Microeconomic Adjustments of Households to Macroeconomic Shocks: Household Level Welfare Impacts of the Indonesian Economic Crisis[1]

Jacinto F. Fabiosa
Center for Agricultural and Rural Development
Iowa State University
Ames, Iowa

Helen H. Jensen
Center for Agricultural and Rural Development
Iowa State University
Ames, Iowa

Correspondence to: J. Fabiosa, Center for Agricultural and Rural Development, Iowa State University, Ames, IA, 50011-1070, USA. Phone: (515) 294-6183. FAX: (525) 294-6336. E-Mail: jfabios@gcard.iastate.edu.

Subject Code: Consumer Behavior / Household Economics
Session Type: Selected Paper

[1] Paper submitted for presentation to the 2002 AAEA Annual Meeting in Long Beach, California, July 28-31, 2002.

Abstract

The macroeconomic crisis in Indonesia in the late 1990s reduced real per capita income by 74 percent and increased prices of some food groups by 92-445 percent. Adjustments in the consumption decisions of households during this period was analyzed using SUSENAS data. The data showed a very strong pattern of adjustment in the consumption decisions of households. That is, households substituted away from more expensive food groups to cheaper alternatives. Of the nine food groups examined, per capita consumption declined in seven food groups with largest declines in eggs-milk (38%), fish (20%), and meats (13%). In contrast, consumption of the cheapest food group – tubers, increased by 22 percent. Also, households substituted away from the expensive animal-protein sources to cheaper plant-protein sources. Consumption of legumes increased by 13 percent. Moreover, the proportion of households with positive consumption showed the largest declines in meats (13 percentage points) and eggs-milk (10 percentage points), while it declined the lowest in legumes (0.66 percentage points). On the other hand, the proportion of households with positive consumption actually increased only in tubers. The same pattern is shown by the budget re-allocation of households.

An AIDS model that accommodates zero consumption was estimated using Heien-Wessels and Shonkwiler-Yen methods. Variation in the parameter (and elasticity) estimates between the two models is largest in food groups with higher proportion of zero consumption such as in meats, while parameter estimates did not vary significantly in food groups with high proportion of positive consumption such as vegetable and cereals.

Welfare analysis shows doubling of the cost of purchasing a bundle of food groups that give the same level of utility as in the pre-crisis period.

Microeconomic Adjustments of Households to Macroeconomic Shocks: Household Level Welfare Impacts of the Indonesian Economic Crisis

1. Introduction

In 1997-1998, a number of Asian economies suffered severe currency and financial crisis. Many analysts (Corsetti, Pesenti, and Roubini 1998) blamed structural and policy distortions as the root cause of the crisis. In particular, public guarantees to private projects and a network that encouraged personal favoritism made costs and riskiness considerations less important in investment projects that led to accumulation of non-performing assets.

Of the Asian countries affected, Indonesia was one severely hit by the crisis. Table 1 provides some aggregate measures of the magnitude of the economic shock in Indonesia. The ruphia depreciated by 244 percent, from an exchange rate of 2,343 ruphias per U.S. dollar in 1996, it jumped to 7,855 rupiahs in 1999 and 8,422 ruphias. Inflation skyrocketed to 148 percent between 1996 and 2000. Real per capita income dropped from $898 in 1996 to $233 in 1999, and remained low even in 2000 at $224. Although the macroeconomic crisis in Indonesia was most severe in 1998, its impact extended into 1999 and beyond.

With the magnitude of this crisis, the whole country of Indonesia had to make adjustments. The Government of Indonesia (GOI) had to comply with conditions set by international lending institutions as a requirement to receive the needed assistance package. For example, the control of the State Trading Enterprise (BULOG) on imports of food products was relaxed. But larger adjustments had to be done by individual households. The general objectives of this paper are: a) to analyze how Indonesian households adjusted to the macroeconomic shock. Particular focus is made on adjustments in their consumption decisions, and b) to estimate the welfare impacts of these adjustments at the household level. Specifically, we will investigate whether welfare impacts are underestimated (overestimated) due to parameter attenuation (inflation) in estimation.

2. Model

Let [1] be a demand function

[1] $q^* = q^*(P,Y)$,

where q^* is a vector of consumption quantities, P is a vector of prices, and Y is income. The demand function is assumed to be integrable that gives a well-behaved cost function in [2]

[2] $C = C(U,P)$,

where U is a utility level. Welfare impact analysis can use equation [2] to measure compensating variation, which quantifies the change in the cost (C) of purchasing a consumption bundle that gives the same level of utility in the reference period, given the price changes. That is,

[3] $CV = C(U^0,P^1) - C(U^0,P^0)$.

Since the microeconomic adjustments of households to the macroeconomic shock included the increase in the proportion of zero consumption, any analysis of the impact of the macroeconomic shock will have to properly address this issue. The bias in the parameter estimates resulting from the use of only positive consumption when there are many zero observations is well known. In the past, zero consumption was avoided by employing a representative household as a unit of observation, with the expectation that averaging[2] would eliminate observations with zero consumption. Recently, the literature has developed two strands of fundamental approaches in dealing with zero consumption in a system of equation. The first is an economic approach, which uses a Kuhn-Tucker model (Wales and Woodland [1983], Lee and

[2] For example, an average of a Primary Sampling Unit is used.

and Pitt [1986]) that treats zero consumption as a corner solution of a consumer's utility maximization problem. The second is a statistical approach, which proceeds by assuming all interior solution but uses a truncated distribution for the random disturbance to correct for any zero consumption. With the difficulty of evaluating multiple integrals in the likelihood function, maximum likelihood estimation in the second approach is not widely used. Instead, a two-step procedure is commonly used. Heien and Wessels (HW 1990) proposed a two-step procedure where the estimating model is augmented with a "mills ratio" regressor. However, Shonkwiler and Yen (SY 1999) showed that the HW model lacks proper interaction of the censoring rule and the mean of the latent variable. Moreover, in a monte carlo experiment, SY reported tendencies of attenuation and inflation of parameters with the procedure suggested by HW. This paper uses the two-step procedure of HW and SY in order to allow assessment of whether parameter attenuation and inflation have large impacts on the welfare estimates.

Following the representation used by SY, we model the zero consumption using latent variables with selection mechanism in [4]

[4] $$q_{it}^{*} = f(X_{it}, \beta_i) + \mu_{it}, \qquad d_{it}^{*} = z_{it}^{'}\alpha_i + \upsilon_{it}$$

$$d_{it} = \begin{cases} 1 & if \quad d_{it}^{*} > 0 \\ 0 & if \quad d_{it}^{*} \leq 0 \end{cases}$$

$$q_{it} = d_{it} q_{it}^{*}$$

The two estimating equations are derived from [4]. The first is the HW model,

[4] $$q \;\; = f(X \;\; , \beta \;) + \delta R \;\; + \varepsilon \;\; ,$$

where is R the additional "mills ratio" regressor generated from a probit model in the first step of the estimation and derived as

$$R = \frac{\phi}{\Phi} \quad if \quad q_{it} > 0$$

and

$$R = \frac{\phi}{1-\Phi} \quad if \quad q_{it} \leq 0$$

where ϕ is a normal density function and Φ is a normal cumulative density function.

The second estimating equation is the SY model,

[5] $$q_{it} = \Phi f(X_{it}, \beta_i) + \delta_i \phi + \varepsilon_{it}.$$

The major difference between the two models in [4] and [5] is that the selection rule interacts with the expected value of the latent variable in a multiplicative manner in SY but not in HW, inducing the likely parameter attenuation (inflation).

For ease of estimation, many welfare analyses employ an Almost Ideal Demand Systems (AIDS).[3] This paper specifies the $f(X_{it},\beta_I)$ function as a standard LA/AIDS. The advantages in using the LA/AIDS is established in the literature including a) flexible functional form, b) satisfying exact aggregation across consumers, c) non-linear Engel curves, and d) estimated by a suitable linear approximation. The details of the model are not repeated below. It is of the form,

[6] $$w_{it} = \alpha_{io} + \sum_{j=1}^{n} \gamma_{ij} \ln p_{jt} + \beta_i \ln\left(\frac{Y_t}{P_t}\right) + \lambda_i D_{it} + \varepsilon_t$$

where w is budget share and the j^{th} commodity share is $w_j = (p_j q_j)/Y$; q_j is the quantity demanded of j^{th} commodity; Y is the group expenditures, p_j is the nominal price of j^{th}

[3] It should be noted that this analysis is limited in two respects. First, only food expenditure is analyzed. Second, because it assumes a two-stage budgeting framework by households, AIDS will only give conditional elasticities. If households make adjustments in the first stage of their budgeting decisions, then the model may not fully capture this adjustments.

commodity; *ln P* is the Stone price index defined as $ln\ P = \Sigma_j\ w_j\ ln\ p_j$; D_{it} is a vector of demographic variables, ε is stochastic error term distributed as i.i.d (0, Ω); and (α, γ, β,λ) is a vector of parameters.

Theoretical restrictions of adding-up, homogeneity, and symmetry are imposed on the parameters (Deaton and Muellbauer 1980), i.e.,

Adding-up

[7] $$\sum_{i=1}^{n} \alpha_{i0} = 1, \quad \sum_{i=1}^{n} \beta_i = 0, \quad \sum_{i=1}^{n} \gamma_{ij} = 0 \quad \forall j,$$

Homogeneity

[8] $$\sum_{j=1}^{n} \gamma_{ij} = 0 \quad \forall i,$$

Symmetry

[9] $$\gamma_{ij} = \gamma_{ji} \quad \forall i, j$$

Standard elasticities are estimated using the formula given by Green and Alston (1990, 1991), where the expenditure elasticity is given by

[10] $$\varepsilon_i = \left(1 + \frac{\beta_i}{w_i}\right),$$

marshallian price elasticity is

[11] $$\varepsilon_{ij} = \delta_{ij} + \frac{\gamma_{ij}}{w_i} + \frac{\beta_i w_j}{w_i},$$

and compensated elasticities are derived as,

[12] $$\varepsilon^{*} = \varepsilon + \varpi\ \varepsilon \quad .$$

The models estimated are [4] and [5] with the expected value of the latent variable q^* specified in [6]. Restrictions in [7] to [9] are imposed. Elasticities are adjusted to account for the influence of the selection mechanism in the SY AIDS Model

3. Empirical Results

The availability of a national household survey data both before the crisis (1996) and during the crisis (1999)[4] provides rich information for examining how households adjusted to the macroeconomic shock. The National Socio-Economic Household Survey (SUSENAS) had 60,674 households in 1996 and 60,681 in 1999. Nine aggregate major commodities are considered, including cereals, tubers, fish, meat, eggs-milk, vegetables, pulses (legumes), fruits, and oils-fat. Table 2 shows the prices of major commodities in the pre and post-crisis period. In 1996, tubers are the cheapest at 574 rupiahs per kilogram (kg), followed by cereals at 962 rupiahs per kg. Meat, eggs-milk, and fish are the most expensive at 5,857 and 4,094 rupiahs per kg. In terms of price changes between the pre and crisis period, fruits, tubers, and pulses had the smallest price change, in the range of 92 to 152 percent. Fish showed the highest increase of 445 percent. Cereals also increased substantially by 179 percent, a reflection of the reform of the price support called for as a condition of the financial support package. Total food expenditure increased by 128 percent.[5]

Table 3 shows the changes in household consumption and expenditure. The changes in household consumption and expenditure is expressed in terms of the change in the level of per capita consumption for households with positive consumption, and in the change in the

[4] Although the macroeconomic crisis in Indonesia was most severe in 1998, its impact extended into 1999 and beyond.

[5] It should be noted that prices of the aggregate commodities from the consumption survey show larger price increases in food compared to the increase in the general price level (i.e., general inflation).

proportion of households with positive consumption. Also, changes in the shares of consumption expenditure are shown to capture the joint impact of the change in consumption level and prices. A general pattern of adjustment is shown by this data. Households with positive consumption levels reduced their consumption of seven of the nine aggregate food groups with largest decline in the more expensive food groups including eggs-milk at 38.15 percent, fish 19.55 percent, and meat 13.01 percent. These three groups are the major sources of animal protein. A decline in the consumption level is also observed in other food groups but at moderate rates. For example, cereals consumption declined by 5.77 percent, oils-fats by 4.09 percent, and fruits by 3.23 percent. However, consumption of tubers and pulses, the cheaper food groups, increased by 22.17 and 13.15 percent, respectively. This shows that households substituted the more expensive food items with the cheapest of all food groups – tubers, which also has one of the lowest price increases. Also, households substituted the more expensive animal-protein sources with the cheaper plant-protein source - pulses.

Another dimension in the response of consumers is reflected by the reduction of the proportion of households with positive consumption. Again, a similar pattern emerges. That is, meats and eggs-milk showed the highest decline in the proportion of households with positive consumption, 12.68 percentage points for meat and 9.89 percentage points for eggs-milk. Also, the proportion of households with positive consumption declined the lowest in pulses, by 0.66 percent. Of the nine food groups, the proportion of households with positive consumption showed an increase only in tubers by 0.75 percent.

The expenditure share of each food group reflects the changes in consumption and prices. The largest decline in expenditure share is in meat by 2.4 percent. The expenditure share of tubers also declined but this decline can be attributed to the relatively lower increase in prices of tubers compared to the other commodities.

The welfare impacts of the crisis can be estimated given the parameter estimates of the model. Most welfare analysis use a single set of parameter estimates and simply apply the changes in prices to the same set of parameters to estimate welfare impacts. However, with the magnitude of the 1998 macroeconomic shock in Asia, it is likely that part of the adjustments of the households is to change their underlying preference structure.[6] With the 1996 and 1999 SUSENAS two different sets of parameters is used in estimating the welfare impacts. We will examine whether welfare impacts are underestimated or overestimated with the use of only one set of parameters.

Parameters (and elasticities) of the model were estimated from the entire household sample to allow full and correct treatment of zero consumption observations. However, in estimating the welfare impacts it was necessary to use a representative household to generate the price changes faced by the same representative household in the 1996 and 1999 data. This was necessary because there is no guarantee that the same households were included in the 1996 and 1999 surveys. But both surveys had the same Enumeration Area (EA) as the Primary Sampling Unit. The EA's satisfy two conditions: a) identifiable in the field with clear permanent boundaries, and b) homogenous.

Table 4 shows the parameter estimates for the 1996 SUSENAS for both the HW and SY AIDS model. In general, the departure of the SY estimates from the HW estimates is inversely related to the proportion of households with positive consumption. This is somehow expected because the main difference between the two models is that the selection rule enters in a

---

[6] Lucas critique argues that estimated parameters in econometric models might be non-constant with respect to regimes investigated.

multiplicative manner in the SY model but not in the HW. That is, the difference between the parameter estimates is large when the proportion of positive consumption is low, as in the case of meat, where the signs are even different. A large difference is also observed in tubers. However, as the proportion of positive consumption increases (i.e., approaching one), the difference between the two estimates vanishes, as in the case of vegetables and cereals.

Tables 5 to 10 present the elasticity estimates of the two models. In the HW model, except for cereals and eggs-milk, all aggregated commodities have expenditure elasticities that are greater than one, while meat is the only one that is elastic both for Marshallian and Hicksian elasticity. This may be due to the availability of cheaper substitutes. Similar to the pattern in the parameter estimates, larger differential is shown by aggregate commodities that have lower proportion of positive consumption compared to other commodities with higher proportion of positive consumption.

Initial welfare impact estimates indicate that in the crisis period, it costs Indonesian households two times more (on an annual basis) to purchase a bundle of goods that gave the same level utility as in the pre-crisis period. The welfare impacts are much higher using the parameter estimates in the SY model than the HW model.

4. Summary and Conclusion

Indonesia was severely affected by the Asian-wide macroeconomic crisis in the late 1990s. Its currency depreciated by 244 percent, inflation skyrocketed to 148 percent, and real per capita income declined by 74 percent. This paper analyzed the microeconomic adjustments of Indonesian households in their consumption decisions during the macroeconomic crisis. Preliminary welfare impacts at the household level were also estimated.

The availability of a nationwide consumption and expenditure survey in 1996 and 1999 allowed a detailed analysis of household adjustments to the macroeconomic shock. The pattern of adjustments in consumption was evident in two dimensions, namely, on the level of consumption, and on the proportion of households with positive consumption during the survey period. In both cases, there was an evident shift away from more expensive food groups such as eggs-milk and fish to cheaper commodities such as tubers. Specifically, there was an evident shift away from expensive animal-protein source food groups such as meats to cheaper plant-protein alternatives such as pulses (legumes). Average per capita consumption declined in all food groups except for tubers and pulses. This adjustment is further reflected by the budgeting decisions of households, allocating less household income on meats and more to cheaper food groups.

Since the microeconomic adjustments of households to the macroeconomic shock included the increase in the proportion of zero consumption, any analysis of the impact of the macroeconomic shock will have to properly address this issue. This paper used the two-step procedure of HW and SY in estimating an AIDS model of nine food groups. Parameter estimates varied between the HW and SY AIDS model, especially on food groups with lower proportion of positive consumption such as the meats group. Less variation is observed for food groups with high proportion of households with positive consumption.

Estimated demand parameters were used in deriving a cost function for the welfare analysis. With prices increasing in the range of 92 to 445 percent, it cost Indonesian households twice as much (on an annual basis) in the crisis period to purchase a bundle of food groups that gives the same level of utility as that of the pre-crisis period.

Table 1. Macroeconomic indicators

Variable	**Units**	**1993**	**1996**	**1999**	**2000**
Exchange Rate	LC/US	2087.1	2342.3	7855.2	8421.8
CPI	Index	84.2	91.4	115.2	227.0
Per Capita RGDP	US$	842.3	897.6	232.9	224.3

Source: IFS http://imf.largo.apdi.net/

Table 2. Comparison of prices and food expenditures between the 1996 and 1999 SUSENAS

	1999	**1996**	**% Δ (99-96)**
Prices	Rupiah per kilogram		
Cereals	2671	962	179
Tuber	1355	574	146
Fish	17349	3331	445
Meat	15083	5857	169
Eggs and Milk	11576	4094	234
Vegetable	5316	1563	270
Pulses	3320	1353	152
Fruits	2158	1234	92
Oils and Fat	4650	1737	173
Expenditure	Rupiah per month		
Food	63,588	29,234	128

Table 3. Comparison per capita consumption, proportion of positive consumption, and expenditure shares between 1996 and 1999 SUSENAS

	1999	**1996**	**% Δ (99-96)**
Per Capita Consumption	Kilograms per person per month		
Cereals	8.85	9.53	-5.77
Tuber	2.16	2.13	22.17
Fish	1.12	1.52	-19.55
Meat	0.80	1.04	-13.01
Eggs and Milk	0.64	1.29	-38.15
Vegetable	2.63	3.28	-12.34
Pulses	1.55	1.48	13.15
Fruits	2.40	2.78	-3.23
Oils and Fat	1.05	1.15	-4.09
Proportion of positive Q	Percent		
Cereals	98.94	99.64	-0.69
Tuber	52.06	51.32	0.75
Fish	85.34	87.33	-1.99
Meat	30.06	42.74	-12.68
Eggs and Milk	66.20	76.09	-9.89
Vegetable	97.88	98.98	-1.10
Pulses	75.20	75.86	-0.66
Fruits	69.69	75.93	-6.24
Oils and Fat	97.73	98.68	-0.94
Expenditure Shares	Percent		
Cereals	0.418	0.385	0.033
Tuber	0.019	0.021	-0.002
Fish	0.127	0.132	-0.005
Meat	0.041	0.065	-0.024
Eggs and Milk	0.063	0.071	-0.008
Vegetable	0.152	0.140	0.012
Pulses	0.054	0.051	0.003
Fruits	0.050	0.065	-0.015
Oils and Fat	0.076	0.071	0.005

Table 4. Parameter estimates HW 1996 using the HW and SY AIDS Model

	HW AIDS Model		**SY AIDS Model**	
	Coefficient	**Std Error**	**Coefficient**	**Std Error**
Cereals Equation				
Cereals Price	0.130	0.003	0.139	0.002
Food Expenditure	-0.113	0.002	-0.120	0.002
Tubers Equation				
Tuber Price	0.003	0.000	0.012	0.001
Food Expenditure	0.015	0.001	0.047	0.001
Fish Equation				
Fish Price	0.001	0.001	0.003	0.001
Food Expenditure	0.003	0.001	0.001	0.001
Meat Equation				
Meat Price	-0.007	0.001	0.008	0.002
Food Expenditure	0.002	0.001	-0.021	0.002
Eggs and Milk Equation				
Eggs and Milk Price	0.012	0.000	0.015	0.000
Food Expenditure	-0.017	0.001	-0.025	0.001
Vegetable Equation				
Vegetable Price	0.021	0.001	0.022	0.001
Food Expenditure	0.029	0.001	0.029	0.001
Pulses Equation				
Pulses Price	0.004	0.001	0.006	0.001
Food Expenditure	0.009	0.001	0.018	0.001
Fruit Equation				
Fruits Price	0.033	0.000	0.043	0.001
Food Expenditure	0.040	0.001	0.074	0.001

Table 5. HW Expenditure elasticity SUSENAS 1996

	Expenditure	**Average Share**
Cereals	0.71	0.385
Tubers	1.72	0.021
Fish	1.03	0.132
Meat	1.03	0.065
Eggs and Milk	0.76	0.071
Vegetables	1.21	0.140
Pulses	1.18	0.051
Fruits	1.62	0.065
Oils and Fat	1.45	0.071

Table 6. HW Marshallian elasticity SUSENAS 1996

	Cereals	Tubers	Fish	Meat	Egg	Vege	Pulses	Fruits	Oils
Cereals	**-0.57**	0.00	-0.01	0.00	-0.02	-0.04	0.00	-0.06	0.00
Tubers	-0.45	**-0.89**	0.01	0.28	0.11	-0.43	0.02	-0.20	-0.17
Fish	-0.17	0.02	**-0.99**	0.05	-0.01	0.05	0.03	0.02	-0.01
Meat	-0.12	0.10	0.10	**-1.12**	0.01	0.08	-0.05	0.05	-0.09
Egg	-0.17	0.06	0.01	0.03	**-0.81**	0.08	-0.01	0.08	-0.03
Veg	-0.31	-0.05	0.02	0.03	0.00	**-0.89**	-0.01	-0.02	0.02
Pulses	-0.18	0.02	0.05	-0.07	-0.04	-0.02	**-0.93**	-0.04	0.05
Fruits	-0.71	-0.07	-0.05	0.02	0.01	-0.12	-0.05	**-0.54**	-0.11
Oils	-0.23	-0.05	-0.07	-0.11	-0.08	0.00	0.02	-0.10	**-0.83**

Table 7. HW Hicksian elasticity SUSENAS 1996

	Cereals	Tubers	Fish	Meat	Egg	Vege	Pulses	Fruits	Oils
Cereals	**-0.28**	0.01	0.08	0.05	0.03	0.05	0.04	-0.02	0.06
Tubers	0.17	**-0.84**	0.24	0.38	0.24	-0.17	0.11	-0.08	-0.05
Fish	0.22	0.04	**-0.86**	0.12	0.06	0.19	0.08	0.09	0.07
Meat	0.28	0.12	0.24	**-1.05**	0.09	0.22	0.00	0.12	-0.02
Egg	0.14	0.07	0.11	0.08	**-0.75**	0.18	0.03	0.12	0.03
Veg	0.14	-0.03	0.18	0.10	0.09	**-0.71**	0.05	0.06	0.11
Pulses	0.26	0.05	0.20	0.00	0.04	0.15	**-0.87**	0.04	0.13
Fruits	-0.13	-0.02	0.17	0.12	0.13	0.12	0.03	**-0.43**	0.00
Oils	0.30	-0.02	0.13	-0.02	0.03	0.22	0.09	0.00	**-0.73**

Table 8. SY Expenditure elasticity SUSENAS 1996

	Expenditure	**Average Share**
Cereals	0.66	0.385
Tubers	3.47	0.021
Fish	1.01	0.132
Meat	0.64	0.065
Eggs and Milk	0.61	0.071
Vegetables	1.23	0.140
Pulses	1.38	0.051
Fruits	2.25	0.065
Oils and Fat	0.96	0.071

Table 9. SY Marshallian elasticity SUSENAS 1996

	Cereals	Tubers	Fish	Meat	Egg	Vege	Pulses	Fruits	Oils
Cereals	**-0.52**	-0.03	-0.01	0.01	-0.02	-0.02	0.00	-0.08	0.01
Tubers	-1.60	**-0.54**	-0.04	0.53	0.23	-1.07	-0.05	-0.42	-0.50
Fish	-0.17	0.05	**-0.98**	0.03	-0.02	0.05	0.04	0.03	-0.04
Meat	0.08	0.23	0.12	**-0.85**	-0.03	0.14	-0.07	-0.01	-0.25
Egg	-0.13	0.14	0.01	-0.03	**-0.77**	0.10	-0.01	0.12	-0.05
Veg	-0.31	-0.11	0.02	0.02	0.00	**-0.89**	-0.01	-0.03	0.06
Pulses	-0.24	0.01	0.05	-0.13	-0.06	-0.05	**-0.90**	-0.08	0.01
Fruits	-1.06	-0.13	-0.11	-0.11	0.01	-0.25	-0.10	**-0.43**	-0.08
Oils	-0.01	-0.11	-0.06	-0.24	-0.07	0.16	0.02	-0.01	**-0.65**

Table 10. SY Hicksian elasticity SUSENAS 1996

	Cereals	Tubers	Fish	Meat	Egg	Vege	Pulses	Fruits	Oils
Cereals	**-0.27**	-0.01	0.08	0.06	0.02	0.07	0.04	-0.04	0.06
Tubers	-0.27	**-0.47**	0.41	0.75	0.47	-0.59	0.13	-0.19	-0.25
Fish	0.22	0.07	**-0.85**	0.10	0.05	0.19	0.09	0.09	0.04
Meat	0.33	0.25	0.20	**-0.81**	0.02	0.23	-0.03	0.03	-0.20
Egg	0.11	0.15	0.09	0.01	**-0.72**	0.19	0.03	0.16	-0.01
Veg	0.16	-0.08	0.18	0.10	0.09	**-0.71**	0.06	0.05	0.15
Pulses	0.30	0.04	0.23	-0.04	0.04	0.14	**-0.83**	0.02	0.11
Fruits	-0.20	-0.09	0.18	0.04	0.17	0.07	0.02	**-0.28**	0.08
Oils	0.36	-0.09	0.06	-0.18	0.00	0.29	0.07	0.05	**-0.58**

References

Agnew, G.K. 1998. "LinQuad: An Incomplete Demand System Approach to Demand Estimation and Exact Welfare Measures." Thesis. Department of Agricultural and Resource Economics, University of Arizona.

Amemiya, T. 1974. "Multivariate Regression and Simultaneous Equation Models when the Dependent Variables are Truncated Normal." *Econometrica*, 42:999-1012.

BPS (Central Bureau of Statistics). 1996 and 1999. Indonesia's National Socio-Economic Survey (SUSENAS). Jakarta, Indonesia.

Corsetti, G., P. Pesenti, and N. Roubini. 1998. "What Caused the Asian Currency and Financial Crisis?" Paper presented in a CEPR- World Bank conference on "Financial Crises: Contagion and Market Volatility," May 1998.

Deaton, A., and J. Muellbauer. 1980. "An Almost Ideal Demand System." *American Economic Review*, 70:312-26.

Green, R., and J.M. Alston. "Elasticities in AIDS Models." Amer. J. Agr. Econ. 72(1990):442-45.

Green, R., and J.M. Alston. "Elasticities in AIDS Models: A Clarification and Extension." Amer. J. Agr. Econ. 72(1991):874-75.

Heien. D, and C.R. Wessels. 1990. "Demand System Estimation with Microdata: A Censored Regression Approach," *Journal of Business and Economic Statistics*, 8(3):365-71.

Lee, L., and M. Pitt. 1986. "Microeconometric Demand Systems with Binding Non-negativity Constraints: The Dual Approach." *Econometrica*, 54:1237-42.

Lucas, R.E. 1976. "Econometric Policy Evaluation: A Critique." *Carnegie-Rochester Conference Series in Public Policy*, 1:19-46.

Phaneuf, D., C. Kling, and J. Herriges. 2000. "Estimation and Welfare Calculations in a Generalized Corner Solutions in Recreation Demand." *The Review of Economics and Statistics*, 82:83-92.

SAS Institute Inc. 1993. SAS/ETS User's Guide, Version 6. Second Edition. Cary, NC: SAS Institute Inc.

Shonkwiler, J.S., and S. Yen. 1999. "Two-Step Estimation of a Censored Demand System of Equations." *American Journal of Agricultural Economics*, 81:972-82.

Wales, T., and A. Woodland. 1983. "Estimation of Consumer Demand Systems with Binding Non-Negativity Constraints." *Journal of Econometrics*, 21:263-85.