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Food and Agricultural
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# Preliminary Analysis of Demand Parameters for Indonesia

by

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Working Paper for Indonesia

NUTRITION ECONOMICS OFCO.

February 1986

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This report is part of a research project funded by the United States Agency for International Development, Bureau for Science and Technology, Office of Nutrition under the technical supervision of the Nutrition Economics Group, Office of International Cooperation and Development, United States Department of Agriculture.

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## Introduction

The two objectives of the IAPRI project (Impact Evaluation of Consumption and Nutrition Effects of Food and Agricultural Policies) are to provide consumer demand parameter estimates and to demonstrate their use for food and nutrition policy analysis. The 1980 SURGASAR Survey provides the data base for estimating these demand parameters and developing the nutrition linkages.

The focus of this report is threefold. First, to review the structure of consumer demand models selected for application. The intent is to evaluate the relative strengths and weaknesses of these models, and to provide a basis for judging their relative merits for the proposed policy exercises. Second, to discuss procedures for estimating the models and specializing them to the available survey data. Finally, provisional estimates are given in the appendices to be used in evaluating the demand models for structural and policy analyses. Once the exploratory empirical results for the demand systems have been fully reviewed, work will proceed on developing a complete set of consumer demand parameters.

## Demand Parameters for Food

Results of the descriptive analysis show that income, family size, and location variables are important in explaining variations in food consumption and expenditure patterns. Using these explanatory variables, a demand system specified in a multinomial logit framework is estimated for selected food groups. Expenditure and household size elasticities are computed by income group and region. Procedures are then outlined to expand the analysis to two other demand systems and incorporate prices to estimate jointly expenditure and price elasticities.

**Engel Curves**

Initially, prices are assumed constant across households in the sample--a usual hypothesis in cross section data analysis. Only income and other socioeconomic characteristics (e.g., family size and composition, location (rural/urban), residence (Java/outer-Java)) are evaluated for their influence on household food consumption patterns. Hence, the task is to estimate reduced form demand equations with the focus on the consumption/income relationship.

The hypothesized relationships are supported by the descriptive analyses of household food participation patterns, average budget shares for food, and consumption levels (Appendices A.1 and B.1). Results of the preliminary descriptive analysis were used to identify the major food groups and provide a perspective for the distribution of food budget shares and food consumption levels by income group, family size, and location.

Five functional forms were evaluated for estimating the Engel curves for food:

(1) $$C_i/N = \alpha_i + \beta_i \ln(Y/N) + \Sigma\, \Theta_{ik} \ln N_k$$

(2) $$\ln(C_i/N) = \alpha_i + \beta_i \ln(Y/N) + \Sigma\, \Theta_{ik} \ln N_k$$

(3) $$C_i/N(\lambda_C) = \alpha_i + \beta_i \ln Y/N(\lambda_Y) + \Sigma\, \Theta_{ik} \ln N_k(\lambda_N)$$

(4) $$w_i = \alpha_i + \beta_i \ln Y + \Sigma\, \Theta_{ik} \ln N_k$$

(5) $$\ln(w_i/w_j) = \alpha_i + \beta_i \ln Y + \Sigma\, \Theta_{ik} \ln N_k$$

where $C_i$ is expenditure on food group i, Y is total weekly expenditures, N is the number of persons in the household, $N_k$ is the number of persons in age-sex

group k, $w_i$ is average budget share for group i, and $\lambda$ is a transformation variable.

The Semi-log Equation (1), and log-log linear Equation (2), are modified versions of the functional forms often applied to estimate Engel curves for food (Prais and Houthakker, 1955). Both the expenditure on food group i and total expenditure are "scaled" on a per capita basis. Household composition variables are added to reflect potential influences of a household composition effect on food consumption patterns.

Equation (3) is a general representation with equations (1) and (2) as special cases. The advantage of this specification is that the data can be used to identify the functional form within the "power family" that best describes food consumption. The variables in Equation (3) are transformed using the variable, $\lambda$. By allowing $\lambda_j$ to take different values, the one that maximize the likelihood function can be estimated. The value of the $\lambda$ is used to determine which of the common empirical Engel curves (semi-log, log-log linear, log-log inverse) best represent the sample data.

Equation (4) is the form used initially by Lesser (1963). The budget shares for food are related to income and other socioeconomic variables. This specification is simple to estimate and is a special case of the flexible Almost Ideal Demand System (AIDS) when prices are held constant. Moreover, it provides a basis for understanding the model in Equation (5).

Equation (5) is a linear version of the multinomial logit model. This model satisfies the Engel aggregation condition, predicts positive budget shares, and is less restrictive in terms of the range of possible values of the estimated elasticities than Equation (4).

Three main considerations used in choosing among these functional forms were:

(1) the model must be simple to estimate, with linearity in the parameters an important factor;

(2) the parameter estimates must be consistent with restrictions from the individual consumer theory, i.e., satisfy Engel aggregation condition; and

(3) the models must be compatible with the available data.

Based on these three criteria, the multinomial logit model was determined provisionally to be the most appropriate empirical model. It will be utilized in the explanatory work that proceeds the estimation of the full demand systems. A major factor in the choice of the multinomial logit specification was the capacity that the formulation represents for reflecting interactions of food demands. Summary results based on this model are presented in Appendices (A.2 and B.2) where budget shares are predicted, implied food preferences are evaluated, and expenditure and household size elasticities are computed for urban and rural households. Further, these estimates are evaluated by income group and region (Java versus outer-Java).

## Demand System for Food

From the preliminary estimates of the consumption and income relationships, we move to incorporate relative prices in estimating jointly the price and income parameters.

Computed prices are generated for selected food groups. The implicit prices vary greatly by districts, reflecting differences of markets and perhaps household preferences in the cross section data. Assuming that these prices reflect "true" relative price changes and that household preferences are constant or accomodated by the other conditioning variables, these implicit prices can be used to estimate full demand system. In our analysis we assume that the socioeconomically "adjusted" households are similar in food

preferences but have made consumption choices subject to different relative prices.

The search for a tractable demand system, given available data, is underway. Three demand systems under consideration are:

(6) $$w_i = \alpha_i + \Sigma\, \gamma_{ij} \ln P_j + \beta_i \ln(Y/P) + \Sigma\, \Theta_{ik} \ln N_k$$

(7) $$\ln(w_i/w_j) = \alpha_i + \Sigma\, \gamma_{ij} \ln P_j + \beta_i \ln Y + \Sigma\, \Theta_{ik} \ln N_k$$

(8) $$C_i(\lambda) = \Sigma\, \gamma_{ij} P_j(\lambda) + \beta_i Y(\lambda)$$

Equation (6) is variant of the AIDS demand system (Deaton and Muellbauer, 1980) with an addition of demographic variables. The model is expressed in real income and nominal prices. The demand restrictions (aggregation, homogeneity, and symmetry) can be imposed to make the AIDS model consistent with demand theory. The major drawback of the AIDS system is the possible problem of non-linearity if the true price index is used to deflate the nominal income. The simple approach to circumvent this problem, as suggested by Deaton and Muellbauer (1980), is to use Stone's index $\log P = \Sigma\, w_k P_k$, i.e., the sum of the logarithms of prices. Results by Johnson, et al. (1984), for U.S. suggest that the approximation is reasonable empirically.

Equation (7) is an extended version of the multinomial logit model. This budget allocation model is conditioned on prices, income, and other socioeconomic factors. Note that the log-specification of the right hand side variables is an empirical convenience and not a condition for application of the model. Equation (7) satisfies the adding up conditions and the homogeneity and symmetry can be imposed as linear restrictions on the parameters. Main advantages of the multinomial logit model are that

(1) the predicted budget shares always lie between 0 and 1,

(2) the predicted budget shares add to unity,

(3) the model is linear in the parameters, and

(4) the model is flexible--i.e., the elasticities can incorporate consumer adjustments in budget reallocations, and vary at different points in the data set.

The major practical limitation of this model is its inability to handle zero observations.

Equation (8) can be used to locally approximate a demand system (Johnson, et al., 1985). Applying the Box-Cox transformation procedure, the model is linear in all parameters except $\lambda$. Recall that this value of the transformation variable ($\lambda$) defines the specific functional form of the demand system (e.g., $\lambda = 1$ for linear and $\lambda = 0$ for double log). The demand restrictions can be applied to hold locally at specified income, prices, and budget proportions. The approximation of the demand system is flexible, but this procedure does not guarantee a satisfactory global approximation.

The zero observations in microeconomic data poses a serious estimation problem for all demand systems. The common assumption for the distribution of bounded error term is violated. To adjust for zero observations, the models can be adapted. For example, one may use a censored dependent variable model, where the dependent variable has stochastic unobserved threshold level. The structure of this model is

$$C_{1i} = X_{1i}\beta_1 + U_{1i} \tag{9}$$

$$C_{2i} = X_{2i}\beta_2 + U_{2i}$$

where $C_i$ for each household is observed if $C_{1i} > C_{2i}$, and 0 if $C_{2i} > C_{1i}$. The

Tobit model (1958) is a special case of this model, where the threshold is a fixed value ($C_{2i} = 0$). By mixing probit and ordinary least square procedures, it is possible to solve for consistent estimates of the demand model (Madalla 1983). This procedure, however, requires that more parameters be estimated.

## Demand Parameters for Nutrients

The specification of the empirical models for nutrient consumption utilizes the household production theory (Report #2, pp. 34-39). Households act both as consumer and producers. As producers, the households purchase market goods and combine with labor and other factors to transform them through a production process to utility yielding nutrients. Income derived from production activities and other sources is used to facilitate the consumption of these nutrients.

The problem of determining the optimal choices of nutrients can be viewed as occurring in two stages. First, the households determine the minimum cost of producing these nutrients and second, the households maximize utility defined in the nutrient space, subject to an income constraint that incorporates the cost function. The resulting nutrient demand functions are expressed in income, implicit nutrient prices, and household specific utility and production function characteristics.

A two equation Engel curve based empirical model is proposed for the analysis of the SURGASAR data. Within a framework of simultaneous equations, Engel curves for food cost and indices of nutrient availability are specified. The food cost equation,

(10) $$C = g(Y, X1)$$

is expressed as function of income, Y, and a vector of socioeconomic and efficiency parameters, X1. If it is postulated that all foods purchased are used as inputs in the household production process, then Equation (10) can be interpreted as a composite derived demand for the inputs.

An index of nutrient availability, INAVAL, is specified conditioned on food cost, and a vector of socioeconomic and efficiency variables that pertain to nutrition status, X2,

$$\text{INAVL} = h(C, X2). \tag{11}$$

Reported food supplies are transformed into micro nutrients and then principal components are computed for these nutrients. The principal components, which measure the nutrient composition of the food supply, give nearly as much information as computing a disaggregated model with individual Engel curves for all the micro nutrients. The advantage of the principal components approach is that the dimensionality of the problem is greatly reduced (Basiotis et al. 1986).

Equations (10) and (11) constitute the structure of the empirical model for evaluating nutrient consumption. An additional equation may, however, be specified relating the availability of each nutrient to the general principal component index of nutrient availability. If included, this equation will expand the model to a system of three equations. A simple specification for this additional equation is

$$\text{NUT} = 1(\text{INVAL})$$

where NUT is the individual micronutrient.

The estimation of these Engel curves (Equations (10) and (11)) is based on the assumption that prices are constant across households. That is, food

prices in food cost or expenditure equation (Equation (10)) are regarded as constant. This assumption is, however, not plausible for nutrient prices. As discussed in our earlier report (Report #2), the implicit prices for nutrients are conditional on household specific income, utility and production characteristics. The implicit prices vary if the households are heterogeneous with respect to these characteristics. This poses a potential problem for estimation and interpretation of the nutrient availability equation.

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# APPENDIX A:

## Food Consumption and Expenditure Patterns in Urban Indonesia

## A.1. Food Expenditure Participation Rates, Average Food Budget Shares and Food Intake Levels.

Descriptive results on participation rates, food budget shares, and food consumption levels are given for urban households. Participation rates measure the size distribution of consuming households. Food budget shares are computed primarily to examine their behavior with respect to changes in socioeconomic variables. Per capita consumption levels are estimated and presented for selected food commodities.

### Participation Rates

From Table A1.1, observe that over 75 percent of the urban households reported consumption of rice, fruits and vegetables, fish, beverages, prepared (processed) foods, and sugar. However, only about one-third of these families reported consumption of cassava, meats, and dairy products. Less than one-fourth of the urban households reported consuming corn, wheat, and sweet potatoes during the survey week.

Participation rates were similar between Java and the off-Java islands. Soybeans, fish, and prepared foods are the only exceptions. There were more households consuming soybeans and prepared foods in urban Java than in urban outer-Java. There were more consumers of fish in urban outer-Java than in Java. For all income levels, participation rates were high for rice, vegetables, fish, beverages, and sugar (Table A1.2). In the case of corn, cassava, and sweet potatoes, participation rates declined with income (Table A1.2). For wheat, potatoes, fruits, and animal products, the proportion of consumers reporting consumption increased with income.

Proportion of consuming households varied across food groups. Regardless of income level, rice, vegetables, fish and beverages were the most widely consumed food groups. The secondary crops, corn and sweet potatoes in

particular, were the least widely consumed. In fact, the share of participating households for these crops declined as income level increased.

**Budget Shares**

(a) Regional Variations

The average per person expenditure for food in Indonesia was Rp 1,735 (US $2.78) per week (Table A1.3). Food accounted for 64 percent of the average weekly expenditure. Of the total food budget, 27 percent was allocated to rice--the main staple crop (Table A1.4). Other significant average budget allocations were for fruits and vegetables (13.3 percent), animal products (12.4 percent), fish (10.8 percent), and prepared foods (9.2 percent). The secondary food crops (corn, wheat, cassava, sweet potatoes, and potatoes) accounted for 2.1 percent of the food budget.

The average person in Java had a food cost of Rp 1,590 (US $2.54) per week on food. This constituted 61 percent of the weekly expenditure (Table A1.4). Rice accounted for 27 percent of the food budget. The rice share was followed by animal products (13.7 percent), fruits and vegetables (12.0 percent), prepared foods (12.7 percent), and fish (6.2 percent).

In the off-Java islands, the average per person weekly allocation for food was Rp 1,880 (US $3.01), or 66 percent of the average weekly expenditure. Rice, as in Java, accounted for 27 percent of the food budget. Fruits and vegetables, animal products, and fish had shares of 13.3, 12.4, and 10.8 percent, respectively.

Comparing expenditure shares for Java and the outer-Java islands, it is evident that in the two regions food consumption accounted for

approximately two-thirds of all weekly household expenditure, with rice the dominant food crop and the secondary food crops have minor shares in the food budgets. There are, however, two notable exceptions. The budget share for fish was higher in off-Java, and the share allotted to beans, soybeans in particular, was higher in Java.

Variations in budget shares are more noticeable across the provinces (Table A1.5). Although rice was the main staple in all the provinces, the budget share for rice varied from 21 percent in Jakarta to 31 percent in Bali. The budget shares of corn and cassava increase from West to East Java. Outside Java, the shares for corn and cassava were higher in Sulawesi and the other provinces (Nusa Tenggara, Maluku, and Irian Jaya). For fish, the budget share varied from 1.71 percent in Yogyakarta to 16.7 percent in Sulawesi and 17.3 percent in Kalimantan.

(b) Variation by Income class

The share of food in the total budget ranged from 74 percent in the lowest income group to 54 percent in the highest income group (Table A1.6). Because most of the foods consumed were necessities, their budget shares declined with income. The share of rice, for example, declined from 41 percent to 16 percent from the lowest to the highest income groups. On the other hand, the shares of fruits and animal products increased with income.

Within the staple foods, rice remained the main staple at all income levels. Because the other staple foods (corn, cassava, and sweet potatoes) declined in importance as income increases, rice stood out as the staple main food in the upper income groups. That is, as income level rose, the average diet included more rice.

The decline in the budget shares of the staple foods was accompanied by an increase in shares for fruits and animal products. The budget shares of fruits and animal products were 2.9 and 4.7 percent, respectively, in the lowest income group. These shares increased to 6.7 and 19.3 percent, respectively, in the highest income group.

The income induced food allocations exhibited similar patterns across regions. The budget share of rice declines while the shares of fruits and animal products increased with income. The secondary staple foods, except potatoes, had relatively lower shares in the upper income groups.

**Levels of Food Consumption**

The levels of food consumption, shown in Tables A1.7 and A1.8, are computed on a per capita basis. No adjustments have been made for age or sex variations of household members. The results therefore, are conditional on the assumption that age and sex composition make little difference in average food consumption for the population groups.

The average diet per person per week contained 2.97 kgs of cereals (of which 2.2 kgs are rice) and 1.0 kg of root and tuber crops (Table A1.7). In addition, it included 0.38 kgs of beans, 1.23 kgs of fruits and vegetables, 0.34 kgs of fish, 0.13 kgs of meat, and 0.14 kgs of dairy products. Consumption levels did not vary much across regions (Table A1.7). The only noticeable variations were in the consumption of fish and soybeans. The consumption of fish varied from 0.17 kgs in Java to 0.47 kgs in off-Java. For soybeans, the variation was from 0.42 kgs in Java to 0.25 kgs off-Java.

The levels of consumption, however, did vary across income groups (Table A1.8). Average consumption of rice, fruits and vegetables, fish, and animal

products increased with household income. The income related consumption patterns for corn and cassava consumption, however, were inconclusive. The consumption levels dropped in the middle income groups and rose in the top income group. There are two possible explanations for this phenomenon. First, the data may not show shift in the quality characteristics of these foods. Second, the results may reflect the flaws associated with the nonadjustment of the data for age and sex differences.

Notwithstanding the potential limitations of the reported consumption data, three distinct results can be established: (1) average consumption was higher among households in off-Java than in Java; (2) the levels of consumption of most food groups increased with income; and (3) there was a shift from starchy foods to animal products with increasing income.

### A.2. Predicted Budget Shares, Income and Household Size Elasticities

Results based on a multinomial linear logit model are presented for urban households. Regional and income effects on food preferences, budget shares, income and household size elasticities, and scale economies are isolated and evaluated.

#### Food Preferences

The structural parameter estimates for twelve commodity groups are resented in table (A2.2). These estimates measure the effects of socioeconomic variables; namely income, family size and location of residence on expenditure share of $i^{th}$ commodity group relative to budget share of Rice--the reference base commodity group.

The income coefficients measure the relative share responses due to change in the level of income. The coefficients are all positive and statistically significant which suggest that increase in income induces urban

households to shift from rice to other commodity groups. Such behavior is evident in their ranking of the food groups.

In order to rank the food groups, let (P) denote that one food group is preferred to another and (PI) denote indifference between two food groups. Holding the influence of the other socioeconomic variables, the income effects imply that households order their food bundles as follows:

(13) FG6 (P) FG4 (P) FG9 (P) FG7 (P) FG11 (P) FG3 (P) FG5 (P) FG2 (P) FG1

This ordering implies that as total food expenditure rises, households allocate their total budget across food groups according the ranks shown in equation (13). That is, households allocate relatively more to animal products (FG6), fruits (FG4), prepared foods (FG9), and fish (FG7), and less to the staple crops (FG2 and FG1).

The coefficients associated with household size are all negative which suggest a decline in budget share of commodity group i relative to rice. The reverse of the pattern for income effects is observed when the food groups are ordered in accordance with the induced effects of household size (equation 14). As household size increases, the preference ordering is such that higher proportions of the total budgets are allocated to food crops, and less to animal products, fruits and fish; i.e.

(14) FG1 (P) FG11 (P) FG5 (P) FG3 (P) FG2 (P) FG9 (P) FG7 (P) FG4 (P) FG6

Household size thus induces urban households to shift away from food groups that are most preferred on the basis of income effect.

**Predicted Budget Shares**

Budget shares were predicted for all 13 commodity groups, 12 food groups and one nonfood group (Table A2.3). Nonfood group accounts for one-third of

the total weekly expenditure. Within the food groups, rice accounts for 17 percent of the total weekly budget with fruits and vegetables having a joint share of 9 percent, and fish and animal products accounting for 14 percent. Among the rest of the food groups, beverages and prepared food groups account for 5.1 and 5.0 percent, respectively. In terms of food budgets, the predicted shares of rice, fruits and vegetables, and fish and animal products are 26.6, 14.1 and 21.9 percent, respectively.

The regional (Java vs. outer-Java) variations of these predicted budget shares are limited (Table A2.3). The only noticeable variations are in the budget shares of fish which account for 3.7 percent in Java, and 8.7 percent in outer-Java.

The comparison of the budget shares between low and high income groups shows patterns of expenditure allocation corresponding to income. The budget shares of most food groups are higher for low income households than high income households. Exceptions are animal products, prepared foods, fruits and fish which are higher among high income households. As income rises, the households move from a concentration on cereal and starchy staple foods to animal products, fruits and processed foods. Such reallocation is accompanied by a declining share of food in the total budget.

**Expenditure Elasticities**

The expenditure elasticities corresponding with Table A2.3 are presented in Table A2.4. These elasticities represent a quantitative expression of the preference ordering implied in equation (12). The elasticities for animal products, and fruits all exceed unity and are thus "luxuries." The demand for fish and prepared foods is invariant with income. The elasticities of the other food groups are positive and less than unity, and hence constitute

"necessities." Rice, the reference food group, has the lowest expenditure elasticity among all the food groups.

If we hold income and household size variables at the means and allow regional variable to vary, the elasticities suggest little variation in budget allocation practices between Java and outer-Java. Households, regardless of their location of residence, show similar food ranking patterns. The levels of response vary, however, between the regions. Expenditure elasticities are larger among households in urban outer Java.

Food ranking patterns are also invariant across income groups. Both the low and high income prefer more consumption of animal products, fruits, fish and prepared foods, and less of the staple food groups as income rises. Expenditure elasticities are, however, larger among the low income groups. These households are strongly sensitive to expenditure on animal products, fruits, fish and prepared foods which all have elasticities greater than unity. Only animal products constitute a luxury food group among the high income households.

## Household Size Elasticities

The elasticities in Table A2.5 show that household size has negative effects on demand for luxury food groups, i.e., animal products, fruits, fish and prepared foods. The demand for the other food groups is positive with a change in household size. Conversely, the change in household size induces urban households to substitute the consumption of the basic food groups for the luxury food groups.

The response patterns are in general similar across regions and income groups. Food preferences rankings are invariant to these variables. The levels of the elasticities vary, however, across these groups. The size elasticities are larger among households in Java, and among the high income

households. Region and income variables hence influence the responses in budget shares due to a change in household size.

## Economies of Scale

The sum of expenditure and household size elasticities can be interpreted as indicating economies of scale in consumption (Tyrell and Mount 1982). When the sum is one, it indicates constant returns to scale. When the sum is greater than one, it indicates diseconomies of scale. If less than one, it indicates economies of scale. For all the food groups, except animal products, the elasticities are less than unity. This suggests that the urban households enjoy economies of scale in food consumption.

Households in both Java and outer-Java enjoy economies of scale in all food groups except animal products. The scale elasticities are lower in general in urban Java than outer Java. Similarly, both the low and high income groups enjoy economies of scale, with higher income households getting the most.

Table A1.1. Food Expenditure Participation by Region--All Urban Households (%)

| Food Groups | Java | off-Java | Indonesia |
|---|---|---|---|
| Cereals | 97.4 | 99.0 | 98.2 |
| Rice | 97.3 | 99.0 | 98.1 |
| Corn | 9.4 | 6.9 | 8.1 |
| Wheat | 14.3 | 16.0 | 15.2 |
| Root and Tubers | 56.5 | 55.4 | 55.9 |
| Cassava | 31.4 | 27.3 | 29.2 |
| Sweet potatoes | 21.1 | 11.7 | 16.1 |
| Potatoes | 25.3 | 30.8 | 28.2 |
| Beans | 92.5 | 72.9 | 82.2 |
| Soybeans | 90.0 | 61.6 | 75.1 |
| Fruits | 73.7 | 76.7 | 75.3 |
| Vegetables | 95.8 | 98.4 | 97.1 |
| Fish | 83.2 | 96.5 | 90.2 |
| Meat and Poultry | 41.2 | 36.2 | 38.5 |
| Eggs | 62.8 | 60.9 | 61.8 |
| Dairy products | 34.5 | 45.0 | 40.0 |
| Fats and Oils | 94.3 | 96.4 | 95.4 |
| Beverages and tobacco | 96.8 | 96.2 | 96.5 |
| Prepared foods | 84.4 | 71.3 | 77.5 |
| Sugar | 94.8 | 96.1 | 95.5 |
| Other foods | 96.5 | 98.6 | 97.6 |

Table A1.2. Food Expenditure Participation by Income Group--Urban Households

| Food Groups | under 7,200 | 7,200-11,400 | 11,401-19,000 | above 19,000 |
|---|---|---|---|---|
| | | (Rp/person/month) | | |
| Cereals | 98.9 | 99.6 | 98.9 | 93.6 |
| Rice | 98.6 | 99.6 | 98.9 | 93.6 |
| Corn | 10.9 | 7.2 | 6.3 | 8.2 |
| Wheat | 5.1 | 14.0 | 20.7 | 24.1 |
| Root and Tubers | 54.7 | 54.7 | 55.6 | 60.4 |
| Cassava | 36.5 | 31.5 | 25.7 | 19.5 |
| Sweet potatoes | 19.2 | 17.4 | 13.0 | 14.1 |
| Potatoes | 11.0 | 26.4 | 34.5 | 47.3 |
| Beans | 78.1 | 84.9 | 83.6 | 80.6 |
| Soybeans | 72.5 | 77.9 | 76.1 | 71.8 |
| Fruits | 58.8 | 74.0 | 83.4 | 89.9 |
| Vegetables | 98.1 | 98.6 | 97.6 | 92.3 |
| Fish | 84.0 | 92.8 | 93.5 | 89.4 |
| Meat and Poultry | 15.7 | 31.6 | 50.2 | 67.4 |
| Eggs | 38.5 | 62.1 | 73.1 | 78.6 |
| Dairy products | 14.6 | 35.5 | 53.0 | 66.3 |
| Fats and oils | 95.7 | 96.4 | 96.3 | 91.5 |
| Beverages and tobacco | 96.4 | 96.6 | 97.0 | 95.7 |
| Prepared foods | 66.4 | 75.0 | 83.1 | 58.3 |
| Sugar | 94.5 | 96.2 | 97.1 | 93.1 |
| Other foods | 98.5 | 98.5 | 98.4 | 93.3 |

Table A1.3. Family Size, Weekly Food Expenditure and Food Budget Shares

| | Sample Households | Family Size | Food Expenditure (Rp/week) | Food Share (%) |
|---|---|---|---|---|
| Indonesia--Urban | 3,608 | 5.4 | 9,366 | 63.7 |
| Java | 1,711 | 5.2 | 8,276 | 60.5 |
| off-Java | 1,897 | 5.5 | 10,348 | 66.1 |
| Expenditure Group: (Rp/month/person) | | | | |
| under 7,200 | 908 | 6.0 | 5,558 | 74.0 |
| 7,200-11,400 | 1,145 | 5.6 | 8,453 | 70.2 |
| 11,401-19,000 | 944 | 5.1 | 11,005 | 63.8 |
| above 19,000 | 611 | 4.3 | 14,196 | 53.6 |

Table A1.4. Average Food Budget Shares by Region--All Urban Households

| Food Groups | Java | off-Java | Indonesia |
|---|---|---|---|
| | Share (%) | Share (%) | Share (%) |
| Cereals | 27.2 | 27.4 | 27.3 |
| Rice | 26.6 | 26.7 | 26.7 |
| Corn | 0.3 | 0.3 | 0.3 |
| Wheat | 0.3 | 0.4 | 0.4 |
| Root and Tubers | 1.4 | 1.5 | 1.4 |
| Cassava | 0.4 | 0.5 | 0.5 |
| Sweet potatoes | 0.3 | 0.2 | 0.2 |
| Potatoes | 0.6 | 0.7 | 0.6 |
| Beans | 6.2 | 3.2 | 4.5 |
| Soybeans | 4.8 | 1.8 | 3.1 |
| Fruits | 5.1 | 4.5 | 4.7 |
| Vegetables | 6.9 | 9.8 | 8.6 |
| Fish | 6.2 | 14.0 | 10.8 |
| Meat and Poultry | 7.1 | 5.9 | 6.4 |
| Eggs | 3.5 | 2.8 | 3.1 |
| Dairy products | 3.1 | 2.8 | 2.9 |
| Fats and Oils | 4.1 | 4.3 | 4.2 |
| Beverages and tobacco | 10.6 | 10.9 | 10.8 |
| Prepared foods | 12.7 | 6.6 | 9.2 |
| Sugar | 3.1 | 3.6 | 3.4 |
| Other foods | 2.8 | 2.7 | 2.7 |
| Food Expenditure | 60.5 | 66.1 | 63.7 |

Table A1.5. Food Expenditure Shares by Province--Urban Indonesia

| Food Group | Jakarta | West Java | Central Java | DI Yogyakarta | East Java | Bali | Sumatera | Kalimantan | Sulawesi | Others* |
|---|---|---|---|---|---|---|---|---|---|---|
| Cereals | | | | | | | | | | |
| Rice | 20.74 | 30.23 | 30.0 | 20.28 | 25.01 | 30.93 | 26.71 | 21.40 | 28.40 | 26.91 |
| Corn | 0.08 | 0.13 | 0.24 | 0.22 | 1.04 | 0.25 | 0.12 | 0.13 | 0.45 | 1.45 |
| Wheat | 0.21 | 0.34 | 0.20 | 0.17 | 0.29 | 0.17 | 0.33 | 0.51 | 0.68 | 0.72 |
| Root and Tubers | | | | | | | | | | |
| Cassava | 0.19 | 0.44 | 0.76 | 0.45 | 0.60 | 0.11 | 10.39 | 0.39 | 0.55 | 1.06 |
| Sweet potatoes | 0.16 | 0.27 | 0.37 | 0.22 | 0.39 | 0.59 | 0.22 | 0.14 | 0.12 | 0.13 |
| Potatoes | 0.54 | 0.84 | 0.43 | 0.42 | 0.53 | 0.61 | 0.83 | 0.62 | 0.30 | 0.29 |
| Beans | | | | | | | | | | |
| Soybeans | 4.20 | 4.08 | 6.00 | 5.37 | 5.60 | 2.99 | 1.97 | 1.73 | 0.87 | 1.85 |
| Fruits | 5.25 | 5.01 | 6.44 | 5.52 | 5.16 | 4.90 | 3.96 | 7.11 | 5.27 | 4.05 |
| Vegetables | 6.98 | 6.17 | 7.84 | 6.41 | 7.31 | 6.53 | 10.61 | 8.10 | 7.09 | 8.43 |
| Fish | 6.14 | 8.80 | 3.06 | 1.71 | 5.48 | 5.47 | 12.77 | 17.25 | 16.66 | 9.93 |
| Meat and poultry | 7.48 | 6.75 | 6.45 | 5.52 | 9.08 | 11.33 | 5.99 | 6.20 | 4.61 | 8.50 |
| Eggs | 3.92 | 3.18 | 3.35 | 3.83 | 3.42 | 3.56 | 2.82 | 3.55 | 2.30 | 2.05 |
| Dairy products | 3.76 | 2.06 | 2.50 | 2.66 | 3.30 | 2.23 | 2.72 | 2.83 | 3.41 | 3.26 |
| Fats and oils | 4.19 | 3.55 | 4.15 | 4.70 | 4.40 | 4.15 | 4.54 | 3.46 | 3.61 | 4.70 |
| Beverages and tobacco | 11.37 | 10.39 | 9.38 | 8.59 | 10.67 | 8.18 | 10.84 | 11.31 | 10.69 | 10.35 |
| Prepared foods | 18.37 | 10.82 | 9.99 | 24.85 | 8.29 | 11.35 | 8.05 | 6.34 | 6.00 | 7.04 |
| Sugar | 2.64 | 2.15 | 4.57 | 5.03 | 4.11 | 2.27 | 3.35 | 4.05 | 4.32 | 3.49 |
| Other foods | 2.45 | 2.76 | 2.94 | 2.77 | 3.40 | 2.10 | 2.30 | 3.04 | 2.28 | 3.28 |
| Food Expenditures | 54.31 | 62.99 | 63.46 | 52.79 | 60.82 | 51.07 | 64.73 | 62.81 | 65.32 | 63.70 |

Others: Nusa Tenggara, Maluku, and Irian Jaya

Table A1.6. Food Expenditure Shares by Income Group--Urban Indonesia (Rp/person/month)

| Food Groups | under 7,200 | 7,200-11,400 | 11,401-19,000 | above 19,000 |
|---|---|---|---|---|
| | Share (%) | Share (%) | Share (%) | Share (%) |
| Cereals | 42.2 | 32.2 | 24.3 | 16.8 |
| Rice | 41.2 | 31.7 | 23.7 | 16.2 |
| Corn | 0.8 | 0.2 | 0.2 | 0.2 |
| Wheat | 0.2 | 0.3 | 0.4 | 0.4 |
| Root and Tubers | 1.8 | 1.4 | 1.3 | 1.3 |
| Cassava | 1.1 | 0.5 | 0.3 | 0.2 |
| Sweet potatoes | 0.4 | 0.3 | 0.2 | 0.1 |
| Potatoes | 0.3 | 0.6 | 0.7 | 0.9 |
| Beans | 4.9 | 4.4 | 4.4 | 4.3 |
| Soybeans | 3.9 | 3.2 | 2.9 | 2.5 |
| Fruits | 2.9 | 3.8 | 4.8 | 6.7 |
| Vegetables | 8.8 | 9.2 | 8.9 | 7.5 |
| Fish | 7.8 | 11.3 | 11.6 | 10.8 |
| Meat and Poultry | 1.8 | 3.8 | 7.2 | 11.0 |
| Eggs | 1.7 | 2.6 | 3.5 | 3.9 |
| Dairy products | 1.2 | 2.1 | 3.3 | 4.4 |
| Fats and oils | 4.7 | 4.5 | 4.2 | 3.8 |
| Beverages and tobacco | 9.5 | 11.1 | 11.4 | 10.3 |
| Prepared and partically prepared foods | 6.1 | 7.2 | 8.9 | 13.4 |
| Sugar | 4.0 | 3.7 | 3.3 | 2.0 |
| Other foods | 2.6 | 2.6 | 2.6 | 2.6 |
| Food Expenditure | 74.0 | 70.2 | 63.8 | 53.6 |

Table A1.7. Weekly per Capita Food Consumption by Region--Urban Households (Kilograms/person/week except for eggs which are numbers)

| Food Groups | Java | outer-Java | Indonesia |
|---|---|---|---|
| Cereals | | | |
| Rice | 2.08 | 2.29 | 2.18 |
| Corn | 0.52 | 0.69 | 0.59 |
| Wheat | 0.14 | 0.24 | 0.20 |
| Root and Tubers | | | |
| Cassava | 0.43 | 0.55 | 0.48 |
| Sweet potatoes | 0.36 | 0.37 | 0.36 |
| Potatoes | 0.17 | 0.16 | 0.16 |
| Beans | 0.47 | 0.29 | 0.38 |
| Soybeans | 0.42 | 0.25 | 0.34 |
| Fruits | 0.57 | 0.59 | 0.58 |
| Vegetables | 0.63 | 0.68 | 0.65 |
| Fish | 0.17 | 0.47 | 0.34 |
| Meat | 0.10 | 0.15 | 0.13 |
| Eggs | 1.52 | 1.32 | 1.40 |
| Dairy products | 0.16 | 0.13 | 0.14 |
| Sugar | 0.19 | 0.23 | 0.21 |

Table A1.8. Weekly per Capita Food Consumption by Income Group--Urban Households (Kilograms/person/week except for eggs which are numbers)

| Food Groups | under 7,200 | 7,200-11,400 | 11,401-19,000 | above 19,000 |
|---|---|---|---|---|
| Cereals | | | | |
| Rice | 1.90 | 2.23 | 2.34 | 2.47 |
| Corn | 0.73 | 0.43 | 0.44 | 0.73 |
| Wheat | 0.19 | 0.18 | 0.22 | 0.24 |
| Root and Tubers | | | | |
| Cassava | 0.50 | 0.45 | 0.45 | 0.60 |
| Sweet potatoes | 0.33 | 0.34 | 0.39 | 0.42 |
| Potatoes | 0.11 | 0.15 | 0.18 | 0.24 |
| Beans | 0.27 | 0.34 | 0.44 | 0.63 |
| Soybeans | 0.26 | 0.31 | 0.38 | 0.55 |
| Fruits | 0.33 | 0.48 | 0.65 | 1.06 |
| Vegetables | 0.47 | 0.60 | 0.76 | 1.00 |
| Fish | 0.18 | 0.34 | 0.43 | 0.55 |
| Meat | 0.07 | 0.10 | 0.14 | 0.20 |
| Eggs | 0.70 | 1.03 | 1.68 | 2.62 |
| Dairy products | 0.10 | 0.11 | 0.15 | 0.24 |
| Sugar | 0.13 | 0.20 | 0.24 | 0.33 |

Table A2.1. Variables, Mean Budget Shares and Definitions

| Variables | Group Code | Definition | Mean Budget Share |
|---|---|---|---|
| $w_1$ | FG1 | Budget share of rice | 0.17 |
| $w_2$ | FG2 | Budget share of non-rice cereals, roots and tubers | 0.02 |
| $w_3$ | FG3 | Budget share of beans | 0.04 |
| $w_4$ | FG4 | Budget share of fruits | 0.04 |
| $w_5$ | FG5 | Budget share of vegetables | 0.06 |
| $w_6$ | FG6 | Budget share of meat and poultry and dairy products | 0.09 |
| $w_7$ | FG7 | Budget share of fish | 0.06 |
| $w_8$ | FG8 | Budget share of fats and oils | 0.03 |
| $w_9$ | FG9 | Budget share of prepared foods | 0.06 |
| $w_{10}$ | FG10 | Budget share of sugar | 0.02 |
| $w_{11}$ | FG11 | Budget share of beverages and stimulants | 0.07 |
| $w_{12}$ | FG12 | Budget share of other foods | 0.02 |
| $w_{13}$ | FG13 | Budget share of non-food | 0.33 |
| Y | | Weekly total family expenditure | 19,432 |
| HHS | | Household size | 5.82 |
| DRG | | Dummy variable for region; 1 for Java, 0 otherwise | 0.52 |

Table A2.2. Parameter Estimates for 13 Commodity Groups Based on Multinomial Logit Model by Region

| | N | Intercept | ln INC | ln HHS | ln DRE |
|---|---|---|---|---|---|
| $\ln(w_2/w_1)$ | 1181 | -5.172<br>(-12.220) | .409<br>(8.463) | -.632<br>(-9.947) | -.181<br>(-3.755) |
| $\ln(w_3/w_1)$ | 1181 | -6.046<br>(-15.478) | .525<br>(11.779) | -.592<br>(-10.240) | .505<br>(11.378) |
| $\ln(w_4/w_1)$ | 1181 | -8.493<br>(-21.148) | 0.881<br>(19.223) | -1.034<br>(-17.401) | .156<br>(3.42) |
| $\ln(w_5/w_1)$ | 1181 | -4.641<br>(16.346) | 0.481<br>(14.848) | -.590<br>(-14.058) | -.297<br>(-9.203) |
| $\ln(w_6/w_1)$ | 1181 | -12.412<br>(-27.445) | 1.39<br>(27.014) | -1.173<br>(-17.545) | 0.135<br>(2.618) |
| $\ln(w_7/w_1)$ | 1181 | -7.539<br>(-18.125) | 0.846<br>(17.826) | -.839<br>(-13.629) | -.793<br>(-16.764) |
| $\ln(w_8/w_1)$ | 1181 | -5.159<br>(-17.501) | 0.454<br>(13.480) | -.595<br>(-13.632) | -.055<br>(-1.643) |
| $\ln(w_9/w_1)$ | 1181 | -8.394<br>(-17.878) | 0.851<br>(15.874) | -.806<br>(-11.608) | .396<br>(7.409) |
| $\ln(w_{10}/w_1)$ | 1181 | -4.682<br>(-13.145) | .361<br>(8.867) | -.460<br>(-8.734) | -.186<br>(-4.592) |
| $\ln(w_{11}/w_1)$ | 1181 | -5.386<br>(-9.401) | .532<br>(8.128) | -.574<br>(-6.771) | -.067<br>(-1.034) |
| $\ln(w_{12}/w_1)$ | 1181 | -6.332<br>(-15.535) | .509<br>(10.937) | -.629<br>(-10.440) | .224<br>(4.839) |
| $\ln(w_{13}/w_1)$ | 1181 | -10.002<br>(-36.639) | 1.268<br>(40.694) | -1.013<br>(-25.080) | .254<br>(8.183) |

Table A2.3. Predicted Budget Shares by Region and Income Group--Urban Households

| Region/ Expenditure Group | Commodity Group | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FG1 | FG2 | FG3 | FG4 | FG5 | FG6 | FG7 | FG8 | FG9 | FG10 | FG11 | FG12 | FG13 | INC | HHS |
| Urban | .1659 | .0070 | .0321 | .0358 | .0560 | .0839 | .0566 | .0287 | .0497 | .0219 | .0510 | .0167 | .3947 | 19,432 | 5.82 |
| Region | | | | | | | | | | | | | | | |
| Java | .1567 | .0140 | .0386 | .0364 | .0459 | .0845 | .0365 | .0264 | .0568 | .0189 | .0467 | .0175 | .4211 | 18,896 | 5.80 |
| Outer-Java | .1696 | .0182 | .0252 | .0337 | .0669 | .0799 | .0874 | .0302 | .0414 | .0247 | .0540 | .0152 | .3536 | 20,283 | 6.0 |
| Exenditure Group | | | | | | | | | | | | | | | |
| Low | .2368 | .0082 | .0361 | .0343 | .0643 | .0637 | .0551 | .0334 | .0483 | .0265 | .0573 | .0189 | .3170 | 12,344 | 6.29 |
| High | .1332 | .0062 | .0293 | .0355 | .0505 | .0941 | .0557 | .0258 | .0593 | .0192 | .0466 | .0151 | .4296 | 24,727 | 5.47 |

Table A2.4. Predicted Expenditure Elasticities by Region and Income Group--Urban Households

| Region/ Expenditure Group | Commodity Group | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FG1 | FG2 | FG3 | FG4 | FG5 | FG6 | FG7 | FG8 | FG9 | FG10 | FG11 | FG12 | FG13 | INC | HHS |
| Urban | .1580 | .5670 | .6830 | 1.0390 | .6390 | 1.5480 | 1.0040 | .6120 | 1.0090 | .5190 | .6900 | .6670 | 1.4260 | 19,432 | 5.82 |
| Region | | | | | | | | | | | | | | | |
| Java | .1053 | .5143 | .6303 | .9863 | .5863 | 1.4953 | .9513 | .5593 | .9563 | .4663 | .6373 | .6143 | 1.3733 | 18,596 | 5.80 |
| Outer-Java | .1898 | .5988 | .7148 | 1.0708 | .6708 | 1.5798 | 1.0358 | .6438 | 1.0408 | .5508 | .7218 | .6988 | 1.4578 | 20,283 | 6.00 |
| Exenditure Group | | | | | | | | | | | | | | | |
| Low | .2735 | .6825 | .7985 | 1.1545 | .7545 | 1.6635 | 1.1195 | .7275 | 1.1245 | .6345 | .8055 | .7625 | 1.5415 | 12,344 | 6.29 |
| High | .1023 | .5113 | .6273 | .9833 | .5833 | 1.4923 | .9483 | .5563 | .9533 | .4633 | .6343 | .6113 | 1.3703 | 24,727 | 5.47 |

Table A2.5. Predicted Household Size Elasticities by Region and Income Group--Urban Households

| Region/ Expenditure Group | Commodity Group | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FG1 | FG2 | FG3 | FG4 | FG5 | FG6 | FG7 | FG8 | FG9 | FG10 | FG11 | FG12 | FG13 | INC | HHS |
| Urban | .7461 | .1231 | .1541 | -.2879 | .1561 | -.4269 | -.0929 | .1511 | -.0599 | .2861 | .1721 | .1171 | -.2669 | 19,432 | 5.82 |
| Region | | | | | | | | | | | | | | | |
| Java | .7606 | .1376 | .1686 | -.2734 | .1706 | -.4124 | -.0784 | .1656 | -.0454 | .3006 | .1866 | .1316 | -.2524 | 18,896 | 5.80 |
| Outer-Java | .7291 | .1061 | .1371 | -.3049 | .1391 | -.4439 | -.1099 | .1341 | -.0769 | .2691 | .1551 | .1001 | -.2839 | 20,283 | 6.00 |
| Exenditure Group | | | | | | | | | | | | | | | |
| Low | .6577 | .0347 | .0657 | -.3763 | .0677 | -.5153 | -.1813 | .0627 | -.1483 | .1977 | .0837 | .0287 | -.3553 | 12,344 | 6.29 |
| High | .7882 | .1652 | .1962 | -.2458 | .1982 | -.3848 | -.0508 | .1932 | -.0177 | .3282 | .2142 | .1592 | -.2248 | 24,727 | 5.47 |

Table A2.6. Estimates of Economies of Scale by Region and Income Group--Urban Households

| Region/ Expenditure Group | Commodity Group | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FG1 | FG2 | FG3 | FG4 | FG5 | FG6 | FG7 | FG8 | FG9 | FG10 | FG11 | FG12 | FG13 | INC | HHS |
| Urban | .9041 | .6901 | .8371 | .7511 | .7951 | 1.1211 | .9110 | .7631 | .9491 | .8051 | .8621 | .7841 | 1.1591 | 19,432 | 5.82 |
| Region | | | | | | | | | | | | | | | |
| Java | .8659 | .6519 | .7989 | .7129 | .7569 | 1.0829 | .8729 | .7249 | .9109 | .7669 | .8239 | .7459 | 1.1209 | 18,896 | 5.80 |
| Outer-Java | .9189 | .7049 | .8519 | .7659 | .8099 | 1.1359 | .9259 | .7779 | .9639 | .8199 | .8769 | .7989 | 1.1739 | 20,283 | 6.00 |
| Exenditure Group | | | | | | | | | | | | | | | |
| Low | .9312 | .7172 | .8635 | .7782 | .8222 | 1.1482 | .9382 | .7902 | .9762 | .8322 | .8892 | .8112 | 1.1862 | 12,344 | 6.29 |
| High | .8905 | .6765 | .8235 | .7375 | .7815 | 1.1075 | .8975 | .7495 | .9356 | .7915 | .8485 | .7705 | 1.1455 | 24,727 | 5.47 |

# APPENDIX B

## Food Consumption and Expenditure Patterns in Rural Indonesia

## B.1. Food Expenditure Participation Rates, Average Food Budget Shares, and Food Intake Levels.

Descriptive results on participation rates, food budget shares, and food consumption levels are provided for rural households in this appendix. The participation rates measure the proportions of consuming households. Food budget shares are computed primarily to examine their relationships to changes in socioeconomic variables. Finally, per capital consumption levels are estimated for selected food commodities.

### Participation Rates

Seventy-five percent of the rural households reported consumption of rice, vegetables, fish, and processed foods and beverages (Table B1.1) during the week of the survey. About 60 percent consumed beans (legumes) and fruits, and only about 33 percent reported consumption of animal products (meats, eggs,and dairy products). Within the staple foods, rice was preferred, followed by cassava. Less than 25 percent of the households reported consuming the secondary foods (corn, wheat, and potatoes). Regional variations were more marked in consumption of soybeans, processed (prepared) foods, fruits, and animal products (Table B1.1). Soybeans and processed foods had high consumption participation rates among rural households in Java. The proportions of households consuming fruits and animal products however were higher in outer Java.

The most notable variations across provinces were in consumption of corn, potatoes, soybeans, and dairy products (Table B1.2). Higher proportions of households reported consuming corn in East Java, Sulawesi, and the other provinces (Nusa Tenggara, Maluku, and Irian Jaya). Most of the households in Java reported consumption soybeans. Relatively larger proportions of

households in Sumatera reported consumption of potatoes. The proportions of dairy products consumed were higher in Sumatera and Kalimantan than in other provinces.

The participation rates for rice, vegetables, fish, and beverages vary little by income level (Table B1.3). In the case of wheat, potatoes, fruits, animal products, and processed foods, however, the participation rates increased with income. This pattern was consistently reversed for corn.

**Food Budget Shares**

Regional effects

The rural Indonesian households spent an average of Rp 1,375 (U.S. $2.20) per week for food (Table B1.4). This constituted 75 percent of average total weekly expenditure. Within the total food budget, 35 percent was allocated to rice--the main cereal food. The secondary foods (corn, wheat, cassava, and potatoes) jointly accounted for 5.3 percent of the food budget (Table B1.5). Fruits and vegetables, fish, and animal products accounted for 12.3, 10.6, and 7.3 percent, respectively.

In Java, the mean per capita food expenditure (Rp 1,047) and the budget share allotted to food (72.0 percent) were lower than the national averages. Food allocation patterns were, by and large, similar between Java and the outer Java islands, although food expenditures and budget shares for food are higher in outer Java. The most notable variations were in the budget shares for fish and beans. Fish had a higher share of the budget in outer Java (Table B1.5), while the reverse was observed for beans and soybeans.

Table B1.6 gives a more detailed view of food budget allocations by province, and some regional patterns are evident. Rice was more prominent in West Java, while the mean budget share of corn was greater in East Java, Sulawesi, and the "other" provinces. The cassava share was highest in Central

and East Java and fish was more dominant in the food budget in Kalimantan, Sulawesi, and Sumatera.

Income effects

Table B1.7 shows that mean food budget shares decline with income. As the rural households moved into higher income levels, noticeable changes occurred in their food allocation patterns. First, the budget shares for for most of the staple crops--rice, corn, cassava, and sweet potatoes--declined with income. The budget shares for wheat and potatoes increased with income. Secondly, for the nonstaples only the budget shares for fruits and animal products increased with income. Finally, the shares for most industrial food products (processed foods, beverages, and tobacco) rose with income.

These results suggest that households in higher income groups, who tended to allocate a smaller proportion of their total budgets on food, concentrated on a few foods--like rice, and shift to greater consumption of fruits, animal products, and processed foods. The reverse occurred in the shift from higher to lower income households.

**Levels of Food Consumption**

The food consumption levels (Tables B1.8 and B1.9) are computed on a per capita basis. Variations in household composition are assumed to have no effect on actual food consumption in making these calculations. The average diet per person per week consisted of 2.39 kgs. of rice, 1.45 kgs. of corn, 0.26 kgs. of wheat, 1.99 kgs. of starchy root crops, and 1.21 kgs. of fruits and vegetables. In addition, it included 0.32 kgs. of fish and 1.32 kgs. of animal products (meat, eggs, and dairy products).

Noticeable variations existed in food consumption across regions, i.e., from Java to outer Java. Except for potatoes and corn, the average

consumption of the staple foods (cereal and starchy crops) was higher in outer Java. In addition, consumption of fish, meat, and dairy products was also higher among the rural households in outer Java. Overall, average food consumption was lower in Java than in the outer Java islands. Generally, food consumption rose with income. The only exception was corn, for which the pattern was inconclusive.

## B.2. Predicted Budget Shares, Expenditure and Household Size Elasticities

### Food Preferences

The parameter estimates for income in Table B2.2 are positive and statistically significant as indicated by their t-values. The households respond to change in income by reallocating their food budget away from the base group (rice) to the other food groups. The proportions of the budget allocation follows a preference ranking procedure as described in equation (15).

(15) FG6 Ⓟ FG7 Ⓟ FG9 Ⓟ FG4 Ⓟ FG11 Ⓟ FG3 Ⓟ FG5 Ⓟ FG2 Ⓟ FG1

where relatively higher proportions are allocated to animal products (FG6), fish (FG7), prepared foods (FG9) and fruits (FG4). Lower in the preference rankings were the staple foods (FG1 and FG2) and vegetables (FG5).

The parameter estimates for household size, on the contrary, are negative which imply a reallocation of food budgets towards the staple crops. As it is shown in equation (16), the rural households give staple crops the highest priorities. The lowest priorities are for animal products (FG6), fish (FG7), prepared foods (FG9), and fruits (FG4),

(16) FG1 Ⓟ FG2 Ⓟ FG5 Ⓟ FG3 Ⓟ FG11 Ⓟ FG4 Ⓟ FG9 Ⓟ FG7 Ⓟ FG6.

**Predicted Budget Shares**

The predictions of the multinomial logit model of the mean budget shares of thirteen commodity groups are given in Table B2.3. Of total weekly expenditure, an average rural family allocates 72 percent to food and the rest to nonfood items. Within the staple foods, 23 percent of the total budget spent on rice and 3 percent on secondary food staples. Fruits and vegetables (FG4 and FG5), animal products (FG6), and fish (FG7) accounted for 10.1, 6.7, and 6.2 percent of the total budget, respectively.

Within food budget, the shares of rice and the secondary staple food are 32.0 and 4.0 percent, respectively. Fruits and vegetables take 14 percent of the food budget. Animal products and fish account for 9.3 and 8.6 percent of the food budget, respectively. Note that these predictions are close to the sample mean budget shares in Table B2.1.

Variations in budget shares due to regional effects are limited. A notable exception is the budget share of fish which is higher in outer-Java than Java.

The low income households have higher budget shares in most of the food groups. The exceptions are fruits, animal products, fish, and processed foods which are higher among the high income households. Consistent with Engel law of demand for food, the budget shares of the staple foods decline with income.

**Expenditure Elasticities**

The predicted expenditure elasticities for the food groups (Table B2.4) show that the top four commodity groups in equation (14) have elasticities more than unity. These represent commodities which are luxuries in the rural households food consumption basket. Preferences for beverages are invariant to income changes. The remaining food groups, most of which are the staple foods,

have elasticities less than one. Rice, the basic essential staple food, has the lowest elasticity (0.47).

The expenditure elasticities are in general higher in outer-Java than in Java. Animal products, fish, fruits and prepared foods have elasticities that exceed unity in both regions. The rest of the food groups are in the categories of necessities in all the regions.

The expenditure elasticities due to income effect alone show variations across income groups. The low income households are more responsive to a change in income level, i.e., the expenditure elasticities of these households are higher than the high income households. Regardless of income levels, animal products, fish, and processed foods remain, however, luxury food groups.

## Household Size Elasticities

The household size elasticities for the food commodity groups (Table B2.5) are all negative except for rice (FG1), secondary crops (FG2), and vegetables (FG5). Among the food groups that respond negatively to household size, the demand falls rapidly for animal products (FG6) and fish (FG7). An increase in household size thus induces rural families to more basic foods.

The response patterns are unchanged but the levels vary across regions and income levels. The size elasticities are higher in Java than in outer-Java. Similarly, the high income households are more responsive to a change in family size than the low income households.

## Economics of Scale

The sum of the expenditure and household size elasticities reported in table (B2.6) varies between 0.85 and 1.20. Diseconomies of scale are evidenced

in the consumption of animal products. Consumption of fruits and secondary crops is scale neutral. The rest of the food groups have aggregated elasticities that are less than unity which indicate the existence of economies of scale in consumption.

Households in Java enjoy relatively higher economies of scale in most of the food groups. Similarly, high income households are more efficient in consumption compared with low income households. Diseconomies of scale in animal products remain, however, invariant to region and income groups.

Table B1.1. Food Expenditure Participation by Region--All Rural Households

| | Java | off-Java | Indonesia |
|---|---|---|---|
| Cereals | 99.4 | 99.6 | 99.5 |
| Rice | 94.8 | 98.8 | 96.9 |
| Corn | 27.6 | 19.7 | 23.2 |
| Wheat | 5.0 | 11.7 | 8.7 |
| Root and Tubers | 62.4 | 61.7 | 62.0 |
| Cassava | 49.9 | 42.8 | 46.0 |
| Sweet potatoes | 19.3 | 16.5 | 17.7 |
| Potatoes | 7.5 | 15.9 | 12.1 |
| Beans | 80.6 | 42.9 | 59.8 |
| Soybeans | 72.7 | 25.5 | 46.7 |
| Fruits | 61.4 | 97.9 | 66.2 |
| Vegetables | 97.9 | 97.9 | 97.9 |
| Fish | 81.9 | 94.3 | 88.8 |
| Meat and poultry | 16.2 | 24.7 | 20.8 |
| Eggs | 35.4 | 40.1 | 38.0 |
| Dairy products | 7.6 | 18.2 | 13.4 |
| Fats and oils | 91.9 | 92.8 | 92.4 |
| Beverages and tobacco | 97.2 | 96.3 | 96.7 |
| Prepared foods | 69.8 | 55.6 | 62.0 |
| Sugar | 92.0 | 90.6 | 91.2 |
| Other foods | 99.2 | 99.4 | 99.3 |

Table B1.2. Food Expenditure Participation by Province--Rural Households

| | Java-Bali | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | West Java | Central Java | DI Yogyakarta | East Java | Bali | Sumatera | Kalimantan | Sulawesi | Others |
| Cereals | 99.7 | 98.9 | 98.2 | 99.5 | 98.4 | 99.6 | 99.7 | 99.5 | 99.7 |
| Rice | 99.7 | 90.4 | 98.2 | 91.7 | 96.8 | 99.6 | 99.7 | 95.3 | 98.6 |
| Corn | 11.0 | 26.5 | 25.0 | 51.3 | 11.1 | 7.6 | 7.1 | 50.5 | 51.7 |
| Wheat | 7.1 | 3.9 | 5.4 | 3.6 | 0.0 | 9.2 | 16.8 | 16.7 | 11.1 |
| Root and Tubers | 63.4 | 68.3 | 67.9 | 55.2 | 66.7 | 68.4 | 54.3 | 53.2 | 49.7 |
| Cassava | 51.0 | 55.2 | 57.1 | 45.3 | 31.8 | 44.2 | 45.7 | 36.5 | 41.3 |
| Sweet potatoes | 19.2 | 22.7 | 17.9 | 14.1 | 42.9 | 19.9 | 13.1 | 13.7 | 7.6 |
| Potatoes | 11.0 | 4.6 | 8.9 | 5.9 | 1.6 | 24.6 | 4.6 | 4.9 | 2.4 |
| Beans | 76.0 | 87.7 | 94.6 | 81.1 | 61.9 | 49.3 | 33.5 | 32.6 | 36.8 |
| Soybeans | 59.0 | 86.9 | 94.6 | 79.6 | 38.1 | 35.2 | 18.8 | 3.9 | 16.3 |
| Fruits | 69.5 | 62.1 | 51.8 | 51.1 | 63.5 | 67.4 | 77.6 | 76.2 | 67.0 |
| Vegetables | 96.2 | 98.7 | 98.2 | 99.2 | 98.4 | 99.6 | 98.3 | 94.4 | 94.4 |
| Fish | 91.6 | 76.0 | 33.9 | 78.4 | 90.5 | 96.0 | 97.4 | 98.3 | 76.7 |
| Meat and poultry | 17.7 | 13.7 | 16.1 | 15.0 | 30.2 | 23.6 | 27.8 | 20.1 | 32.3 |
| Eggs | 31.0 | 33.9 | 42.9 | 40.2 | 49.2 | 43.5 | 43.5 | 35.3 | 25.7 |
| Dairy products | 9.5 | 6.4 | 14.3 | 5.7 | 6.4 | 20.6 | 22.7 | 9.8 | 12.3 |
| Fats and oils | 87.9 | 94.4 | 98.2 | 93.8 | 96.8 | 96.0 | 92.6 | 87.3 | 85.4 |
| Beverages and tobacco | 97.0 | 97.9 | 98.2 | 97.6 | 90.5 | 97.4 | 98.9 | 91.4 | 94.8 |
| Prepared foods | 72.3 | 78.5 | 92.9 | 57.0 | 71.4 | 56.9 | 62.2 | 48.8 | 50.7 |
| Sugar | 90.9 | 91.2 | 98.2 | 95.4 | 73.0 | 92.4 | 98.9 | 87.3 | 76.0 |
| Other foods | 99.2 | 99.0 | 98.2 | 99.4 | 98.4 | 99.5 | 99.7 | | 99.0 |

Table B1.3. Food Expenditure Participation by Income Group--Rural Households

| Food Group | under 7,200 | 7,200-11,400 | 11,401-19,000 | above 19,000 |
|---|---|---|---|---|
| Cereals | 99.5 | 99.3 | 99.9 | 99.6 |
| Rice | 95.0 | 98.8 | 99.7 | 99.6 |
| Corn | 29.5 | 18.0 | 15.1 | 12.1 |
| Wheat | 3.6 | 9.9 | 18.0 | 26.3 |
| Root and Tubers | 58.5 | 64.7 | 67.3 | 68.1 |
| Cassava | 46.1 | 47.0 | 43.6 | 47.4 |
| Sweet potatoes | 15.0 | 20.3 | 20.4 | 23.7 |
| Potatoes | 5.7 | 14.6 | 25.0 | 26.7 |
| Beans | 59.7 | 57.9 | 62.0 | 65.1 |
| Soybeans | 50.3 | 43.3 | 42.4 | 42.2 |
| Fruits | 56.3 | 73.6 | 81.0 | 84.1 |
| Vegetables | 97.2 | 98.8 | 98.5 | 98.7 |
| Fish | 83.9 | 92.5 | 96.1 | 96.1 |
| Meat and Poultry | 9.9 | 24.5 | 41.6 | 52.2 |
| Eggs | 26.0 | 44.8 | 56.7 | 68.1 |
| Dairy products | 4.1 | 16.7 | 28.8 | 45.7 |
| Fats and Oils | 90.0 | 94.2 | 96.8 | 96.1 |
| Beverages and Tobacco | 96.0 | 96.9 | 98.5 | 98.7 |
| Prepared foods | 54.8 | 66.9 | 72.1 | 78.5 |
| Sugar | 88.4 | 92.7 | 96.7 | 95.7 |
| Other foods | 99.3 | 99.1 | 99.6 | 99.1 |

Table B1.4. Family Size, Weekly Food Expenditure and Food Budget Shares

| | Sample Households | Family Size | Food Expenditure (Rp/week) | Food Share (%) |
|---|---|---|---|---|
| Indonesia--Rural | 4,502 | 4.8 | 6,602 | 74.9 |
| Java | 2,023 | 4.5 | 4,710 | 72.0 |
| off-Java | 2,479 | 5.1 | 8,144 | 76.4 |
| Expenditure Group: (Rp/person/month) | | | | |
| under 7,200 | 2,338 | 5.2 | 4,617 | 79.0 |
| 7,200-11,400 | 1,267 | 4.7 | 7,456 | 76.8 |
| 11,401-19,000 | 644 | 4.1 | 9,718 | 72.6 |
| above 19,000 | 232 | 3.5 | 13,028 | 62.8 |

Table B1.5. Average Food Budget Shares by Region--All Rural Families

| | Java (%) | off-Java (%) | Indonesia (%) |
|---|---|---|---|
| Cereals | 40.2 | 35.6 | 37.1 |
| Rice | 36.5 | 33.6 | 34.6 |
| Corn | 3.5 | 1.4 | 2.1 |
| Wheat | 0.1 | 0.5 | 0.4 |
| Root and Tubers | 2.9 | 2.7 | 2.8 |
| Cassava | 1.9 | 1.4 | 1.5 |
| Sweet potatoes | 0.5 | 0.4 | 0.4 |
| Potatoes | 0.4 | 0.5 | 0.4 |
| Beans | 5.2 | 2.0 | 3.1 |
| Soybeans | 4.0 | 0.8 | 1.8 |
| Fruits | 4.1 | 4.3 | 4.3 |
| Vegetables | 6.9 | 8.4 | 8.0 |
| Fish | 6.7 | 12.5 | 10.6 |
| Meat and poultry | 3.3 | 5.2 | 4.6 |
| Eggs | 1.6 | 1.7 | 1.7 |
| Dairy products | 0.7 | 1.1 | 1.0 |
| Fats and oils | 4.8 | 4.6 | 4.7 |
| Beverages and tobacco | 10.3 | 10.8 | 10.7 |
| Prepared foods | 6.5 | 3.7 | 4.6 |
| Sugar | 3.6 | 4.3 | 4.1 |
| Other foods | 3.2 | 2.5 | 2.7 |
| Food Expenditure | 72.0 | 76.4 | 74.9 |

Table B1.6. Average Food Expendtiture Shares by Province--Rural Indonesia

| | Java-Bali | | | | | Outer-Java | | | |
|---|---|---|---|---|---|---|---|---|---|
| | West Java | Central Java | DI Yogyakarta | East Java | Bali | Sumatera | Kalimantan | Sulawesi | Others |
| Cereals | 44.1 | 39.5 | 35.2 | 35.2 | 38.5 | 35.5 | 31.3 | 40.1 | 38.4 |
| Rice | 43.3 | 34.7 | 32.8 | 27.6 | 36.9 | 34.8 | 30.5 | 33.8 | 31.7 |
| Corn | 0.5 | 4.7 | 2.3 | 7.4 | 1.6 | 0.3 | 0.2 | 5.3 | 6.1 |
| Wheat | 0.2 | 0.1 | 0.1 | 0.1 | 0.0 | 0.4 | 0.6 | 0.7 | 0.6 |
| Root and Tubers | 2.2 | 3.9 | 3.4 | 3.1 | 3.7 | 2.8 | 1.4 | 3.5 | 4.0 |
| Cassava | 1.1 | 2.8 | 2.5 | 2.4 | 1.3 | 1.3 | 0.9 | 1.5 | 2.3 |
| Sweet potatoes | 0.4 | 0.7 | 0.5 | 0.4 | 1.8 | 0.4 | 0.2 | 0.6 | 0.2 |
| Potatoes | 0.5 | 0.2 | 0.4 | 0.2 | 0.1 | 0.7 | 0.2 | 0.2 | 0.1 |
| Beans | 4.0 | 6.3 | 8.3 | 6.1 | 3.1 | 2.2 | 1.6 | 1.6 | 2.8 |
| Soybeans | 2.4 | 5.6 | 7.1 | 5.1 | 1.5 | 1.0 | 0.5 | 0.1 | 0.7 |
| Fruits | 4.7 | 4.0 | 3.6 | 3.5 | 3.3 | 3.5 | 6.0 | 5.2 | 5.3 |
| Vegetables | 5.4 | 8.4 | 8.8 | 7.7 | 8.5 | 9.7 | 6.5 | 6.1 | 7.2 |
| Fish | 9.4 | 4.1 | 0.8 | 5.4 | 6.1 | 11.6 | 16.6 | 13.0 | 9.4 |
| Meat and poultry | 3.5 | 2.9 | 2.9 | 3.6 | 3.6 | 5.2 | 4.6 | 5.0 | 7.2 |
| Eggs | 1.3 | 1.5 | 2.8 | 1.9 | 2.2 | 1.7 | 1.9 | 1.5 | 1.4 |
| Dairy products | 0.8 | 0.6 | 1.4 | 0.7 | 0.5 | 1.2 | 1.2 | 0.7 | 1.1 |
| Fats and oils | 3.8 | 5.4 | 6.1 | 5.6 | 5.5 | 4.9 | 4.1 | 4.4 | 4.4 |
| Beverages and tobacco | 9.4 | 9.3 | 8.4 | 12.8 | 11.3 | 11.4 | 11.5 | 8.4 | 8.8 |
| Prepared foods | 6.0 | 7.4 | 11.1 | 5.8 | 8.5 | 3.8 | 4.0 | 3.0 | 3.1 |
| Sugar | 2.5 | 4.1 | 5.2 | 5.0 | 2.4 | 3.9 | 5.4 | 5.0 | 3.7 |
| Other foods | | | | | | | | | |
| Food Expenditure | 74.9 | 70.5 | 64.3 | 69.2 | 74.8 | 76.0 | 77.1 | 76.9 | 76.9 |

Table B1.7. Average Food Expenditure Shares by Income Group--Rural Indonesia

| Food Group | under 7,200 | 7,200-11,400 | 11,401-19,000 | above 19,000 |
|---|---|---|---|---|
| Cereals | 47.1 | 36.4 | 29.1 | 20.5 |
| Rice | 42.8 | 34.8 | 27.6 | 19.2 |
| Corn | 4.0 | 1.3 | 0.9 | 0.4 |
| Wheat | 0.2 | 0.3 | 0.6 | 0.8 |
| Root and Tubers | 3.3 | 2.6 | 2.4 | 2.5 |
| Cassava | 2.2 | 1.3 | 1.1 | 1.0 |
| Sweet potatoes | 0.4 | 0.5 | 0.4 | 0.4 |
| Potatoes | 0.2 | 0.4 | 0.7 | 0.8 |
| Beans | 3.1 | 2.9 | 2.8 | 3.9 |
| Soybeans | 2.3 | 1.6 | 1.4 | 1.3 |
| Fruits | 3.2 | 4.3 | 5.1 | 6.5 |
| Vegetables | 7.8 | 8.2 | 7.7 | 8.0 |
| Fish | 8.3 | 11.4 | 12.7 | 12.0 |
| Meat and Poultry | 1.7 | 3.9 | 7.5 | 11.2 |
| Eggs | 1.0 | 1.7 | 2.1 | 2.7 |
| Dairy products | 0.3 | 1.1 | 1.5 | 2.1 |
| Fats and Oils | 4.8 | 4.7 | 4.6 | 4.1 |
| Beverages and Tobacco | 9.2 | 11.0 | 12.0 | 12.2 |
| Prepared foods | 3.6 | 4.6 | 5.2 | 6.7 |
| Sugar | 4.0 | 4.3 | 4.1 | 4.0 |
| Other foods | 2.5 | 2.6 | 2.7 | 3.1 |
| Food Expenditure | 79.0 | 76.8 | 72.6 | 62.8 |

Table B1.8. Weekly per Capita Food Consumption by Region--Rural Households

| | Java | off-Java | Indonesia |
|---|---|---|---|
| Rice | 2.13 | 2.54 | 2.39 |
| Corn | 1.52 | 1.38 | 1.45 |
| Wheat | 0.15 | 0.28 | 0.26 |
| Cassava | 0.98 | 1.08 | 1.03 |
| Sweet potatoes | 0.74 | 0.74 | 0.74 |
| Potatoes | 0.24 | 0.21 | 0.22 |
| Soybeans | 0.29 | 0.25 | 0.27 |
| Fruits | 0.60 | 0.74 | 0.69 |
| Vegetables | 0.62 | 0.61 | 0.62 |
| Fish | 0.17 | 0.40 | 0.32 |
| Meat | 0.10 | 0.24 | 0.20 |
| Eggs | 0.93 | 1.03 | 1.00 |
| Dairy products | 0.12 | 0.12 | 0.12 |
| Sugar | 0.15 | 0.23 | 0.20 |

Table B1.9. Weekly per Capita Food Consumption by Income Group--Rural Households

| Food Group | under 7,200 | 7,200-11,400 | 11,401-19,000 | above 19,000 |
|---|---|---|---|---|
| Rice | 2.03 | 2.70 | 3.04 | 3.21 |
| Corn | 1.42 | 1.24 | 1.82 | 1.13 |
| Wheat | 0.18 | 0.23 | 0.34 | 0.49 |
| Cassava | 1.00 | 0.95 | 1.18 | 1.64 |
| Sweet potatoes | 0.68 | 0.81 | 0.82 | 0.97 |
| Potatoes | 0.15 | 0.22 | 0.28 | 0.46 |
| Soybeans | 0.20 | 0.31 | 0.39 | 0.59 |
| Fruits | 0.48 | 0.73 | 1.02 | 1.70 |
| Vegetables | 0.50 | 0.66 | 0.83 | 1.27 |
| Fish | 0.20 | 0.38 | 0.52 | 0.71 |
| Meat | 0.11 | 0.17 | 0.29 | 0.38 |
| Eggs | 0.67 | 1.01 | 1.44 | 2.14 |
| Dairy products | 0.08 | 0.12 | 0.15 | 0.23 |
| Sugar | 0.13 | 0.23 | 0.31 | 0.46 |

Table B2.1. Variables, Mean Budget Shares and Definitions

| Variables | Group Code | Definition | Mean Budget Shares |
|---|---|---|---|
| $w_1$ | FG1 | Budget share of rice | 0.22 |
| $w_2$ | FG2 | Budget share of Non-rice | 0.04 |
| $w_3$ | FG3 | Budget share of beans | 0.04 |
| $w_4$ | FG4 | Budget share of fruits | 0.04 |
| $w_5$ | FG5 | Budget share of vegetables | 0.06 |
| $w_6$ | FG6 | Budget share of animal products | 0.07 |
| $w_7$ | FG7 | Budget share of fish (FG7) | 0.07 |
| $w_8$ | FG8 | Budget share of fats and oils | 0.03 |
| $w_9$ | FG9 | Budget share of prepared foods | 0.04 |
| $w_{10}$ | FG10 | Budget share of sugar (FG10) | 0.03 |
| $w_{11}$ | FG11 | Budget share of beverages and stimulants | 0.08 |
| $w_{12}$ | FG12 | Budget share of other foods | 0.02 |
| $w_{13}$ | FG13 | Budget share of non-food | 0.25 |
| Y | | Weekly total family expenditure | 13,753 |
| HHS | | Household size | 5.3 |

Table B2.2. Parameter Estimates for 13 Commodity Groups Based on Multinomial Logit Model by Region

| | Intercept | ln INC | ln HHS | ln DRE |
|---|---|---|---|---|
| $\ln(w_2/w_1)$ | -2.997<br>(-4.060) | 0.114<br>(1.348) | -0.008<br>(-0.079) | -0.037<br>(-0.430) |
| $\ln(w_3/w_1)$ | -5.464<br>(-9.387) | 0.442<br>(6.619) | -0.517<br>(-6.587) | 0.491<br>(7.221) |
| $\ln(w_4/w_1)$ | -6.424<br>(-10.992) | 0.573<br>(8.537) | -0.498<br>(-6.324) | 0.183<br>(2.680) |
| $\ln(w_5/w_1)$ | -3.998<br>(-8.721) | 0.358<br>(6.797) | -0.393<br>(-6.363) | -0.166<br>(-3.093) |
| $\ln(w_6/w_1)$ | -10.830<br>(-15.645) | 1.162<br>(14.620) | -0.887<br>(-9.501) | 0.062<br>(0.769) |
| $\ln(w_7/w_1)$ | -5.976<br>(-10.315) | 0.640<br>(9.631) | -0.675<br>(-8.639) | -0.614<br>(-9.080) |
| $\ln(w_8/w_1)$ | -3.657<br>(-7.846) | 0.273<br>(5.103) | -0.479<br>(-7.622) | -0.031<br>(-0.563) |
| $\ln(w_9/w_1)$ | -6.881<br>(-10.542) | 0.628<br>(8.386) | -0.617<br>(-7.007) | 0.373<br>(4.894) |
| $\ln(w_{10}/w_1)$ | -4.625<br>(-8.540) | 0.352<br>(5.656) | -0.425<br>(-5.817) | -0.207<br>(-3.271) |
| $\ln(w_{11}/w_1)$ | -5.029<br>(-8.158) | 0.491<br>(6.942) | -0.445<br>(-5.354) | 0.003<br>(0.038) |
| $\ln(w_{12}/w_1)$ | -6.724<br>(-10.673) | 0.559<br>(7.730) | -0.690<br>(-8.122) | 0.254<br>(3.454) |
| $\ln(w_{13}/w_1)$ | -7.551<br>(-15.762) | 0.917<br>(16.682) | -0.698<br>(-10.811) | 0.459<br>(8.206) |

Table B2.3. Predicted Budget Shares by Region and Income Group - Rural Households

| Region/ Expenditure Group | Commodity Group | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FG1 | FG2 | FG3 | FG4 | FG5 | FG6 | FG7 | FG8 | FG9 | FG10 | FG11 | FG12 | FG13 | INC | HHS |
| Urban | .2249 | .0322 | .0341 | .0406 | .0599 | .0667 | .0615 | .0346 | .0389 | .0281 | .0753 | .0197 | .2836 | 13,653 | 5.3 |
| Region | | | | | | | | | | | | | | | |
| Java | .2082 | .0293 | .0409 | .0414 | .0508 | .0638 | .0411 | .0315 | .0439 | .0233 | .0698 | .0209 | .3350 | 10,171 | 5.0 |
| Outer-Java | .2358 | .0344 | .0284 | .0390 | .0679 | .0679 | .0861 | .0368 | .0342 | .0325 | .0788 | .0184 | .2397 | 16,916 | 5.6 |
| Exenditure Group | | | | | | | | | | | | | | | |
| Low | .2631 | .0364 | .0348 | .0398 | .0628 | .0545 | .0591 | .0372 | .0375 | .0295 | .0757 | .0194 | .2502 | 10,029 | 5.7 |
| High | .1842 | .0275 | .0327 | .0408 | .0558 | .0827 | .0633 | .0313 | .0399 | .0261 | .0735 | .0198 | .3221 | 19,523 | 4.7 |

Table B2.4. Predicted Expenditure Elasticities by Region and Income Group - Rural Households

| Region/ Expenditure Group | Commodity Group | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FG1 | FG2 | FG3 | FG4 | FG5 | FG6 | FG7 | FG8 | FG9 | FG10 | FG11 | FG12 | FG13 | INC | HHS |
| Rural | .4679 | .5819 | .9099 | 1.0409 | .8259 | 1.6299 | 1.1079 | .7409 | 1.0959 | .8199 | .9589 | 1.0269 | 1.3849 | 13,653 | 5.3 |
| Region | | | | | | | | | | | | | | | |
| Java | .4387 | .5527 | .8807 | 1.0117 | .7967 | 1.6007 | 1.0787 | .7117 | 1.0667 | .7907 | .9297 | .9977 | 1.3557 | 10,171 | 5.0 |
| Outer-Java | .4911 | .6051 | .9331 | 1.0641 | .8491 | 1.6531 | 1.1311 | .7641 | 1.1191 | .8431 | .9821 | 1.0501 | 1.4081 | 16,916 | 5.6 |
| Exenditure Group | | | | | | | | | | | | | | | |
| Low | .5125 | .6265 | .9545 | 1.0855 | .8705 | 1.6745 | 1.1525 | .7855 | 1.1405 | .8645 | 1.0250 | 1.0715 | 1.4295 | 10,029 | 5.7 |
| High | .4171 | .5311 | .8591 | 0.9901 | .7751 | 1.5791 | 1.0571 | .6901 | 1.0451 | .7691 | .9081 | .9761 | 1.3341 | 10,523 | 4.7 |

Table B2.5. Predicted Household Size Elasticities by Region and Income Group - Rural Households

| Region/ Expenditure Group | Commodity Group | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FG1 | FG2 | FG3 | FG4 | FG5 | FG6 | FG7 | FG8 | FG9 | FG10 | FG11 | FG12 | FG13 | INC | HHS |
| Rural | .4591 | .4511 | -0.579 | -.0389 | .0661 | -.4279 | -.2159 | -.0199 | -.1579 | .0341 | .0141 | -.2309 | -.2389 | 13,653 | 5.3 |
| Region | | | | | | | | | | | | | | | |
| Java | .4777 | .4697 | -0.393 | -.0203 | .0847 | -.4093 | -.1973 | -.0013 | -.1393 | .0527 | .0327 | -.2123 | -.2203 | 10,171 | 5.0 |
| Other | .4470 | .4390 | -.1240 | -.0510 | .0540 | -.4400 | -.2280 | -.0320 | -.1700 | .0220 | .0020 | -.2430 | -.2510 | 16,916 | 5.6 |
| Exenditure Group | | | | | | | | | | | | | | | |
| Low | .4288 | .4208 | -.0882 | -.0692 | .0358 | -.4582 | -.2462 | -.0506 | -.1882 | .0038 | -.0166 | 0.2612 | -.2692 | 10,029 | 5.7 |
| High | .4974 | .4894 | -.0196 | -.0006 | .1044 | -.3896 | -.1776 | .0184 | -.1196 | .0724 | .0524 | -.1926 | -2.006 | 19,523 | 4.7 |

Table B2.6. Estimates of Economies of Scale by Region and Income Group--Rural Households

| Region/ Expenditure Group | Commodity Group | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FG1 | FG2 | FG3 | FG4 | FG5 | FG6 | FG7 | FG8 | FG9 | FG10 | FG11 | FG12 | FG13 | INC | HHS |
| Urban | .9270 | 1.0330 | .8520 | 1.0020 | .8920 | 1.2020 | .8920 | .7210 | .9380 | .8540 | .9730 | .7960 | 1.1460 | 13,653 | 5.3 |
| Region | | | | | | | | | | | | | | | |
| Java | .9164 | 1.0224 | .8414 | .9914 | .8814 | 1.1914 | .8814 | .7104 | .9274 | .8434 | .9624 | .7854 | 1.1354 | 10,171 | 5.0 |
| Outer-Java | .9381 | 1.0441 | .8091 | 1.0131 | .9031 | 1.2131 | .9031 | .7321 | .9491 | .8651 | .9841 | .8071 | 1.1571 | 16,916 | 5.6 |
| Exenditure Group | | | | | | | | | | | | | | | |
| Low | .9413 | 1.0473 | .8663 | 1.0163 | .9063 | 1.2163 | .9063 | .7349 | .9523 | .8683 | 1.0084 | .8103 | 1.1600 | 10,029 | 5.7 |
| High | .9145 | 1.0205 | .8395 | .9895 | .8795 | 1.1895 | .8795 | .7085 | .9255 | .8415 | .9605 | .7835 | 1.1335 | 19,523 | 4.7 |