy and services more than an equivalent stimulus among lower income groups.** It is interesting to note that the elasticity for savings and investment is the highest among the poorest rural class and falls with income in both urban and rural areas; furthermore, the elasticity for tax is highest among the poor urban sector and falls at the highest income levels in both urban and rural areas.

5. FOOD COMMODITIES EXPENDITURE SHARES

The analysis in the previous sectors centered on broad aggregated of consumer expenditure. In this section expenditure on individual food commodities*** is analysed and elasticities are estimated for urban and rural areas, food expenditure patterns are then considered by region and income class. This level of disaggregation is essential to analyse policy interventions at the regional level for specific commodities.

A. Total Private Food Expenditure

The 1974-75 ENDEF breakdown of total private consumption of seventeen categories of food in absolute, percentage and per capita terms is shown in Table 5.1. The total value of food expenditure in the 1974-75 survey period was 137.52 billion cruzieros (August 1974 cruzieros). About one quarter of which was spent on staple foods and just over two-fifths was spent on sources of animal protein such as meat and milk.

*The calorie - elasticity estimates calculated by Knight et al (1979), are significantly lower than these food expenditure elasticity estimates.

** The marginal budget share depends on both the elasticity and the average budget share, both of which are higher for the energy and service sectors among middle income than among lower income groups.

*** Throughout this analysis "expenditure" refers to "monetary and non-monetary expenditure" and this includes home-produced and consumed commodities as well as purchased one.

TABLE 5.1. -ALLOCATION OF TOTAL PRIVATE FOOD
EXPENDITURE IN BRAZIL, 1974 - 1975

| | Value of Total Food Consumption* (in Cr'000,000,000) | | | Percentage Breakdown of Total Food Consumption (in %) | | | Average Per Capita Expenditure (in Cr) | | |
|------------------------|--|--------------|---------------|---|---------------|---------------|--|---------------|---------------|
| | Urban | Rural | Total | Urban | Rural | Total | Urban | Rural | Total |
| | 1. Wheat | 10.01 | 2.91 | 12.92 | 10.78 | 6.51 | 9.39 | 156.2 | 67.6 |
| 2. Rice | 8.18 | 4.94 | 13.12 | 8.81 | 11.05 | 9.54 | 127.6 | 114.8 | 122.5 |
| 3. Maize | .73 | 1.54 | 2.27 | .79 | 3.45 | 1.65 | 11.4 | 35.8 | 21.2 |
| Cereals | <u>18.92</u> | <u>9.39</u> | <u>28.31</u> | <u>20.38</u> | <u>21.01</u> | <u>20.58</u> | <u>295.2</u> | <u>218.2</u> | <u>264.3</u> |
| 4. Roots | 3.09 | 3.24 | 6.33 | 3.33 | 7.25 | 4.60 | 48.2 | 75.3 | 59.1 |
| Staples | <u>22.01</u> | <u>12.63</u> | <u>34.64</u> | <u>23.71</u> | <u>28.26</u> | <u>25.18</u> | <u>343.4</u> | <u>293.5</u> | <u>323.4</u> |
| 5. Sugar | 3.48 | 2.40 | 5.88 | 3.75 | 5.37 | 4.28 | 54.3 | 55.7 | 54.9 |
| 6. Pulses | 4.59 | 4.35 | 8.94 | 4.95 | 9.73 | 6.50 | 71.6 | 101.0 | 83.4 |
| 7. Vegetables | 6.24 | 2.35 | 8.59 | 6.72 | 5.26 | 6.25 | 97.4 | 54.6 | 80.2 |
| 8. Fruits | 4.61 [†] | 1.69 | 6.30 | 4.97 | 3.78 | 4.58 | 71.9 | 39.3 | 58.8 |
| 9. Beef** | 18.41 | 5.13 | 23.54 | 19.83 | 11.48 | 17.12 | 287.3 | 119.2 | 219.7 |
| 10. Pork | 4.43 | 4.87 | 9.30 | 4.77 | 10.89 | 6.76 | 69.1 | 113.1 | 86.8 |
| 11. Poultry and Eggs | 7.11 | 2.86 | 9.97 | 7.66 | 6.40 | 7.25 | 110.9 | 66.4 | 93.1 |
| 12. Fish | 2.76 | 1.22 | 3.98 | 2.97 | 2.73 | 2.89 | 43.1 | 28.3 | 37.1 |
| 13. Dairy Products | 8.04 | 3.18 | 11.22 | 8.66 | 7.11 | 8.16 | 125.4 | 73.9 | 104.7 |
| Animal Protein | <u>40.75</u> | <u>17.26</u> | <u>58.01</u> | <u>43.89</u> | <u>38.61</u> | <u>42.18</u> | <u>635.8</u> | <u>400.9</u> | <u>541.4</u> |
| 14. Vegetable Oils | 4.41 | .92 | 5.33 | 4.75 | 2.06 | 3.88 | 68.8 | 21.4 | 49.7 |
| 15. Coffee, Tea, Cocoa | 4.02 | 2.14 | 6.16 | 4.33 | 4.79 | 4.48 | 62.7 | 49.7 | 57.5 |
| 16. Other Beverages*** | 1.73 | .41 | 2.14 | 1.86 | .92 | 1.56 | 27.0 | 9.5 | 20.0 |
| 17. Condiments | .98 | .55 | 1.53 | 1.06 | 1.23 | 1.11 | 15.3 | 12.8 | 14.3 |
| TOTAL FOOD | 92.82 | 44.70 | 137.52 | 100.00 | 100.00 | 100.00 | 1448.3 | 1038.3 | 1283.6 |

* Since data was not collected for the rural frontier region, the seventh ENDEF region, including the north and the central-west, was assumed to have the same expenditure pattern as the rest of Brazil as discussed earlier. Numbers may not add correctly due to rounding.

** Includes all bovine and ovine meat.

*** Includes alcoholic and carbonated beverages.

The urban population groups account for just over two-thirds of national food expenditure where the per capita food expenditure level is 1448.3 Cr, in comparison with a per capita level of 1038.3 Cr. in rural areas.

The data also points to differing patterns of food consumption in urban and rural areas. Wheat is the major cereal in urban areas while rice dominates cereal consumption in the rural areas. The diet of Brazil as a whole is not dominated by one staple as in many developing countries and the percentage of total food expenditure going to cereals is approximately equal in urban and rural areas. Maize is less popular than either wheat or rice and is consumed almost entirely in rural areas. Roots are also more common in the rural diet, pushing the overall share of rural expenditure going to roots and cereal foods to 28.26% as compared to an urban share of 23.71%.

The sources of protein differ in urban and rural areas as well. Expenditure on animal protein sources accounts for a high 44% of total food expenditure in urban areas, with beef being heavily favored (19.83%). The share of total rural food expenditure going to animal protein sources is still high at 38.61% but lower than the urban figure, while pork and beef each account for approximately 11%. In per capita terms, expenditure on beef in urban areas is almost two and one half times that in rural areas, while rural expenditure on pork is over 1.6 times that in urban areas.* The share going to other animal protein sources -- poultry and eggs, fish, and dairy products -- are all slightly higher in urban areas, resulting in an absolute urban per capita expenditure level on these commodities about 1.6 times that of rural areas. The lower share of rural food expenditure going to animal protein sources in rural areas is counterbalanced, however, by the high share

*A significant portion of the pork consumed is pork fat, which substitutes for vegetable oils in many rural areas.

spent on legumes (a major source of vegetable protein), a share double that of urban areas.

Of other foods in the Brazilian diet, per capita expenditure on fruits and vegetables in urban areas is almost double that in rural areas, and per capita urban expenditure on vegetable oils and beverages (other than coffee, tea, and cocoa) is three times that of rural areas.

Tables 5.2 and 5.3 show the breakdown of total food expenditure in three rural and seven urban regions of Brazil. The analogous breakdown for rural and urban areas by income class is shown in Tables 5.4 and 5.5. The average level of per capita food expenditure in each region is indicated at the bottom of each column. Such a breakdown shows the important role of regional diversity in determining consumption patterns in a country as large as Brazil. Wheat is an important cereal in all urban areas but shows up as important in rural diets only in the south. Rice consumption is not only concentrated in rural areas as seen in Table 5.1, but is significantly more important in the southeastern rural areas of Minas Gerais and Espirito Santo. Root crops account for larger expenditure shares in the poor regions of northeast and north. They play a less important role in the diets of urban and rural families in other parts of the country. This pattern of staple consumption, generally dominated by roots in the northern areas, wheat in the southern and large urban areas and rice in southeastern Brazil, has important implications for policies of agricultural pricing and staple commodity subsidization since any particular policy will have differential impacts across regions.

Among sources of protein, beef has a larger percentage share in all urban areas. It is also important in the diet of even the poor northeastern rural families as well where it accounts for 14% of food expenditure. Consumption of pork, both pork meat and pork fat, is concentrated in the south and particularly the southeast. On the other hand fish and pulses

TABLE 5.2.-COMMODITY BREAKDOWN OF TOTAL
FOOD EXPENDITURE IN SEVEN URBAN AREAS

| | Rio de Janeiro | Sao Paulo | Nonmet Urban South | Nonmet Urban Southeast | Nonmet Urban Northeast | Salvador | Belem |
|---|-------------------|--------------|-----------------------|---------------------------|---------------------------|----------|-------|
| 1. Wheat | 9.5 | 10.9 | 12.1 | 10.0 | 11.2 | 12.8 | 8.6 |
| 2. Rice | 8.7 | 8.8 | 7.7 | 11.9 | 7.0 | 3.5 | 3.9 |
| 3. Maize | .5 | .4 | .8 | 1.1 | 1.6 | .5 | .2 |
| Cereals | 18.7 | 20.1 | 20.6 | 23.0 | 19.8 | 16.6 | 12.7 |
| 4. Roots | 3.0 | 2.3 | 3.8 | 3.4 | 6.1 | 3.9 | 10.2 |
| Staples | 21.7 | 22.4 | 24.4 | 26.4 | 25.9 | 20.7 | 22.9 |
| 5. Sugar | 3.2 | 2.8 | 4.6 | 4.7 | 4.3 | 2.9 | 2.8 |
| 6. Pulses | 4.8 | 4.7 | 4.2 | 5.2 | 6.3 | 4.2 | 3.9 |
| 7. Vegetables | 7.3 | 8.0 | 6.4 | 6.7 | 4.2 | 5.2 | 4.9 |
| 8. Fruits | 5.7 | 5.3 | 4.2 | 4.7 | 5.0 | 4.5 | 5.0 |
| 9. Beef | 22.5 | 19.6 | 20.0 | 14.2 | 22.0 | 27.1 | 28.2 |
| 10. Pork | 3.2 | 3.1 | 5.1 | 10.5 | 4.3 | 2.4 | 1.3 |
| 11. Poultry and Eggs | 7.4 | 8.4 | 8.3 | 6.7 | 6.7 | 7.6 | 5.8 |
| 12. Fish | 3.7 | 2.7 | 2.1 | 1.8 | 5.0 | 5.0 | 8.7 |
| 13. Dairy Products | 8.3 | 10.2 | 8.7 | 7.3 | 7.3 | 9.5 | 6.2 |
| Animal Protein | 45.1 | 44.0 | 44.2 | 40.5 | 45.3 | 51.6 | 50.2 |
| 14. Vegetable Oils | 5.3 | 5.9 | 4.5 | 4.5 | 2.8 | 3.2 | 2.5 |
| 15. Coffee, tea, cocoa | 3.8 | 4.1 | 4.6 | 4.7 | 4.4 | 4.2 | 3.8 |
| 16. Other Beverages | 2.2 | 2.0 | 2.2 | 1.5 | .9 | 2.57 | 1.3 |
| 17. Condiments | .9 | 1.0 | 1.1 | 1.0 | 1.1 | 1.0 | 1.3 |
| Average Per Capita Food Expenditure ¹ . | 1700 | 1734 | 1452 | 1302 | 1076 | 1345 | 1426 |

¹. Not including tobacco. Figures may not add up exactly to totals due to rounding.

TABLE 5.3.-COMMODITY BREAKDOWN OF TOTAL
FOOD EXPENDITURE IN THREE RURAL REGIONS

| | <u>South</u> | <u>Southeast</u> | <u>Northeast</u> | |
|---|--------------|------------------|------------------|------|
| 1. Wheat | 9.7 | 4.6 | 3.9 | |
| 2. Rice | 10.1 | 14.8 | 8.5 | |
| 3. Maize | 3.0 | 4.3 | 4.1 | |
| Cereals | | 22.8 | 23.7 | 16.5 |
| 4. Roots | 5.9 | 4.0 | 11.6 | |
| Staples | | 28.7 | 27.7 | 28.1 |
| 5. Sugar | 4.5 | 8.4 | 5.1 | |
| 6. Pulses | 6.7 | 7.9 | 14.3 | |
| 7. Vegetables | 6.2 | 6.7 | 3.1 | |
| 8. Fruits | 3.5 | 3.3 | 4.5 | |
| 9. Beef | 11.6 | 5.7 | 14.1 | |
| 10. Pork | 12.7 | 18.5 | 5.7 | |
| 11. Poultry and Eggs | 7.7 | 6.1 | 5.0 | |
| 12. Fish | 1.1 | 1.2 | 5.0 | |
| 13. Dairy Products | 7.9 | 6.2 | 7.1 | |
| Animal Protein | | 41.0 | 37.7 | 36.9 |
| 14. Vegetable Oils | 1.9 | 1.7 | 1.8 | |
| 15. Coffee, Tea, Cocoa | 4.4 | 5.1 | 4.8 | |
| 16. Other Beverages | 1.6 | .5 | .4 | |
| 17. Condiments | 1.5 | 1.0 | 1.0 | |
| | 100.0 | 100.0 | 100.0 | |
| Average per capita food expenditure ¹ . | 1346 | 1071 | 787 | |

¹. Not including tobacco

TABLE 5.4

COMMODITY BREAKDOWN OF TOTAL RURAL
FOOD EXPENDITURE BY INCOME GROUP

| | Lower 60% | Middle 30% | Upper 10% | Upper 40% |
|------------------------------|-----------|------------|-----------|-----------|
| 1. Wheat | 4.4 | 7.0 | 8.4 | 7.4 |
| 2. Rice | 10.5 | 11.2 | 8.2 | 10.4 |
| 3. Maize | 4.3 | 3.7 | 2.4 | 3.4 |
| Cereals | 19.2 | 21.9 | 19.0 | 21.2 |
| 4. Roots | 11.0 | 6.8 | 5.0 | 6.2 |
| Staples | 30.2 | 28.7 | 24.0 | 27.4 |
| 5. Sugar | 6.2 | 5.4 | 4.3 | 5.1 |
| 6. Pulses | 14.2 | 8.7 | 4.7 | 7.5 |
| 7. Vegetables | 4.1 | 5.4 | 6.0 | 5.6 |
| 8. Fruits | 3.4 | 3.9 | 5.0 | 4.2 |
| 9. Beef | 10.0 | 11.0 | 14.9 | 12.2 |
| 10. Pork | 8.9 | 11.9 | 13.4 | 12.3 |
| 11. Poultry and eggs | 4.9 | 6.9 | 7.6 | 7.1 |
| 12. Fish | 4.2 | 2.1 | 1.0 | 1.7 |
| 13. Dairy Products | 5.1 | 7.9 | 9.9 | 8.5 |
| Animal Protein | 33.1 | 39.8 | 46.8 | 41.8 |
| 14. Vegetable Oil | 1.9 | 1.8 | 1.7 | 1.8 |
| 15. Coffee, tea and cocoa | 5.6 | 4.4 | 3.6 | 4.1 |
| 16. Other Beverages | .3 | .7 | 2.5 | 1.2 |
| 17. Condiments | 1.0 | 1.2 | 1.4 | 1.3 |
| | 100.0 | 100.0 | 100.0 | 100.0 |
| Average per capita | 720 | 1166 | 1858 | 1312 |

¹. not including tobacco

TABLE 5.5

COMMODITY BREAKDOWN OF TOTAL
URBAN FOOD EXPENDITURE FOR FOUR
INCOME CLASSES

| | Lower 20% | Lower 40% | Middle 40% | Upper 20% |
|------------------------------|---------------|---------------|---------------|---------------|
| 1. Wheat | 10.4 | 11.1 | 11.0 | 10.0 |
| 2. Rice | 10.6 | 11.0 | 8.7 | 4.9 |
| 3. Maize | 1.9 | 1.4 | .7 | .5 |
| Cereals | | 22.9 | 23.5 | 20.4 |
| 4. Roots | 6.8 | 5.3 | 3.3 | 2.8 |
| Staples | | 29.7 | 28.8 | 23.7 |
| 5. Sugar | 5.2 | 4.6 | 3.4 | 3.1 |
| 6. Pulses | 9.3 | 7.7 | 4.6 | 2.8 |
| 7. Vegetables | 4.5 | 5.4 | 6.7 | 7.5 |
| 8. Fruits | 2.9 | 3.2 | 5.0 | 7.2 |
| 9. Beef | 15.8 | 17.2 | 20.8 | 23.9 |
| 10. Pork | 6.9 | 6.2 | 4.2 | 3.1 |
| 11. Poultry and Eggs | 5.1 | 6.3 | 8.2 | 7.7 |
| 12. Fish | 4.7 | 3.8 | 3.0 | 3.3 |
| 13. Dairy Products | 4.9 | 5.7 | 8.5 | 11.7 |
| Animal Protein | | 37.4 | 39.2 | 44.7 |
| 14. Vegetable Oils | 3.3 | 4.2 | 5.0 | 4.4 |
| 15. Coffee, tea and cocoa | 6.3 | 5.4 | 4.0 | 3.3 |
| 16. Other Beverages | .5 | .6 | 1.9 | 3.0 |
| 17. Condiments | 1.1 | 1.0 | 1.0 | 1.0 |
| TOTAL | 100.00 | 100.00 | 100.00 | 100.00 |

are eaten primarily in the north and northeast. The expenditure shares going to poultry, eggs and dairy products show less variation across regions than the other sources of protein mentioned above.

6. FOOD COMMODITIES EXPENDITURE ELASTICITIES

Expenditure elasticities were estimated for the seven urban and three rural regions of Brazil. These are reported in Tables 6.1 and 6.2. These tables also give estimates of the elasticity of expenditure on individual commodities with respect to total ("global") expenditure.* Tables 6.1 and 6.2 show estimates of mean elasticities with respect to both total food and global expenditure for all urban and all rural regions taken together. Tables 6.3 through to 6.6 record estimates made for each of the seven urban and three rural regions and for the selected four urban and three rural income classes. Estimates of the elasticities with respect to food expenditure are given in Appendix D. For most estimates the log-log form of the demand equation was used. This form implies constant elasticities across income groups. In a few estimates the log-log form did not provide a good fit.** In these situations the semi-log or the log-log quadratic was used. The semi log form is given by

$$X_i = \alpha_i + \beta_i \ln FX$$

where

X_i = expenditure on commodity i

FX = total food expenditure

β_i/X_i = elasticity of expenditure
on i with respect to total
food expenditure

The log-log quadratic is

$$\ln X_i = \alpha_i + \beta_i \ln FX + \gamma_i (\ln FX)^2$$

*These are obtained by multiplying the corresponding elasticity by the food-expenditure elasticity. This two-step approach in estimating elasticities with respect to global expenditure was necessary because of the different sample breakdown in the global expenditure and the food expenditure data.

**Fit was judged by the standard error of the parameter estimates, the overall \bar{R}^2 , and the pattern of the residuals.

TABLE 6.1 -FOOD EXPENDITURE ELASTICITIES
FOR SEVEN AGGREGATED URBAN AREAS

| | Urban Mean Elasticity w.r.t Food Expenditure | Urban Mean Elasticity w.r.t Global Expenditure | Formula for Elasticity w.r.t. Food Expenditure (standard errors in parentheses under estimate) |
|------------------------------|--|--|--|
| 1. Wheat | .97 | .47 | .97 (.036) |
| 2. Rice | .15 | .07 | 12.36 - 2(.840) In F (1.08) |
| 3. Maize | .14 | .07 | .14 (.086) |
| 4. Roots | -.58 | -.28 | -4.14 + 2(.325) In F (.997) (.069) |
| 5. Sugar | .68 | .33 | .68 (.025) |
| 6. Pulses | -.12 | .06 | 1.86 - 2(.136) In F (.876) (.061) |
| 7. Vegetables | 1.30 | .63 | 1.30 (.034) |
| 8. Fruit | 1.95 | .95 | 1.95 (.045) |
| 9. Beef | 1.43 | .70 | 1.43 (.029) |
| 10. Pork | .53 | .26 | .53 (.053) |
| 11. Poultry and Eggs | 1.33 | .65 | 1.33 (.061) |
| 12. Fish | .99 | .48 | .99 (.075) |
| 13. Dairy | 1.76 | .86 | 1.76 (.028) |
| 14. Vegetable Oil | 1.05 | .51 | 1.05 (.061) |
| 15. Coffee, Cocoa and tea | .41 | .21 | .41 (.022) |
| 16. Other Beverages | 2.62 | 1.28 | 2.62 (.113) |
| 17. Condiments | 1.05 | .51 | 1.05 (.033) |

TABLE 6.2-ELASTICITIES OF EXPENDITURE ON
INDIVIDUAL COMMODITIES FOR THREE
AGGREGATED RURAL AREAS

| | Rural Mean Elasticity w.r.t. Total Food Expenditure | Rural Mean Elasticity w.r.t Global Expenditure | Formula for Elasticity (standard errors in parentheses under estimates) |
|--------------------------|--|---|--|
| 1. Wheat | 1.45 | .77 | 1.45 (.067) |
| 2. Rice | .93 | .50 | .93 (.131) |
| 3. Maize | .56 | .30 | 11.72 -2(.808) In FX (1.34) (.098) |
| 4. Roots | .50 | .27 | .50 (.072) |
| 5. Sugar | .58 | .31 | .58 (.045) |
| 6. Pulses | .11 | .06 | 3.56 -2(.250) In FX (1.44) (.105) |
| 7. Vegetables | 1.20 | .64 | 1.20 (.072) |
| 8. Fruits | 1.76 | .94 | 1.76 (.083) |
| 9. Beef | 1.77 | .94 | 1.77 (.067) |
| 10. Pork | 1.03 | .55 | 1.03 (.040) |
| 11. Poultry | 1.53 | .82 | 1.53 (.086) |
| 12. Fish | .27 | .14 | 7.32/X (2.45) |
| 13. Dairy | 2.12 | 1.13 | 2.12 (.081) |
| 14. Vegetable Oil | .90 | .48 | 16.41/X (2.13) |
| 15. Coffee, Cocoa Tea | .38 | .20 | .38 (.042) |
| 16. Other Beverages | 2.57 | 1.37 | -13.71 +2(1.18) In FX (7.95) (.579) |
| 17. Condiments | .93 | .50 | .93 (.064) |

X = Per capita expenditure on same commodity
FX = Total per capita food expenditure

TABLE 6.3- FOOD EXPENDITURE ELASTICITIES FOR URBAN BRAZIL BY REGION*
1974-75 WITH RESPECT TO TOTAL EXPENDITURE
(standard errors in parentheses)

| | Rio de Janeiro | Sao Paulo | Nonmet Urban South | Nonmet Urban Southeast | Northeast | Salvador | Belem |
|-------------------------|----------------|-----------|--------------------|------------------------|-----------|----------|-------|
| 1. Wheat | .35 | .40 | .36 | .63 | .69 | .35 | .45 |
| 2. Rice ^{1.} | -.08 | -.16 | -.05 | .20 | .46 | .53 | .44 |
| 3. Maize | -.13** | .08 | .04 | .20 | .41 | .41 | .48 |
| 4. Roots | .40 | .35 | .24 | .39 | .05** | .14 | -.01 |
| 5. Sugar | .34 | .38 | .28 | .26 | .38 | .33 | .36 |
| 6. Pulses ^{4.} | .08 | .08 | -.22* | .03 | -.07* | .13 | .22 |
| 7. Vegetables | .54 | .60 | .50 | .56 | .91 | .70 | .89 |
| 8. Fruits | 1.04 | .92 | 1.00 | 1.04 | .91 | .86 | 1.02 |
| 9. Beef | .73 | .62 | .68 | .85 | .76 | .45 | .65 |
| 10. Pork | .24 | .34 | .16 | .21 | .21 | .51 | .72 |
| 11. Poultry and eggs | .43 | .42 | .66 | .84 | .95 | .69 | .69 |
| 12. Fish | .63 | .67 | .40 | .69 | .16 | .41 | .21 |
| 13. Dairy Produce | .86 | .72 | .80 | 1.00 | .97 | .85 | 1.04 |
| 14. Vegetable Oil | .38 | .29 | .34 | .63 | .89 | .52 | .77 |
| 15. Coffee, tea cocoa | .22 | .22 | .19 | .13 | .22 | .23 | .22 |
| 16. Other Beverages | 1.26 | 1.17 | 1.59 | 1.22 | 1.32 | 1.42 | 1.51 |
| 17. Condiments | .57 | .57 | .33 | .54 | .55 | .46 | .43 |

* All estimates are log log unless stated otherwise

** Not significant at .05 level, one-tailed test

TABLE 6.4 -FOOD EXPENDITURE ELASTICITIES WITH RESPECT TO TOTAL EXPENDITURE FOR RURAL BRAZIL BY REGION
(standard errors in parentheses)

| | South | Southeast | Northeast |
|------------------------------|-------|-----------|-----------|
| 1. Wheat | .47 | .73 | 1.05 |
| 2. Rice | .01* | .45 | .77 |
| 3. Maize | .11 | .20 | .58 |
| 4. Roots | .32 | .34 | .20 |
| 5. Sugar | .24 | .19 | .46 |
| 6. Pulses | -.15 | .13 | .18 |
| 7. Vegetables | .57 | .44 | .87 |
| 8. Fruit | .95 | .84 | 1.06 |
| 9. Beef | .93 | 1.02 | .95 |
| 10. Pork | .39 | .59 | .65 |
| 11. Poultry and eggs | .59 | .88 | .96 |
| 12. Fish | .05* | .64 | .09 |
| 13. Dairy | .88 | 1.14 | 1.37 |
| 14. Vegetable Oil | 1.32 | .34 | 1.07 |
| 15. Coffee, cocoa and tea | .10 | .26 | .23 |
| 16. Other Beverages | 1.77 | 1.42 | .97 |
| 17. Condiments | .52 | .42 | .56 |

* not significant at .05 level, one-tailed test

TABLE 6.5 -FOOD EXPENDITURE ELASTICITIES FOR URBAN BRAZIL BY INCOME CLASS
1974-75 WITH RESPECT TO TOTAL EXPENDITURE
(standard errors in parentheses)

| | Lower 20% | Lower 40% | Middle 40% | Upper 20% |
|------------------------|-----------|-----------|------------|-----------|
| 1. Wheat | 1.43 | 1.11 | .28 | .17 |
| 2. Rice | 1.48 | .86 | .09 | -.13 |
| 3. Maize | 1.28 | .30 | .02* | .20 |
| 4. Roots | .25 | .23 | .21 | .19 |
| Staples | 1.05 | .74 | | |
| 5. Sugar | .60 | .44 | .25 | .26 |
| 6. Pulses | .13* | .07* | .004* | .02* |
| 7. Vegetables | 1.72 | 1.31 | .51 | .26 |
| 8. Fruits | 1.20 | 1.33 | .75 | .37 |
| 9. Beef | 1.37 | 1.24 | .50 | .24 |
| 10. Pork | .69 | .56 | .23 | -.07 |
| 11. Poultry and Eggs | 2.14 | 1.64 | .38 | .21 |
| 12. Fish | .79 | .62 | .39 | .33 |
| 13. Dairy products | 1.81 | 1.48 | .64 | .37 |
| Animal Protein | 1.36 | | .47 | .25 |
| 14. Vegetable Oils | 2.08 | 1.18 | .33 | .07 |
| 15. Coffee, Tea, Cocoa | .16 | .17 | .20 | .17 |
| 16. Other Beverages | 2.15 | 1.38 | 1.19 | .12 |
| 17. Condiments | .98 | .77 | .35 | .34 |

* not significant at .05 level, one-tailed test.

TABLE 6.6 -FOOD EXPENDITURE ELASTICITIES WITH RESPECT TO TOTAL EXPENDITURE FOR RURAL BRAZIL BY INCOME CLASS (standard errors in parentheses)

| | Lower 60% | Upper 40% | Upper 10% |
|------------------------|-----------|-----------|-----------|
| 1. Wheat | 1.44 | .43 | .16 |
| 2. Rice | 1.55 | .10 | .14 |
| 3. Maize | 1.42 | -.04 | -.22 |
| 4. Roots | .44 | .25 | .13 |
| 5. Sugar | .69 | .18 | .16 |
| 6. Pulses | .41 | .01* | .25 |
| 7. Vegetables | 1.49 | .37 | .18 |
| 8. Fruit | 1.56 | .64 | .21* |
| 9. Beef | 1.46 | .72 | .57 |
| 10. Pork | .91 | .37 | .17 |
| 11. Poultry and Eggs | 1.83 | .38 | .12* |
| 12. Fish | .70 | .17* | .31* |
| 13. Dairy | 2.37 | .56 | .23 |
| 14. Vegetables | 1.74 | .31 | .14* |
| 15. Coffee, cocoa, tea | .31 | .20 | .24 |
| 16. Other Beverages | 1.33 | 1.33 | .88 |
| 17. Condiments | .83 | .41 | .24* |

* not significant at 0.5 level, one-tailed test.

The semi-log form which allows elasticities to vary with rising incomes tends to fit many food commodities well, but for this data set it was true only in a few instances. The log-log inverse - here the food expenditure elasticity is given by $\eta_i = \beta_i + 2\gamma_i \ln FX$ - provided a good fit to commodities that are luxuries at low income levels and become necessities and eventually inferior goods as incomes rise, such as rice, maize, roots and pulses.* Only the log-log form was used for the income-class specific estimations because the fit was good.

A comparison of urban and rural elasticity estimates shows the very different reactions that would occur to policies of income generation carried out in the two sectors. The elasticity of expenditure on all staple foods is much higher in rural than in urban areas, and that of beef, pork, and dairy products is significantly higher as well. Raising incomes in urban areas would have negligible or negative effect on the total demand for rice, maize and roots, while rising incomes in rural areas would stimulate demand for all three products significantly. The only food commodities bordering on luxuries (global expenditure elasticity greater than one) are fruit and alcoholic/carbonated beverages in urban areas and fruit, beef, dairy products and similar beverages in rural areas.

Tables 6.3 and 6.4 permit a more disaggregated analysis of the effect of changes in income on demand in various regions of the country. As with budget shares, elasticities vary significantly across Brazil, particularly for staples and sources of animal protein. Rice and Maize, for example, have quite high elasticities of about 0.50 in northern and northeastern urban areas but are inferior goods in urban areas further to the south. Roots seem to follow the opposite pattern, while wheat maintains a positive elasticity of between 0.35 and 0.70 in all urban areas. The elasticities for all forms of animal protein except pork and fish are quite high in all areas

*It also provides a good fit when expenditure rises very rapidly with income, as in the case of other beverages in rural areas.

(generally between 0.50 and 1.00) but exceed one only in a few cases for dairy products and in the southeast for beef. The only food commodity that is typically a luxury is alcoholic/carbonated beverages.

This average picture changes dramatically when elasticities are estimated separately by income class, as shown in Tables 6.5 and 6.6. Most commodities are luxuries for the lowest 40% of the urban and the lowest 60% of the rural population when classed by per capita income. Even staples such as wheat, rice and maize are luxuries to the poor as are vegetables, fruits and all types of animal protein except pork and fish. In contrast, staples have very low or negative elasticities in upper income groups and only beef (.54) and beverages (.88) among the rural rich have elasticities greater than 0.50.

7. POLICY ISSUES

In this section we discuss a few issues which may be of interest to policy makers. While there has been a substantial amount of analysis done on production in Brazil there are only a limited number of studies readily available on the demand side. There has been increasing criticism voiced of Brazil's economic development which is said to emphasise growth with little concern for equity. In order to investigate equity considerations one must move beyond the mask of broad national aggregate figures.* Consider first the general composition of consumption expenditures.

Cost of Living

Section 3 indicated that food accounts for 45.3 percent

*There are some that suggest, Taylor (1980), that even at this level one may make certain deductions such as the relatively low level of public spending on education.

of rural expenditure and close to 20 percent in the urban areas. In urban areas housing and transportation tend to be more important. Thus price change in these consumption items can be expected to produce a significant change in the cost of living.

The patterns become clearer when one observes the regional values. - Table 3.2. Note in particular the rural northeast where close to 57% of the consumption expenditures of that regions 17.7 million inhabitants goes to food. Thus any policy to improve the standard of living of those inhabitants requires careful consideration of the price of food and the associated purchasing power. Similarly the share on transportation costs is higher in Rio than the other regions considered.

For policies to assist the low income groups (Table 3.3) one is immediately struck by the extremely high values in rural and also urban areas at 65 and 48 percent respectively. Also in urban areas the share for services (housing) at 27 percent does not vary much across income groups.

Food costs

Given the dominant role of food in the consumption basket one is led to a more detailed consideration of food commodities.

- Urban

In most urban areas wheat accounts for about 10% of food expenditure while rice varies across regions. Beef expenditure is quite substantial at around 20 percent but rises above 27 percent in Salvador and Belem. Across income groups the share for roots and pulses falls with income while that for wheat stays essentially constant.

- Rural

In rural areas wheat is not as important but the maize and roots shares are significantly higher. In the northeast roots account for 11.6 percent of food expenditure. Among animal protein sources pork is far more important in rural areas particularly in the southeast. Across income groups the most notable variation is for roots, and pulses. For these the share falls with income while for wheat the pattern is opposite.

Income Changes

If population and all per capita incomes continue to grow at around 2.8 and 5 percent respectively it is interesting to surmise what changes in demand can be expected.

- Urban

In urban areas food expenditure per capita should grow at 2.5 per year. Fruit, dairy and beverages should grow at about this rate - i.e., 5 percent per capita. This pattern also seems to hold across income classes. Rice, maize and pulses will show little per capita change while roots expenditure should fall by about 3 percent per year. Beef should grow at around 3.5 percent.

- Rural

The rural areas overall food expenditure should grow by about 2.6 percent per year. Here the big increases can also be expected is fruits, dairy and other beverages at 5.6 and 7 per cent respectively. Beef expenditure should also grow at close to 5 percent. The general pattern seems to hold across regions although beverage expenditure for example may lag a little in the northeast to 5 percent. Indeed, higher

anticipated expenditure on beverages seems to hold across all income classes. The other strong commodity seems to be beef.

Quantity Estimates

These changes can be related to physical levels of consumption and serve as a useful benchmark for policy makers. For example if one assumes the 2.8 and 5 percent growth rates for population and per capita incomes then the quantity of wheat consumed should increase by the rather substantial amount of 5.8 percent annually. This assumes constant relative prices and no substitute effects. This estimate can be improved by considering different income classes by region and then aggregating

Nutritional Implications

There are some studies of nutritional intake in Brazil. These also vary a great deal in coverage and quality. The study by Fundacao Getulio Vargas (1960) suggests that close to 40% of the Brazilian population at that time were deficient in calorie intake-see McCarthy (1975). This may be somewhat an overestimate as the standard used was 2450 cal. per day. A more recent study by Ward and Sanders (1980) in the northeast suggests that nutritional inadequacies are still substantial there. From the analysis in this report it is evident that improvements in purchasing power either through higher incomes or lower food prices would be desirable to alleviate some of these problems. However some of the data from the ENDEF study suggest that the real cost of living in the northeast is actually higher than that in most other regions of the country. This would support some of the observations by Furtado (1971) on the structural imbalances. It also makes one hesitate before advocating policies to encourage industrialization in the northeast through production subsidies. Rather it seems that some form of wage subsidies would be a more direct approach.

This consumption module is now being incorporated in a general equilibrium model. It is hoped that this will cast some light on these issues.

APPENDIX A:^{1/} ENDEF - NATIONAL HOUSEHOLD EXPENDITURE SURVEY

BRAZIL 1974-75

1. DESCRIPTION OF THE SURVEY

1.1 Responsible Agency, Title and Source

Fundacao Instituto Brasileiro de Geografia e Estadistica
(IBGE)

Estudo Nacional da Despesa Familiar - ENDEF

Various volumes of preliminary data on expenditure,
anthropometry and food consumption by region

Rio de Janeiro 1977

Original language: Portuguese

1.2 Objective

The main objective was to collect extensive social statistics with emphasis on food consumption and nutrition.

1/ This is taken from FAO (1977)

1.3 Reporting Period

Seven days for collection of food consumption information.

1.4 Coverage

Rural and urban areas in 7 different zones, specifically:

- i. Guanabara and Rio de Janeiro
- ii. Sao Paulo
- iii. Parana - Santo Catarina, Rio Grande do Sul
- iv. Espirito Santo and Minas Gerais
- v. Alagoas, Bahia, Ceara, Maranhao, Paraiba, Pernambuco, Piarui, Rio Grande do Norte and Sergipe
- vi. Distrito Federal
- vii. Amazonas, Para, Acre, Amapa, Roraima, Rondonia, Goias and Mato Grosso.

1.5 Design

The survey covered 55,000 families living in the regions listed above. A multistage sample design was adopted. During the first stage municipalities were selected some of these were automatically included as considered self-representative, others were selected with probabilities proportional to population. Subsequently, were selected in order: census units as defined for the 1970 population census, sub-census units and dwellings.

1.6 Organization of Field Work

Teams consisting of one supervisor and three enumerators were formed. Seventy six percent of the field personnel was of the female sex. Of 30,000 candidates, 200 supervisors and 900 enumerators were selected and trained in theoretical and practical aspects of field work. The IBGE office located in each state was responsible for carrying out the survey in that state. Field work lasted from 18 August 1974 to the 15 August of the following year. Each dwelling was interviewed two or

three times each day for a period of seven days to obtain data on food consumption. Each enumerator interviewed two families per day.

1.7 Method of Investigation

The interview method was adopted; during their visits to the families enumerators weighed the food and recorded the name, source and type of meal during which it was consumed, in addition to the price and place of purchase or other mode of acquisition. If possible, left overs were weighed.

2. TABULATION

2.1 Scope of the Tables

On food consumption seven main tables have been published for each region covering food consumed per person either per year or per day in quantity or nutritive value broken down by various foods, in relation also to requirements and place of acquisition.

2.2 Geographical Groups

Data are presented separately for the seven regions where the survey was carried out (see 1.4) and also by urban and rural areas of the same regions.

2.3 Unit of Tabulation and Concept of Household

Unit of tabulation is the "comensal dia" (the total number of "comensais-dia" of a consumption unit, is the sum of meal attendances of the persons forming the unit during the survey week). In counting the meal attendants, the relative importance of the daily meals were also considered. The consumption units was defined as the group of persons related by blood who share meals in the same dwelling and from the same food supply. In practice also boarders or servants, or guests, when present, were included.

2.4 Food Nomenclature

About 1,650 food and 235 food preparations were considered in collecting information. Data are published for 120 food items and 9 food groups.

APPENDIX B: AVERAGE EXPENDITURE SHARE AS A WELFARE MEASURE?

B1. BROAD EXPENDITURE CLASSES

The conventional share of expenditure on a commodity by a class k is given by

$$S = \frac{E_c}{E}$$

where E_c is total expenditure by the class on the commodity. E is total expenditure by the class on all commodities. If one chooses to analyse the average share at the family level as a measure of welfare, for example, then one may compute \bar{S}_k

where

$$S_k = \frac{1}{N_k} \sum_{i=1}^{N_k} S_{ik}$$

when

S_{ik} is share of expenditure by family i in class k on the commodity of interest
 N_k is number of families in class k

Although the first approach is important for macro-economic planning and modelling, the alternate approach is arguably a better measure of welfare because all families receive equal weight in this calculation rather than receiving weights proportional to their family level of expenditure. Thus, for example, although only 19.4% of all private expenditure in the city of Rio de Janeiro goes for food, the average family spends 30.3% of its budget on food. This same effect is noticeable in all seven urban and three rural areas studied and is magnified in those areas with the most uneven distribution of income.* Results are given in Tables B1, B2, and B3.

Average family budget shares for the urban and rural areas studied are shown at the bottom of Table B1. For the seven urban areas the typical family spends about one third of its budget on food, just over one fourth on services, and just under one fifth on manufactured items. About one eleventh is saved or invested and the remainder is divided between transportation, energy, and taxes. In contrast, 57.21% of the typical rural budget in the three rural areas goes for food, with a corresponding fall from the urban figure in budget shares going to all other categories except manufacturing. The emphasis on food is strongest in the northeast, where the typical nonmetropolitan urban family spends 46.8% of its budget on food and the typical rural family spends a full 62.4% of its budget on food. The average caloric intake of persons in each of these two areas is 1,821 and 2,017 calories per day respectively.** A family with a food share that is high is very sensitive to any changes in food prices, and an entire area typified by such families is in danger of severe nutritional problems if a shortfall occurs in

*If all persons spent the same amount, the average of the individual budget shares of good i would equal the share of the average expenditure on good i out of total expenditure. When income is distributed unevenly, however, upper income persons have a disproportionately large effect on the first measure while maintaining an effect on the second measure equal to that of all other persons.

**The ENDEF survey measured food intake as well as expenditure. See Estudo Nacional da Despesa Familiar: Consumo Alimentar, Antropométrica; Dados Preliminares, 7 volumes, Rio de Janeiro, 1977.

TABLE B1 - AVERAGE^{1/} BUDGET SHARES IN BRAZIL BY REGION

| | Food ^{2/} | Manufacturing | Services | Transportation | Energy | Taxes | Savings and Investment | Total |
|------------------------|--------------------|---------------|----------|----------------|--------|-------|------------------------------|-------|
| <u>URBAN:</u> | | | | | | | | |
| Rio de Janeiro | 30.3 | 16.5 | 31.3 | 4.9 | 3.3 | 5.8 | 7.9 | 100.0 |
| Sao Paulo | 27.4 | 17.7 | 30.5 | 4.2 | 3.3 | 6.0 | 10.9 | 100.0 |
| Nonmet Urban South | 34.8 | 20.5 | 26.1 | 2.0 | 3.2 | 4.1 | 9.3 | 100.0 |
| Nonmet Urban Southeast | 35.6 | 21.3 | 25.4 | 2.0 | 3.0 | 3.4 | 9.3 | 100.0 |
| Nonmet Urban Northeast | 46.8 | 20.0 | 20.0 | 1.8 | 2.8 | 3.1 | 5.5 | 100.0 |
| Salvador | 31.5 | 17.2 | 29.6 | 3.6 | 3.2 | 5.1 | 9.8 | 100.0 |
| Belera | 40.9 | 15.8 | 27.0 | 3.5 | 3.5 | 4.2 | 5.1 | 100.0 |
| <u>RURAL:</u> | | | | | | | | |
| South | 48.8 | 18.4 | 19.3 | 2.0 | 1.9 | 1.5 | 8.1 | 100.0 |
| Southeast | 56.3 | 18.3 | 15.5 | 1.4 | 1.4 | 1.8 | 5.3 | 100.0 |
| Northeast | 62.4 | 16.9 | 13.6 | 1.1 | 1.7 | 1.5 | 2.8 | 100.0 |
| <u>Aggregated:</u> | | | | | | | | |
| SEVEN URBAN AREAS | 34.24 | 18.74 | 27.24 | 3.19 | 3.15 | 4.68 | 8.76 | |
| THREE RURAL REGIONS | 57.21 | 17.57 | 15.60 | 1.46 | 1.68 | 1.56 | 4.92 | 100.0 |

^{1/} Average computed by $\bar{S}_k = \frac{1}{N_k} \sum_{i=1}^{N_k} S_{ik}$

where S_{ik} is the share by family i of class k on a given expenditure category

N_k is the number of families in class k .

^{2/} including tobacco

TABLE B2 AVERAGE^{1/} BUDGET SHARES FOR FOUR URBAN AND THREE RURAL INCOME CLASSES*

| | Food** | Manufacturing | Services | Transportation | Energy | Taxes | Savings and Investment | Total |
|-----------------------------|--------|---------------|----------|----------------|--------|-------|------------------------------|-------|
| <u>Seven Urban Areas:</u> | | | | | | | | |
| Lowest 20% | 49.7 | 14.7 | 26.6 | 1.9 | 2.6 | 2.6 | 1.9 | 100.0 |
| Lowest 40% | 46.0 | 16.4 | 26.8 | 2.4 | 2.6 | 3.3 | 2.5 | 100.0 |
| Middle 40% | 32.0 | 20.1 | 27.9 | 3.5 | 3.1 | 5.0 | 8.4 | 100.0 |
| Upper 20% | 16.4 | 20.5 | 25.6 | 3.9 | 4.4 | 6.5 | 22.7 | 100.0 |
| <u>Three Rural Regions:</u> | | | | | | | | |
| Lowest 60% | 65.1 | 14.9 | 15.2 | .9 | 1.5 | 1.0 | 1.4 | 100.0 |
| Middle 30% | 55.8 | 19.4 | 15.8 | 1.5 | 1.4 | 1.7 | 4.4 | 100.0 |
| Upper 10% | 31.5 | 22.8 | 16.9 | 3.3 | 3.0 | 3.3 | 19.2 | 100.0 |

^{1/} See Table B1

* The following ENDEF categories of annual global expenditure per family correspond to the breakdown by income class of the population as reported in this and other tables:

| | | |
|---------------|-------------|---------------------------------|
| <u>Urban:</u> | | (cruzeiros per family per year) |
| Lowest 20% | 0-8999 | |
| Lowest 40% | 0-15799 | |
| Middle 40% | 15800-45199 | |
| Upper 20% | > 45200 | |

| | |
|---------------|------------|
| <u>Rural:</u> | |
| Lowest 60% | 0-8999 |
| Middle 30% | 9000-22599 |
| Upper 10% | > 22600 |

To facilitate reading, exact figures on percentage breakdown were rounded to the nearest multiple of 5%; therefore these percentage figures are only approximations.

** Includes tobacco

TABLE B3-AVERAGE^{1/} BUDGET SHARES OF FAMILIES
IN EXPENDITURE CLASS EARNING LESS THAN

4,500 Cr. / per year
(Approximately 12 monthly August 1974 minimum wages in Rio de Janeiro
in Selected Urban and Rural Areas

| URBAN* : | Food | Manufacturing | Services | Transportation | Energy | Taxes | Savings and Investment | Total | Average | Average | |
|------------------------------|------|---------------|----------|----------------|--------|-------|---------------------------|--------|-------------------------------------|-------------------------------------|------|
| | | | | | | | | | Global Expenditure Per Capita | Global Expenditure Per Family | |
| Rio de Janeiro | 38.9 | 10.6 | 39.1 | 4.0 | 3.3 | 2.7 | 1.4 | 100.00 | 1,316 | 3,292 | 2.50 |
| Nonmet Urban South | 48.6 | 11.1 | 34.4 | .5 | 3.0 | 1.6 | .8 | 100.0 | 1,266 | 3,444 | 2.72 |
| Nonmet Urban Southeast | 47.7 | 12.6 | 34.6 | .6 | 2.1 | .9 | 1.5 | 100.0 | 987 | 2,824 | 2.86 |
| Nonmet Urban Northeast | 56.4 | 14.1 | 22.7 | .8 | 3.0 | 1.4 | 1.6 | 100.0 | 989 | 3,047 | 3.08 |
| Salvador | 38.3 | 12.2 | 39.3 | 2.3 | 4.0 | 3.5 | .4 | 100.0 | 1,342 | 3,180 | 2.37 |
| <u>RURAL:</u> | | | | | | | | | | | |
| South | 63.2 | 10.2 | 21.5 | 1.0 | 1.7 | 1.1 | 1.3 | 1.00 | 1,233 | 3,354 | 2.72 |
| Southeast | 62.8 | 13.9 | 18.9 | 1.3 | .9 | .9 | 1.3 | 1.00 | 1,020 | 3,966 | 3.89 |
| Northeast | 66.5 | 14.1 | 14.6 | .9 | 1.7 | 1.0 | 1.2 | 1.00 | 930 | 3,943 | 4.24 |

* Data for this income level was not available for Sao Paulo or Belem.

^{1/} See Table B 1

food availability.

Table B2 shows the average family budgetary breakdown for persons from different income groups in urban and rural Brazil. Because of the smaller variance of income levels within these classes than within Brazil as a whole the shares are very similar to the corresponding breakdown by income groups in total consumption expenditure discussed earlier.

Table B3 compares expenditure patterns of families in the income class just under 4,500 Cruzieros per year, the approximate equivalent of a one year minimum wage. Even when income levels are equalized, families in the northeast spend more on food, no doubt in part due to the larger average family size. At this level of income, expenditure on services (primarily housing) and energy is higher in urban areas, while consumption of manufactures is approximately the same in all regions. Transportation is far more important in large urban centers than elsewhere, and savings is, as expected, very low everywhere.

B2 FOOD COMMODITY EXPENDITURE

One may also use this average measure the second one to analyse the food budget going to various food commodities. Tables B4 and B5 show the average budgetary breakdown of families in the selected urban and rural areas. As becomes evident when these tables are compared with Tables 5.2 and 5.3 the average family spends a larger share of its budget on staples and pulses and smaller portion on vegetables, fruits and animal proteins than the breakdown of total expenditure would reveal. The discrepancies are most significant in those commodities least favored by those with higher expenditure levels, such as rice and pulses.

To isolate the effect of income level on the average family budget, average food budget shares have been calculated for four urban and four rural income groups as shown in Tables

TABLE B4 -AVERAGE ^{1/}BREAKDOWN OF FAMILY FOOD BUDGET
IN SEVEN URBAN AREAS

| | Average for Seven Areas | Rio de Janeiro | Sao Paulo | Nonmet Urban South | Nonmet Urban Southeast | Nonmet Urban Northeast | Salvador | Belem |
|------------------------|----------------------------|-------------------|--------------|--------------------------|------------------------------|------------------------------|----------|-------|
| 1. Wheat | 10.8 | 9.8 | 11.0 | 12.3 | 9.8 | 11.0 | 13.5 | 8.0 |
| 2. Rice | 9.1 | 9.8 | 9.8 | 8.5 | 12.9 | 7.1 | 3.4 | 4.0 |
| 3. Maize | .9 | .6 | .4 | .9 | 1.4 | 1.6 | .6 | .3 |
| Cereal | 20.8 | 20.2 | 21.2 | 21.7 | 24.1 | 19.7 | 17.5 | 13.2 |
| 4. Roots | 4.2 | 3.1 | 2.4 | 3.9 | 3.5 | 6.8 | 4.5 | 11.5 |
| Staples | 25.0 | 23.3 | 23.6 | 25.6 | 27.6 | 26.5 | 22.0 | 24.7 |
| 5. Sugar | 3.9 | 3.3 | 2.9 | 4.7 | 5.1 | 4.5 | 3.0 | 3.0 |
| 6. Pulses | 5.7 | 5.5 | 5.2 | 4.8 | 6.0 | 7.2 | 4.8 | 4.3 |
| 7. Vegetables | 6.2 | 7.2 | 7.8 | 6.3 | 6.7 | 3.9 | 4.8 | 4.6 |
| 8. Fruits | 4.5 | 5.0 | 4.7 | 3.8 | 4.0 | 4.7 | 3.9 | 4.6 |
| 9. Beef | 19.6 | 21.3 | 19.0 | 19.0 | 13.0 | 20.9 | 27.6 | 27.6 |
| 10. Pork | 5.0 | 3.4 | 3.2 | 5.3 | 11.5 | 4.7 | 2.4 | 1.3 |
| 11. Poultry and Eggs | 7.3 | 7.5 | 8.4 | 8.0 | 6.3 | 6.2 | 7.2 | 5.6 |
| 12. Fish | 3.4 | 3.5 | 2.5 | 2.1 | 1.7 | 5.4 | 5.1 | 9.5 |
| 13. Dairy Products | 7.7 | 7.5 | 9.6 | 8.1 | 6.4 | 6.7 | 8.4 | 5.6 |
| Animal Protein | 43.0 | 43.2 | 42.7 | 42.5 | 25.9 | 43.9 | 50.7 | 49.4 |
| 14. Vegetable Oils | 4.6 | 5.5 | 6.1 | 4.6 | 4.3 | 2.6 | 3.1 | 2.5 |
| 15. Coffee, Tea, Cocoa | 4.6 | 4.1 | 4.3 | 4.8 | 5.2 | 4.8 | 4.7 | 4.2 |
| 16. Other Beverages | 1.5 | 2.0 | 1.7 | 1.8 | 1.2 | .8 | 2.0 | 1.1 |
| 17. Condiments | 1.0 | .87 | 1.0 | 1.1 | 1.0 | 1.1 | 1.0 | 1.5 |
| | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

^{1/} See Table B1

TABLE B5 -AVERAGE^{1/} BREAKDOWN OF FAMILY FOOD BUDGET
BETWEEN COMMODITIES IN THREE RURAL REGIONS

| | <u>Three Region Average</u> | <u>South</u> | <u>Southeast</u> | <u>Northeast</u> |
|------------------------------|-------------------------------------|--------------|------------------|------------------|
| 1. Wheat | 5.5 | 9.6 | 4.4 | 3.7 |
| 2. Rice | 10.3 | 10.7 | 15.0 | 8.3 |
| 3. Maize | 4.0 | 3.2 | 4.6 | 4.2 |
| Cereals | 19.8 | 23.5 | 24.0 | 16.2 |
| 4. Roots | 8.8 | 6.0 | 4.2 | 12.2 |
| Staples | 28.6 | 29.5 | 28.2 | 28.4 |
| 5. Sugar | 5.8 | 4.6 | 9.1 | 5.2 |
| 6. Pulses | 11.6 | 7.3 | 8.7 | 15.1 |
| 7. Vegetables | 4.6 | 6.1 | 6.8 | 3.0 |
| 8. Fruits | 3.8 | 3.3 | 3.0 | 4.3 |
| 9. Beef* | 11.0 | 10.6 | 5.0 | 13.5 |
| 10. Pork | 10.2 | 12.9 | 18.1 | 5.7 |
| 11. Poultry and Eggs | 5.8 | 7.6 | 5.7 | 4.8 |
| 12. Fish | 3.3 | 1.2 | 1.2 | 5.4 |
| 13. Dairy Products | 6.6 | 7.5 | 5.6 | 6.5 |
| Animal Protein | 36.9 | 39.7 | 35.6 | 35.9 |
| 14. Vegetable Oils | 1.8 | 2.0 | 1.8 | 1.7 |
| 15. Coffee, Tea and cocoa | 5.0 | 4.6 | 5.4 | 5.1 |
| 16. Other Beverages** | .7 | 1.3 | .4 | .4 |
| 17. Condiments | 1.2 | 1.5 | 1.0 | 1.1 |
| | 100.00 | 100.00 | 100.0 | 100.0 |

* Includes goat and lamb

** Includes alcoholic and carbonated beverages.

1/ See Table B1

B6 and B7. This breakdown more than any other reveals those food commodities having the most important place in the diets of the poor and thus those commodities perhaps best suited as tools of general nutrition intervention policies. The foods whose consumption is relatively more important to low income groups include maize, roots, pulses and fish, while other forms of animal protein vegetables, and fruits take an increasing share of the family food budget as incomes rise. Wheat and rice consumption are approximately equally representative in the diets of all urban income classes, but wheat is consumed in rural areas far more by the upper income families -- a result partially of the concentration of these families in the south where wheat is primarily grown.

TABLE B6 - AVERAGE ^{1/} BREAKDOWN FOR
FOUR URBAN INCOME CLASSES

| | Lower 20% | Lower 40% | Middle 40% | Upper 20% |
|------------------------------|-----------|-----------|------------|-----------|
| 1. Wheat | 10.2 | 10.9 | 11.0 | 10.1 |
| 2. Rice | 10.4 | 10.8 | 8.9 | 5.1 |
| 3. Maize | 1.9 | 1.4 | .7 | .5 |
| 4. Roots | 7.1 | 5.6 | 3.4 | 2.8 |
| 5. Sugar | 5.2 | 4.7 | 3.5 | 3.1 |
| 6. Pulses | 9.5 | 8.0 | 4.7 | 2.9 |
| 7. Vegetables | 4.4 | 5.2 | 6.7 | 7.4 |
| 8. Fruits | 2.9 | 3.2 | 4.8 | 7.0 |
| 9. Beef | 15.7 | 17.0 | 20.5 | 23.8 |
| 10. Pork | 7.0 | 6.3 | 4.3 | 3.1 |
| 11. Poultry + Eggs | 4.9 | 6.1 | 8.2 | 7.7 |
| 12. Fish | 4.9 | 4.0 | 3.0 | 3.3 |
| 13. Dairy Products | 4.8 | 5.6 | 8.4 | 11.5 |
| Animal Protein | | 37.3 | 39.0 | 44.4 |
| 14. Vegetable Oils | 3.1 | 4.0 | 5.0 | 4.4 |
| 15. Coffee, Tea and cocoa | 6.4 | 5.6 | 4.1 | 3.4 |
| 16. Other Beverages | .5 | .6 | 1.8 | 3.0 |
| 17. Condiments | 1.1 | 1.0 | 1.0 | 1.0 |
| | 100.0 | 100.0 | 100.0 | 100.0 |

^{1/} See Table B1

TABLE B7 -AVERAGE^{1/} BREAKDOWN OF FAMILY FOOD
BUDGET BETWEEN COMMODITIES FOR
THREE RURAL EXPENDITURE CLASSES

| | Lower 60% | Middle 30% | Upper 10% | Upper 40% |
|------------------------------|-----------|------------|-----------|-----------|
| 1. Wheat | 4.1 | 6.7 | 8.5 | 7.1 |
| 2. Rice | 10.0 | 11.2 | 8.3 | 10.6 |
| 3. Maize | 4.4 | 3.8 | 2.5 | 3.6 |
| Cereals | 18.5 | 21.7 | 19.3 | 21.3 |
| 4. Roots | 11.0 | 6.9 | 5.0 | 6.5 |
| Staples | 29.5 | 28.6 | 24.3 | 27.8 |
| 5. Sugar | 6.3 | 5.5 | 4.3 | 5.2 |
| 6. Pulses | 14.9 | 9.0 | 4.7 | 8.1 |
| 7. Vegetables | 3.9 | 5.2 | 6.0 | 5.4 |
| 8. Fruits | 3.4 | 4.0 | 5.0 | 4.2 |
| 9. Beef | 10.2 | 11.3 | 14.5 | 11.9 |
| 10. Pork | 8.6 | 11.5 | 13.4 | 11.9 |
| 11. Poultry and Eggs | 4.7 | 6.8 | 7.7 | 6.9 |
| 12. Fish | 4.6 | 2.2 | 1.1 | 2.0 |
| 13. Dairy Products | 5.0 | 7.8 | 9.9 | 8.4 |
| Animal Protein | 33.1 | 39.6 | 46.6 | 41.1 |
| 14. Vegetable Oils | 1.8 | 1.8 | 1.7 | 1.8 |
| 15. Coffee, Tea and Cocoa | 5.7 | 4.4 | 3.6 | 4.2 |
| 16. Other Beverages | .3 | .7 | 2.4 | 1.0 |
| 17. Condiments | 1.1 | 1.2 | 1.4 | 1.2 |
| | 100.0 | 100.0 | 100.0 | 100.0 |

^{1/} See Table B1

APPENDIX C

REGRESSIONS FOR BROAD EXPENDITURE CATEGORIES.

APPENDIX C.I.

EXPENDITURE ELASTICITIES FOR
AGGREGATED DATA FROM SEVEN URBAN AREAS, 1974-75^{1/}

| | C | log G | (log G) ² | S - P | South | Central NE | non met NE | Salv. | Amaz. | R ² |
|----------------|------------------|----------------|----------------------|------------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------|
| | | | | D2 | D3 | D4 | D5 | D6 | D7 | |
| Food | 3.12 (.135) | .486 (.015) | | -.038 (.037) | -.026 (.042) | -.044 (.044) | -.019 (.043) | -.122 (.057) | -.096 (.072) | .9533 |
| Tobacco | -2.24 (.551) | 1.70 (.124) | -.069 (.007) | -.040 (.022) | (.026) | -.162 (.027) | .091 (.027) | -.092 (.035) | .114 (.044) | .9830 |
| | .793 (.283) | .477 (.032) | | .0008 (.08) | -.215 (.089) | -.495 (.093) | -.650 (.090) | -.455 (.120) | -.540 (.152) | .8986 |
| | -11.20 (1.01) | 3.20 (.227) | -.154 (-12.03) | -.003 (.04) | -.222 (.047) | -.432 (.049) | -.490 (.049) | -.387 (.063) | -.500 (.080) | .9719 |
| Manufacturing | -2.89 (.180) | 1.12 (.020) | | .053 (.049) | .249 (.057) | .308 (.059) | .297 (.057) | .066 (.076) | .018 (.097) | .9830 |
| Services | -.364 (.102) | .908 (.011) | | -.020 (.028) | -.216 (.032) | -.263 (.034) | -.536 (.033) | -.087 (.043) | -.200 (.055) | .9939 |
| Transportation | | | | | | | | | | |
| Services | -4.36 (.439) | 1.15 (.049) | | -.174 (.049) | -.928 (.138) | -.946 (.145) | -.915 (.140) | -.243 (.186) | -.255 (.236) | .9409 |
| Energy | -5.40 (.230) | 1.22 (.026) | | -.0334 (.626) | .045 (.072) | .016 (.076) | .051 (.073) | .059 (.097) | .158 (.123) | .9781 |
| Tax | -5.26 (.268) | 1.27 (.030) | | .012 (.073) | -.261 (.084) | -.441 (.088) | -.454 (.086) | -.023 (.113) | -.207 (.144) | .9773 |
| Savings | -12.30 (.348) | 2.08 (.039) | | .179 (.095) | .590 (.109) | .688 (.115) | .750 (.111) | .076 (.147) | .096 (.187) | .9812 |

1/ Estimates based on the equation $\ln X_i = C + \beta_i \log G + \alpha (\log G)^2 + \sum_k S_{ik} D_k$

where X_i is expenditure on commodity i

G is total expenditure

D_k are dummy variables for the region

APPENDIX C.2.

EXPENDITURE ELASTICITIES FOR
AGGREGATED DATA FROM THREE RURAL REGIONS 1974-75

| | C | log G | (log G) ² | SE | NE | R ² |
|----------------------------|------------------|----------------|-------------------------------|------------------|-----------------|----------------|
| Food | 2.93 (.318) | .533 (.040) | | -.042 (.062) | -.106 (.057) | .9240 |
| | -7.19 (.808) | 3.10 (.204) | -.162 ^{1/} (.013) | -.0026 (.022) | -.030 (.021) | .9904 |
| Tobacco | -2.39 (.353) | .769 (.044) | | -.238 (.069) | .0036 (.064) | |
| Manufacturing | -4.14 (.360) | 1.30 (.045) | | .123 (.070) | .174 (.065) | .9776 |
| Services | -.629 (.319) | .871 (.040) | | -.271 (.062) | -.451 (.058) | .9768 |
| Transportation Services | -9.54 (.434) | 1.70 (.054) | | -.103 (.085) | .052 (.078) | .9821 |
| Energy | -7.29 (.738) | 1.41 (.092) | | -.293 (-2.04) | .249 (1.87) | .9223 |
| Tax | -10.60 (.749) | 1.80 (.093) | | .275 (.146) | .516 (.135) | .9453 |
| Savings | -16.07 (.818) | 2.65 (.102) | | .080 (.160) | .324 (.148) | .9723 |

^{1/} See note on Table C-I

APPENDIX D

ELASTICITIES BY FOOD COMMODITY

This appendix provides estimates by food commodities for selected regions and income classes. The dependent variable in each instance is the total food expenditure. Note that in section 6 of the main text these are adjusted to yield elasticity estimates with respect to total or global expenditure.

TABLE D.I FOOD EXPENDITURE ELASTICITIES FOR URBAN BRAZIL BY REGION*
WITH RESPECT TO TOTAL FOOD EXPENDITURE 1974-75
(standard errors in parentheses)

| | Rio de Janeiro | Sao Paulo | Nonmet Urban South | Nonmet Urban Southeast | Northeast | Salvador | Belem |
|--------------------------|------------------|------------------|--------------------|------------------------|-----------------|----------------|-------------------|
| 1. Wheat | .71 (.028) | .89 (.052) | .81 (.038) | 1.22 (.052) | 1.21 (.094) | .72 (.059) | .85 (.037) |
| 2. Rice ¹ . | -.16 | -.36 | -.12 | .38 | .81 | 1.07 | .83 |
| 3. Maize | -.27** (.146) | .17 ² | .10 ² | -.39 (.109) | .72 (.153) | .83 (.084) | .91 (.193) |
| 4. Roots | .82 (.057) | .79 (.029) | .55 (.084) | .76 (.035) | .08** (1.52) | .28 (.056) | -.02 ³ |
| 5. Sugar | .69 (.071) | .85 (.073) | .63 (.031) | .51 (.065) | .67 (.046) | .68 (.025) | .67 (.091) |
| 6. Pulses ⁴ . | -.17 | -.17 | -.50* | .05 | -.12* | .26 | .42 |
| 7. Vegetables | 1.11 (.028) | 1.34 (.052) | 1.12 (.023) | 1.08 (.062) | 1.59 (.064) | 1.42 (.068) | 1.67 (.068) |
| 8. Fruits | 2.13 (.105) | 2.07 (.050) | 2.27 (.120) | 2.01 (.114) | 1.59 (.068) | 1.74 (.068) | 1.92 (.089) |
| 9. Beef | 1.50 (.053) | 1.38 (.051) | 1.54 (.015) | 1.65 (.072) | 1.33 (.042) | .91 (.030) | 1.22 (.076) |
| 10. Pork | .50 (.166) | .76 (.158) | .37 (.074) | .40 (.048) | .37 (.103) | 1.04 (.078) | 1.36 (.184) |
| 11. Poultry and eggs | .88 (.104) | .94 (.067) | 1.49 (.186) | 1.62 (.132) | 1.67 (.100) | 1.40 (.066) | 1.30 (.061) |
| 12. Fish | 1.29 (.043) | 1.51 (.111) | .90 (.117) | 1.33 (.162) | .28 (.081) | .83 (.122) | .39 (.091) |
| 13. Dairy Produce | 1.76 (.083) | 1.62 (.029) | 1.82 (.074) | 1.94 (.090) | 1.70 (.044) | 1.73 (.055) | 1.96 (.149) |
| 14. Vegetable Oil | .77 (.116) | .64 (.074) | .78 (.104) | 1.22 (.084) | 1.55 (.132) | 1.06 (.046) | 1.44 (.043) |
| 15. Coffee, tea cocoa | .46 (.067) | .50 (.045) | .44 (.038) | .25 (.039) | .38 (.058) | .47 (.063) | .42 (.056) |
| 16. Other Beverages | 2.57 (.356) | 2.62 (.289) | 3.60 (.265) | 2.36 (.189) | 2.32 (.250) | 2.88 (.302) | 2.84 (.378) |
| 17. Condiments | 1.16 (.075) | 1.27 (.049) | .75 (.120) | 1.05 (.056) | .964 (.044) | .938 (.098) | .811 (.048) |

* All estimates are log log unless stated otherwise

** Not significant at .05 level, one-tailed test

¹ Rice coefficients $[\ln FX (\ln FX)^2]$ 9.22, -.634 | 11.61, -.804 |
(1.46) (.099) | (1.55) (.104) |
6.27, -.437 | 7.25, -.48 | 10.07, -.66 | 7.80, -.465 | 7.28, -.44
(.993) (.068) | (1.19) (.084) | (2.05) (.147) | (1.53) (.106) | (.932) (.064)

² Log-log quadratic used: $\log F, (\log F)^2 = -7.76, .59$
14.20, .97 (3.48) (.239) for Sao Paulo;
(6.25) (.421) for the South

³ Log-log quadratic used: Coefficients are 7.17, -.49
(1.95) (.133)
Pulse coefficients $[\ln F, (\ln F)^2]$
5.28, -.39 | 4.19, -.29 | 4.57, -.34 | 1.40, -.102 | -2.41 .17 | 2.77, -.17 |
(1.12) (.076) | (2.04) (.138) | (6.24) (.43) | (1.27) (.089) | (2.40) (.97) | (1.93) (.134) |
6.31 -.404
(1.42) (.097)

TABLE D.2-FOOD EXPENDITURE ELASTICITIES WITH RESPECT TO TOTAL FOOD EXPENDITURE FOR RURAL BRAZIL BY REGION
(standard errors in parentheses)

| | South | Southeast | Northeast |
|------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
| 1. Wheat | 1.07 (.089) | 1.40 (.055) | 1.66 (.091) |
| 2. Rice | .019* (.106) | .87 [138.0 (6.19)] | 1.22 [81.7 (6.08)] |
| 3. Maize | .26 [8.37 -.563 (3.49) (.241)] | .38 [9.34 -.642 (1.96) (.142)] | .91 [18.25 -1.30 (2.60) (.195)] |
| 4. Roots | .74 [59.0 (8.14)] | .66 [28.2 (7.39)] | .31 [28.57 (5.05)] |
| 5. Sugar | .55 (.045) | .36 (.085) | .72 (.028) |
| 6. Pulses | -.35 (.178) | .25 (.039) | .29 (.066) |
| 7. Vegetables | 1.30 (.138) | .84 (.080) | 1.37 (.076) |
| 8. Fruit | 2.16 (.232) | 1.61 (.122) | 1.67 (.032) |
| 9. Beef | 2.13 (.087) | 1.96 (.070) | 1.49 (.024) |
| 10. Pork | .89 (.067) | 1.13 (.045) | 1.03 (.072) |
| 11. Poultry and eggs | 1.35 (.226) | 1.69 (.156) | 1.51 (.094) |
| 12. Fish | .11* (.269) | 1.24 (.168) | .148 (.120) |
| 13. Dairy | 2.01 (.201) | 2.19 (.223) | 2.16 (.086) |
| 14. Vegetable Oil | .302 (.203) | .66 (.118) | 1.68 (.119) |
| 15. Coffee, cocoa and tea | .233 (.107) | .509 (.045) | .365 (.053) |
| 16. Other Beverages | 4.05 (.403) | 2.74 (.841) | 1.52 (.550) |
| 17. Condiments | 1.18 (.147) | .814 (.128) | .878 (.053) |

* not significant at .05 level, one-tailed test

TABLE D.3 - FOOD EXPENDITURE ELASTICITIES FOR URBAN BRAZIL BY INCOME CLASS
1974 - 1975
(standard errors in parentheses)

| | Lower 20% | Lower 40% | Middle 40% | Upper 20% |
|------------------------|----------------|----------------|----------------|----------------|
| 1. Wheat | 1.42 (.137) | 1.34 (.076) | .73 (.045) | .78 (.115) |
| 2. Rice | 1.47 (.168) | 1.04 (.101) | .24 (.111) | -.60 (.156) |
| 3. Maize | 1.27 (.332) | .36 (.193) | .05* (.318) | .91 (.393) |
| 4. Roots | .25 (.164) | .28 (.085) | .54 (.084) | .87 (.088) |
| Staples | 1.04 (.042) | .89 (.040) | .49 (.042) | .43 (.054) |
| 5. Sugar | .59 (.056) | .53 (.036) | .66 (.044) | 1.19 (.131) |
| 6. Pulses | .13* (.12) | .07* (.06) | .01* (.127) | .07* (.180) |
| 7. Vegetables | 1.70 (.106) | 1.58 (.078) | 1.33 (.068) | 1.18 (.063) |
| 8. Fruits | 1.19 (.157) | 1.60 (.094) | 1.95 (.141) | 1.72 (.093) |
| 9. Beef | 1.36 (.097) | 1.50 (.051) | 1.30 (.075) | 1.09 (.075) |
| 10. Pork | .68 (.132) | .67 (.105) | .59 (.165) | -.33 (.289) |
| 11. Poultry and Eggs | 2.12 (.128) | 1.98 (.090) | .98 (.105) | .97 (.122) |
| 12. Fish | .78 (.285) | .75 (.143) | 1.02 (.207) | 1.50 (.376) |
| 13. Dairy products | 1.79 (.276) | 1.79 (.094) | 1.66 (.076) | 1.69 (.114) |
| Animal Protein | 1.35 (.056) | 1.42 (.031) | 1.23 (.028) | 1.16 (.048) |
| 14. Vegetable Oils | 2.06 (.107) | 1.78 (.093) | .85 (.051) | .30 (.129) |
| 15. Coffee, Tea, Cocoa | .16 (.049) | .20 (.033) | .53 (.054) | .79 (.121) |
| 16. Other Beverages | 2.13 (.528) | 1.67 (.256) | 3.09 (.126) | .55 (.369) |
| 17. Condiments | .97 (.153) | .93 (.055) | .91 (.108) | 1.55 (.119) |

* not significant at .05 level, one-tailed test.

TABLE D.4 -FOOD EXPENDITURE ELASTICITIES WITH RESPECT TO TOTAL
FOOD EXPENDITURE FOR RURAL BRAZIL BY INCOME CLASS
(standard errors in parentheses)

| | Lower 60% | Upper 40% | Upper 10% |
|------------------------|-----------------|-----------------|-----------------|
| 1. Wheat | 1.46 (.078) | 1.17 (.103) | .61 (.266) |
| 2. Rice | 1.57 (.081) | .27 (.144) | .54 (.141) |
| 3. Maize | 1.44 (.165) | -.10 (.161) | -.82 (.216) |
| 4. Roots | .45 (.069) | .68 (.146) | .48 (.198) |
| 5. Sugar | .696 (.048) | .48 (.11-1) | .60 (.169) |
| 6. Pulses | .415 (.073) | -.02 (.179) | .93 (.175) |
| 7. Vegetables | 1.51 (.119) | 1.00 (.143) | .68 (.246) |
| 8. Fruit | 1.58 (.104) | 1.76 (.205) | .80 (.475) |
| 9. Beef | 1.48 (.065) | 1.96 (.100) | 2.05 (.158) |
| 10. Pork | .92 (.081) | 1.00 (.096) | .64 (.209) |
| 11. Poultry and Eggs | 1.85 (.147) | 1.05 (.119) | .44* (.391) |
| 12. Fish | .709 (.238) | .451* (.305) | 1.16* (.574) |
| 13. Dairy | 2.40 (.182) | 1.54 (.100) | .85 (.148) |
| 14. Vegetables | 1.76 (.179) | .85 (.137) | .52* (.371) |
| 15. Coffee, cocoa, tea | .31 (.056) | .56 (.094) | .91 (.236) |
| 16. Other Beverages | 1.35* (1.09) | 3.63 (.464) | 3.31 (.934) |
| 17. Condiments | .89 (.086) | 1.12 (.168) | .89* (.699) |

* not significant at .05 level, one-tailed test

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