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ABSTRACT

The Government of Indonesia, like many governments in developing countries, has intervened in food markets to control and stabilize food prices. And recently, the government has had to reduce input and food subsidies due to an increasing fiscal deficit. The resulting food price increases have had effects on consumers that differ among income groups. This paper develops a theoretically consistent methodology to measure changes in different income groups' welfare caused by the adoption of alternative food pricing policies. Households were classified according to expenditure behavior. We obtained estimates of demand parameters for each income class using Indonesian household level expenditure survey data, and evaluated welfare changes from the estimated parameters. The different income groups consumed different types of foods and had different demand responses to prices and income. The results show the importance of considering distributional effects of policy changes and of developing appropriate targeting of food policies.

DISAGGREGATED WELFARE EFFECTS OF AGRICULTURAL PRICE POLICIES IN URBAN INDONESIA

Introduction

Historically, the Government of Indonesia (GOI) has intervened both directly and indirectly to control and stabilize prices in the country's food markets. It has intervened directly in rice markets by setting floor and ceiling prices and indirectly by subsidizing input prices. For corn, which is the main input used by the country's growing, modern poultry industry, the GOI has intervened by investing resources in research (for nonrice staples and secondary crops), by maintaining floor prices, and by subsidizing prices paid by feed mills (20).

In recent years, the GOI (like the governments of many other developing countries, has cut back public expenditures to reduce the increasing fiscal deficit caused by its intervention policies. The partial or total elimination of input and food subsidies and increases in foodstuff prices included in the reforms were price adjustments likely to have variable effects on consumers, because behavioral parameters with respect to consumption differ across socio-economic classes. Recent studies of the food situation in developing countries have demonstrated convincingly that income distribution, as well as relative prices, play a crucial role in determining food consumption and related levels of hunger and malnutrition (1, 6, 7, 9, 10, 11).

The price effects of changes in food and agricultural policies have created the need for consistent methodologies, not only to monitor the disaggregated welfare effects of such adjustments, but also to cope with the possible need for compensation schemes that are fiscally sound and effective in their impact on the poor. Unfortunately, such methodologies generally are not used.

Traditional welfare analysis of price policy changes usually considers all consumers as a group and uses the notion of consumer surplus (an exact measure of consumer welfare only in restrictive instances). For instance, Reutlinger and Knapp (15) used this concept to evaluate the effects of different trade

and stock policies on consumers in food deficit countries. Von Braun and Haen (22) analyzed the effects of price and market intervention policies on the welfare of consumers and producers using producer and consumer surplus measures in Egypt. Scandizzo and Bruce (17) proposed a simplified form of a partial equilibrium methodology derived from the theory of consumer and producer surplus to measure agricultural price intervention effects. Later, Soe et al. (18) used Scandizzo and Bruce's approach to evaluate the effects of taxing rice exports and subsidising rice consumption on producers and consumers' welfare in Myanmar (Burma).

Focusing on all consumers as a group is neither effective nor useful if policymakers are concerned with the effects of these adjustments on the well-being of specific target groups. Any generalization to these target groups that uses demand parameters estimated in aggregate could be erroneous and misleading.

Estimation of demand systems for different socioeconomic groups yields the appropriate parameters because it is difficult to incorporate income distribution effects into demand analysis and because unbiased and consistent structural demand parameters are needed for groups following different underlying behaviors. When behaviors differ by income levels, the effects of income distribution can be incorporated by subdividing consumers into income or socioeconomic groups and estimating the behaviors of these groups separately (5, 12, 13, 14). Specific demand parameters of an income group that are estimated in this way can be used to evaluate accurately the effects of alternative price policies on the well-being of the different groups and to design specific target group compensation schemes, such as a food price subsidy or food assistance (1, 2, 6, 7, 9, 10, 11, 16, 21). In sum, consistent methodologies for assessing policy effects on consumers should include classification of the population into appropriate income classes, estimation of demand parameters for each income class, and welfare analysis based on estimated behavioral parameters.

The general objective of this paper is to present a theoretically sound methodology that could be used to measure welfare-level changes caused by the adoption of alternative food price policies. This paper has three specific objectives: (1) to develop a methodology classifying households by income groups; (2) to analyze expenditure patterns for different income groups; and

(3) to evaluate specific welfare effects of selected price policies on different income groups.

The Data and Classification of Households by Income Groups
Data Issues

Data from the National Social and Economic Surveys (SUSENAS) of households in Indonesia were used in this study. The surveys from 1981, 1984, and 1987 provide the data basic to this study. The information on individual households was aggregated within each primary sampling unit (PSU) to obtain a "representative" household. Because the SUSENAS surveys in 1984 and 1987 were performed in spring only, subround one (spring) from SUSENAS 1981 was used to avoid possible seasonal bias.

The "average" or representative household per PSU was constructed by dividing the aggregate levels of some selected variables (demographic and total expenditures) by the number of households in that PSU. These representative average households per PSU were the units of observation for this study and are hereafter referred to as "households."

Only the observations belonging to the urban regions, both on and off Java, were analyzed. In total, there were 3705 observations for the urban population on and off Java for the three time periods.

Classification of Households by Income Groups

Differences in household behavior in the acquisition of goods, as expressed by differences in income and household characteristics, was the fundamental criterion behind this classification. Households showing similar consumption behaviors were classified as the same income group.

For low income households, food expenditures are explained almost completely by income. For high income households, food expenditures also depend upon other factors such as household demographic characteristics (ages of household members, race, religion, education, health, employment status, geographic location, etc). For these households, the part of expenditures not explained by income is more likely to vary. In other words, when estimating food expenditures as explained by income and some of these household characteristics (Engel relations), the values of the disturbances are likely to be small for low income households and large for high income households.

The method for classifying households into income groups was based on an analysis of homogeneity of variances of residuals from these Engel regressions. The procedure includes two basic steps: estimation of Engel relations, and tests for homoskedasticity of variances.

Estimation of Engel Relations. The objective of the estimation was to obtain residuals of sample observations from Engel regressions. First, an Engel function of the form

$$E_i = \alpha_{i0} \text{ REGION} + \alpha_{i1} \text{ AS1} + \alpha_{i2} \text{ AS2} + \alpha_{i3} \text{ AS3} + \alpha_{i4} \text{ AS4}$$
$$+ \alpha_{i5} \text{ AS5} + \alpha_{i6} \text{ AS6} + \alpha_{i7} \text{ TOTEXP} + \mu_i \tag{1}$$

i = foods, non foods, fish, fruits, vegetables, eggs

$$\mu_i \sim \text{ iid } (0, \nu_i^2)$$

was estimated for 1981, 1984, and 1987, independently, where E_i is expenditures in commodity group i; REGION is a dummy variable (Java = 1, Off Java = 0); AS1 is the average number of children 1-5 years of age per household; AS2 is the average number of children 5-10 years of age per household; AS3 is the average number of males 10-20 years of age per household; AS4 is the average number of females 10-20 years of age per household; AS5 is the average number of males 20 years and older per household; AS6 is the average number of females 20 years and older per household; and TOTEXP is the total expenditure per household.

Then, for each regression, these parameter estimates were used to calculate the corresponding residuals.

Tests for Homoskedasticity of Variances. Successive Goldfeld-Quandt tests using the residuals from step 1 were performed in order to classify observations into groups having different variances. Households were classified into income groups by setting income boundaries for groups of residuals.

The Goldfeld-Quandt test is based on the idea that, if sample observations have been generated under the conditions of homoskedasticity, or if the null hypothesis

$$H_0 : \sigma_1^2 = \sigma_2^2 = \ldots = \sigma_m^2 \qquad (m \leq n),$$

is true (where n is the number of observations and m is the number of groups), then the variance of the disturbances of one part of the sample observations is the same as the variance of the disturbances of another part of the observations. Thus a test for homoskedasticity becomes simply a test for the equality of two variances. Moreover, because under H_o, each sample variance has a chi-square distribution divided by the number of degrees of freedom, their ratio has an F distribution, provided the two sample variances are independent. The requirement that the two sample variances be independent means that two separate regression equations must be estimated—one for each part of the sample observations. Then, the test statistic is

$$s_2^2 \ / \ s_1^2 \quad \sim \quad F \ (n_2 - 2, \ n_1 - 2),$$

where s_i^2 is the variance for sample i, and where n_i is the number of observations in sample i.

Equation (1) was reestimated independently for each group of observations identified as having homogeneous variance. The tests were performed to see if the variances of the residuals of each adjacent pair of groups of observations were the same. If they were, then the observations in both groups were said to belong to the same income group. If they were not the same (i.e., they were statistically different at $\alpha = .05$), then the observations in each group were said to belong to different income groups.

Precise final boundaries were determined for every income group by repeating the Goldfeld-Quandt tests for smaller groups of residuals in the neighbourhood of two adjacent groups. This process was repeated for each survey. Then, the income groups were reconciled so that the same number of groups existed for each year. Final income groups were found by grouping the corresponding yearly income classes.

The 3705 observations for urban zones reported in the 1981, 1984, and 1987 SUSENAS surveys were distributed, following this methodology, into four income groups: low, medium-low, medium-high, and high.

Food Participation Rates

The percentage of sampled representative households reporting expenditures on food groups assists in identifying the most frequently accessed food groups

for each income group and identifies the extent of the problem of zero
expenditures for the subsequent econometric analysis. Low income households
had low participation rates for meats (68%), dairy products (48%) and some
(under 50%) palawija products; high-income groups showed high participation
rates for almost all commodity groups. Rice was consumed by nearly all
households, regardless of income level.

Analytical Framework

Some Duality Results

When consumer behavior is specified, the cost function is the solution to
the dual problem

$$c\ (p,u^{\cdot}) = \min\ p'\ q \qquad s.\ t. \qquad u(q) = u^{\cdot}\ , \qquad (2)$$

where $c(p,u^{\cdot})$ is the cost function, p is a vector of prices and q a vector of
quantities.

In this paper, we use the cost function belonging to the PIGLOG family
associated with the Almost Ideal Demand System (AIDS). Deaton and Muellbauer
(3) approximate the cost function of the PIGLOG class with the following cost
function, which is defined as flexible functional form

$$\ln\ c = \alpha_0 + \sum_{j=1}^{8} \alpha_j\ \ln\ P_j + \tfrac{1}{2} \sum_{j=1} \sum_{k=1} \hat{\gamma}_{jk}\ \ln\ P_j\ \ln\ P_k + U\beta_0\ \Pi\ P_j^{\beta_j}\ . \qquad (3)$$

Welfare Measures

Exact measures of welfare change can be described in terms of the cost
function: index numbers are based on ratios of the cost function under
different price regimes, and compensating and equivalent variation are based
on differences in the values of the cost function evaluated at different sets
of prices and fixed utility levels. Marshallian consumer surplus is exact
only under special conditions.

To measure welfare changes associated with price changes, we use the
compensating variation measure (CV_i). Formally,

$$CV_i = c(u_i^0, p_i^1) - c(u_i^0, p_i^0) \qquad i=1,\ldots,4, \tag{4}$$

where

u_{i0} = original utility level for the ith income group,

p_i^0 = original mean price vector for the ith income group, and

p_i^1 = new mean price vector for the ith income group.

Because the Hicksian demand functions are the derivatives of the cost function, integration also gives the difference in costs of reaching the same level of well being two different price situations. Then,

$$CV = - \int_{p^1}^{p^0} \sum_i x_i (p,u^0) \, dp_i + \Delta m . \tag{5}$$

Thus, to estimate the CVs by income group, we first estimate the original utility levels for each income group by using the duality result and the cost function (2).

Then,

$$u_0 = \left[\ln C - (\alpha_0 + \sum_{j=1}^{8} \alpha_j \ln P_j + 1/2 \sum_{j=1} \sum_{k=1} \hat{\gamma}_{jk} \ln P_j \ln P_k)\right] / \beta_0 \Pi P_j^{\beta_j} \tag{6}$$

Finally, the CVs for each income group are determined using equation (4).

For instance, Huang (4) approximated the compensating variation measure as a function of all price changes and compensated price elasticities obtained from estimated inverse and ordinary demand systems, to measure the effects of the U.S. meat trade on consumers' welfare.

Results and Discussion

Demand parameters of a linearized AIDS (LAIDS) system estimated using the SUSENAS data were used to characterize the structure of the underlying cost functions for each income group. The general form of the derived share equations of this system for all income groups was

$$w_i = \rho_{i0} + \Sigma_s \, \rho_{is} \, N_s + \Sigma_j \, \gamma_{ij} \, \ln P_j + \beta_i \, \ln (X \, / \, P^*), \tag{7}$$

where the N_s are the demographic variables $(s = 1, \ldots, d)$ and $i, j = 1, \ldots, n$. Detailed derivations of the system are available in Deaton and Muellbauer (3).

The existence of a problem of zero expenditures in meats and/or milk for some low income households conditioned the methodology for the estimation of the demand system for this group. Low income households were divided into four groups, or regimes, based upon the outcomes of the discrete choices of consumption of meat and dairy products: those consuming (i) all commodities; (ii) all except meat; (iii) all except dairy; and (iv) all except meat and dairy. Endogenous switching among the four regimes can occur when individuals are not randomly assigned to each regime. Endogenous switching regression techniques were used to obtain unbiased and consistent LAIDS demand parameter estimates. Then, conditional LAIDS, including estimates of self-selection terms to correct for selectivity bias, were estimated for each of these subsamples of low-income households.

Finally, for estimation purposes, the price index P was approximated using Stone's index,

$$\ln P^* = \Sigma_i \, \overline{w}_i \, \ln P_i, \tag{8}$$

where $\overline{w}_i$ is the mean of the budget share. Also, the basic demand restrictions (adding-up, homogeneity, and symmetry) were imposed in the estimation. The estimated own-price and income elasticities for all income groups are reported in Table 1.

The results from a static simulation exercise to measure welfare losses for each income group under different pricing policies show the application of the procedures. These pricing strategies include changes in prices of commodity groups for which the GOI intervenes directly or indirectly in fixing consumer prices (rice, meats, and dairy products) and changes in prices of ommodity groups consumed mainly by low-income households (rice and fish).

Welfare Losses Under Alternative Single Price Increases

The analysis of single commodity price increases involved independent 10 percent increases in the prices of rice, dairy products, fish, and meats. The

results of this exercise are shown in Table 2. Clearly, households in different income groups were affected differently by commodity price increases.

The resulting consumer welfare losses for every income group depended upon the commodity price changed. A 10 percent increase in the price of rice caused the greatest welfare loss for any income group, and a 10 percent increase in the price of dairy products caused the smallest. A 10 percent increase in the price of meats caused the second greatest welfare loss for the high income groups; a 10 percent increase in the price of fish caused the second largest welfare loss for the lowest income group.

The low income groups were the most affected and the high income groups the least affected by an increase in the price of rice. On average, the welfare loss for the medium-low income households was about 1.9 times the loss for the high income households. If we consider not only what these losses represent in terms of mean total expenditures, but also that rice expenditures were the largest food expenditures in the budgets of the medium-low and the low income households, then we can conclude that low income households were most affected by price increases for rice. An increase in the price of dairy products affected high income households the most and low income households the least.

Welfare Losses Under Alternative Multiple Price Increases

Other pricing scenarios involving joint increases of 10 percent in the prices of rice and dairy products, rice and fish, and rice and meats illustrate the effects of multiple price increases. The results from this exercise are shown in Table 3. As for single price increases, it is clear that the welfare of households in different income groups was affected differently by these multiple price increases.

When we consider not only what these losses represent in the mean total expenditures but also the relative decrease in welfare from single to multiple price changes, then we can see that low income households were relatively more affected than were high income households by these multiple price increases: the additional welfare losses for the low income households were much larger than the additional welfare losses for the high income households.

On average, the welfare losses for the high income households were about 1.4 and 2.2 times the loss for the low income households with the multiple price changes. The welfare losses for high income households were about 7 times those for the low income households, when single price increases occurred.

Policy Implications

These results have important implications for the development of food policies. First, if the policymaker's objective is to protect the welfare of low income households, then any increase in the price of rice without an adequate compensation scheme would be the most harmful policy choice to the poor.

Second, related to increased meat prices (and dairy prices, both results of higher input prices), we showed that low income households would be minimally affected by an increase in the price of meat or dairy products. High-income households would be most affected and, alternatively, would benefit most from any price subsidies to input foodstuffs.

Third, an increase in the price of fish would affect low-income households more than would any similar increase in the price of either dairy products or meats. An implication, for example, is that trade policies which hold down the price of fish could ease low income households' welfare losses caused by increases in the price of rice.

Finally, the multiple price increase simulation showed that the additional welfare losses from multiple price changes were greater for low income households, in part because food represents a greater share of the household budget than do other goods.

The analysis confirms that different income groups have different consumption patterns, evidenced both by the types of foods consumed (participation rates) and by estimated demand parameters and elasticities. If the objectives of the government were both to reduce the burden of agricultural subsidies on the fiscal deficit and to preserve the welfare levels of the low income groups, then a number of policy options can be suggested: 1) direct transfers to low income households only; (2) smaller increases in the price of the type of rice that low income households consume the most (if there exist different qualities of rice and if high income

households have a low elasticity of substitution among different types of
rice); (3) reduction or elimination of direct and indirect price subsidies for
meats and dairy products; and finally, (4) no increases in the price of fish
through, perhaps, favorable trade policies.

Summary

The Government of Indonesia, like many governments in developing
countries, has intervened in food markets to control and stabilize food
prices. And recently, the government has had to reduce input and food
subsidies due to an increasing fiscal deficit. The resulting food price
increases have had effects on consumers that differ among income groups. This
paper develops a theoretically consistent methodology to measure changes in
different income groups' welfare caused by the adoption of alternative food
pricing policies. Households were classified according to expenditure
behavior. We obtained estimates of demand parameters for each income class
using Indonesian household level expenditure survey data, and evaluated
welfare changes from the estimated parameters. The different income groups
consumed different types of foods and had different demand responses to prices
and income. The results show the importance of considering distributional
effects of policy changes and of developing appropriate targeting of food
policies.

Table 1. Marshallian own-price and expenditure elasticities of rice, dairy products, fish, and meats for different income groups in urban Indonesia

Income Group	Mean total expend. (rupiahs)	Rice Own	Rice Exp	Dairy Own	Dairy Exp	Fish Own	Fish Exp	Meats Own	Meats Exp
High	189891.3	-.42	.26	-.74	.70	-.50	.22	-.89	.69
Med-high	82156.1	-.58	.10	-.64	.71	-.66	-.82	-.91	.25
Med-low	49132.9	-.87	.15	-.55	.23	-.63	-.34	-.81	-.85
Low 1[a]	28566.4	-.71	.34	-.29	.84	-.84	.16	-.53	.39
Low 2[b]	23930.4	-1.59	.10			-.53	.70	-.91	.65
Low 3[c]	25443.8	-1.67	.71	.33	.34	-.63	.98		
Low 4[d]	20302.6	-.98	.31			-.48	.58		

[a] Low 1 = subsample share of meats > 0, and share of dairy products > 0.

[b] Low 2 = subsample share of meats > 0, and share of dairy products = 0.

[c] Low 3 = subsample share of meats = 0, and share of dairy products > 0.

[d] Low 4 = subsample share of meats = 0, and share of dairy products = 0.

Table 2. Differential welfare changes caused by a single increase of 10 percent in the prices of rice, dairy products, fish, and meats

Income Group	Mean total expend.	Rice	Dairy	Fish	Meats
		----------rupiahs----------			
High	189891.3	-447.9	-157.2	-190.3	-246.7
Medium-high	82156.1	-498.2	-76.0	-128.1	-163.8
Medium-low	49132.9	-520.5	-55.2	-123.9	-103.3
Low 1[a]	28566.4	-375.6	-23.5	-129.0	-59.4
Low 2[b]	23930.4	-1368.1	-	-153.2	-84.0
Low 3[c]	25443.8	-599.5	-64.6	-124.1	-
Low 4[d]	20302.6	-942.2	-	-234.2	-

[a]Low 1 = subsample share of meats > 0, and share of dairy products > 0.
[b]Low 2 = subsample share of meats > 0, and share of dairy products > 0.
[c]Low 3 = subsample share of meats = 0, and share of dairy products > 0.
[d]Low 4 = subsample share of meats = 0, and share of dairy products > 0.

Table 3. Differential welfare changes caused by a multiple increase of 10 percent in the prices of rice-dairy products, rice-fish, and rice-meats

Income Group	Mean total expend.	Rice-Dairy	Rice-Fish	Rice-Meats
		------rupiahs------		
High	189891.3	-604.3	-639.4	-689.7
Medium-high	82156.1	-574.1	-629.7	-663.6
Medium-low	49132.9	-576.6	-647.5	-627.7
Low 1[a]	28566.4	-398.8	-507.8	-431.9
Low 2[b]	23930.4	-	-1530.5	-1456.1
Low 3[c]	25443.8	-663.9	-722.2	-
Low 4[d]	20302.6	-	-1187.9	-

[a]Low 1 = subsample share of meats > 0, and share of dairy products > 0.
[b]Low 2 = subsample share of meats > 0, and share of dairy products > 0.
[c]Low 3 = subsample share of meats = 0, and share of dairy products > 0.
[d]Low 4 = subsample share of meats = 0, and share of dairy products > 0.

REFERENCES

1. *Alderman, H.*, and *C. P. Timmer*: Consumption Parameters for Sri Lanka Food Policy Analysis. Journal of Agrarian Studies, 1: 1-12, 1980.

2. *Burney, N.* and *M. Akmal.*: Food Demand in Pakistan: An Application of the Extended Linear Expenditure System. Journal of Agricultural Economics, 2: 185-195, 1991.

3. *Deaton, A.*, and *J. Muellbauer*: An Almost Ideal Demand System. American Economic Review. 70: 312-326, 1980.

4. *Huang, K.*: Measuring the Effects of U.S. Meat Trade on Consumers' Welfare. Journal of Agricultural and Applied Economics, 25(1): 217-227, 1993.

5. *Jarque, M.C.*: An Application of Limited Dependent Variable Models to Household Expenditure Analysis in Mexico. Journal of Econometrics, 36: 31-53, 1987.

6. *Kennes, W.*: Estimating Demand for Agricultural Commodities in Thailand, Combining Time-Series and Cross-Section Data. European Review of Agricultural Economics, 10: 357-375, 1983.

7. *Pinstrup-Andersen, P.*: The Social and Economic Effects of Consumer-Oriented Food Subsidies: A Summary of Current Evidence. In P. Pinstrup-Andersen, ed., Food Subsidies in Developing Countries. Costs, Benefits and Policy Options, Baltimore, Maryland: The Johns Hopkins University, 1988.

8. *Pinstrup-Andersen, P.*: The Impact of Export Crop Production on Human Nutrition, M. Biswas and P. Pinstrup-Andersen (eds) Nutrition and Development, New York: Oxford University Press, 1985.

9. *Pinstrup-Andersen, P.*, and *H. Alderman.*: The Effectiveness of Consumer-Oriented Food Subsidies in Reaching Rationing and Income Transfer Goals, in Per Pinstrup-Andersen (ed.) Food Subsidies in Developing Countries. Costs, Benefits and Policy Options, Baltimore, Maryland: The Johns Hopkins University Press, 1988.

10. *Pinstrup-Andersen, P.*, *N. Londoño* and *E. Hoover*: The Impact of Increasing Food Supply on Human Nutrition: Implications for Commodity Priorities in Agricultural Research and Policy. American Journal of Agricultural Economics, 58(2): 131-142, 1976.

11. *Pinstrup-Andersen, P.*, and *E. Caicedo.*: The Potential Impact of Changes in Income Distribution on Food Demand and Human Nutrition. American Journal of Agricultural Economics, 60(3): 402-415, 1978.

12. *Pollak, P.A.,* and *T.J. Wales*: Demographic Variables in Demand Analysis. Econometrica, 49: 1533-155, 1981.

13. *Ray, R.*: Analysis of a Time Series of Household Expenditure Surveys for India. Review of Economics and Statistics, 62: 595-602, 1980.

14. *Ray, R.*: The Testing and Estimation of Complete Demand Systems on Household Budget Surveys: An Application of AIDS. European Economic Review, 17: 349-369, 1982.

15. *Reutlinger, S.* and *K. Knapp*: Food Security in Food Deficit Countries. World Bank Staff Working Paper No. 393, 1980.

16. *Savadogu, K.* and *J. Brandt*: Household Food Demand in Burkina Faso: Implications for Food Policy. Agricultural Economics, 2: 345-364, 1980.

17. *Scandizzo, P.* and *C. Bruce*: Methodologies for Measuring Price Intervention Effects. World Bank Staff Working Paper No. 394, 1980.

18. *Soe, T., Batterham, R.* and *R. Drynan*: Demand for Food in Myanmar (Burma). Agricultural Economics, 11: 207-217, 1994.

19. *Tabor, S., K. Altemeier, B. Adinugroho,* and *N. Daris.*: Demand Parameters for Food Policy Analysis in Indonesia, Working Paper No. 2, Ministry of Agriculture, Jakarta, Indonesia, 1987.

20. *Timmer, C.P.*: Indonesia: Transition from food Importer to Exporter, in T. Sicular, ed, Food Price Policy in Asia. A Comparative Study, Ithaca, New York: Cornell University Press, 1990.

21. *Timmer, C.P.*: Is There "Curvature" in the Slutsky Matrix? Review of Economics and Statistics, 62(3): 395-492, 1981.

22. *Von Braun, J.* and *H. Haen*: The Effects of Food Price and Subsidy Policies on Egyptian Agriculture. International Food Policy Research Institute Research Report No. 42, 1983.