

BIBLIOGRAPHIC INFORMATION

Title	A Complete Demand System of Food in Malaysia.
Source	ICFAI Journal of Agricultural Economics; Jul2008, Vol. 5 Issue 3, p17-29, 13p
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Publication/Conference	NA
Edition	NA
Document Type	Article
CPI Primary Subject	Economics
CPI Secondary Subject	Agriculture; ;
Geographic Terms	Malaysia;
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A Complete Demand System of Food in Malaysia[†]

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There has been a notable success in the Malaysian economy, with its countrymen getting wealthier and food consumption undergoing transitional changes. This study intends to analyze the complete demand system of food in Malaysia by using the Household Expenditure Survey 2004/2005 via the Linear Approximate Almost Ideal Demand System (LA/AIDS) model. As expected, the estimated own-price elasticities for all foods follow the law of demand. The empirical results show that the demand for all foods in response to the income is relatively positive, with expenditure elasticities of meat (1.110), fruits (1.341), vegetables (1.341), sugar and beverage (1.039) and other foods (1.115) being elastic. This study shows that the Malaysian food consumption pattern is not only moving towards higher value food products (especially meats) but also functional foods (fruits and vegetables) as the per capita income of Malaysians increases.

Introduction

Since the economic crisis in 1997, there has been a notable success of the Malaysian economy, with its countrymen getting wealthier and food consumption undergoing transitional changes. The most significant change in the food consumption pattern is a strong growth in the demand for wheat based products as substitutes to rice. This decline in the consumption of the staple food, rice, indicates an improvement in the welfare, as laid down by Engel's hypothesis (Mittal, 2006). Another perspective observes an increasing demand for meat products

[†] The paper was presented at proceedings of the USM-UPM-PETA Conference: Agriculture as a Business, Penang, November 28-29, 2007.

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in Malaysia. Kumar (1997) pointed out that such diversification in the food basket will improve the quality of life by adding to the nutritional status and welfare of the population.

Such changes in Malaysia play an important role in the outlook for future in the Malaysian agri-food industry. Understanding of food consumption provides an indication to commodity consumption, which could drive feed grain demand and in turn have a significant impact on the domestic and international feedstuffs market. These brought the policy makers' and industrial players' attention on food demand system in Malaysia. One common means of addressing the system is to build a complete food demand model that can be used to provide information about the prospects for food and related agricultural commodities.

Hence, this study aims to analyze the complete demand system of food in Malaysia via an econometric estimation of the expenditure share equations for foods via the Linear Approximate Almost Ideal Demand System (LA/AIDS). To be more specific, the objective of this study is to investigate the changes in food consumption pattern by estimating the expenditure elasticity, compensated and uncompensated own-price elasticity for selected food commodities including cereal, meat, fish, milk, eggs, oil and fat, fruits, vegetables, sugar and beverage, and spices and others.

Food Consumption Patterns in Malaysia

Trends in the Malaysian food consumption are typical of those in the developing countries. The changes can be categorized into the following stages: an initial increase in the consumption of traditional staple foods (such as rice); followed by an increase in the consumption of non-traditional staple foods (such as wheat and secondary products derived from traditional staple material); diversification in consumption habits including the time and place of consumption; and finally, an increase in the consumption of a greater variety and volume of higher value and higher proteins foods (such as meat, fish and milk).

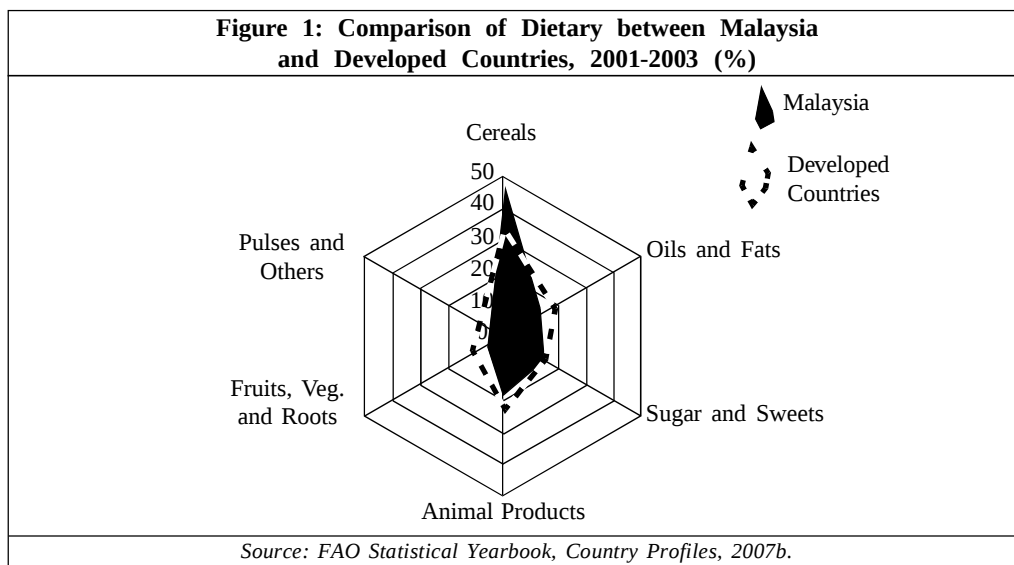
Such changes are statistically indicated in Table 1 which shows the consumption patterns of aggregated food groups in Malaysia. Overall, it shows that there is diversification in food consumption pattern among the Malaysians. In other words, the consumers are exposed to a wider choice of foods. The preference among the choices is further illustrated by the increasing demand for cereals, meat, fish and seafood from 1985-2003. The most significant observation is that there has been more than 100% increase in the consumption of cereals within the same period.

In contrast, the per capita consumption of the staple food, rice, has been declining indicating an increase in the consumer's welfare (Rao, 2000). Radhakrishna (2005) has argued that this sharp decline in the staple food consumption can be attributed to the changes in consumer tastes—from food to non-food items, and within the food group, from staple food to non-staple food items and from 'coarse' to 'fine' staple food.

Table 1: Per Capita Consumption of Foods in Malaysia, 1985-2003									
Year/Per Capita Food Consumption (kg)	Rice	Cereals	Meat	Eggs	Fish and Seafood	Vegetables	Fruits	Spices	Sugar and Sweeteners
1985	83.4	33.4	29.4	45.44	45.44	56.38	54.21	2.53	37.61
1990	84.8	31.1	37.9	48.95	48.95	55.81	53.73	1.99	37.96
1995	86.8	29.8	52.8	58.31	58.31	61.33	55.17	1.36	47.54
1996	86.9	28.1	52.9	56.33	56.33	67.34	55.79	1.43	50.77
1997	87.7	33.6	52.7	60.41	60.41	59.70	57.25	1.28	47.54
1998	88.1	31.5	50.5	57.40	57.40	58.39	52.48	1.82	43.28
1999	77.9	39.6	46.4	60.66	60.66	59.73	54.34	2.74	42.40
2000	86.1	35.6	45.5	60.86	60.86	59.34	55.09	2.79	42.72
2001	87.3	34.3	47.5	58.64	58.64	60.22	56.02	2.98	42.06
2002	75.8	55.4	48.1	57.48	57.48	62.80	55.32	3.22	41.84
2003	70.8	65.6	48.5	56.39	56.39	58.98	54.72	3.32	41.79
Source: Food and Agriculture Organization of the United Nations (FAO), 2007a.									

Comparison of the Malaysian Dietary with Developed Countries

A comparison of the dietary between Malaysia and developed countries from 2001 to 2003 is presented in Figure 1. If the consumption of cereals reflects the economic status of a country, then Malaysia's economic condition had not reached the standard of developed countries. Malaysians consumed as much as 20% more cereals than the developed countries. It indicates that cereals are still the main source of dietary calorie in Malaysia.



In the meantime, there is just a small gap in the consumption of animal products, sugar and sweet between Malaysia and the developed countries. Such closing-gap refers to the westernization in the Malaysians' food consumption pattern. Hence, it is expected that meat consumption will be increased in future. However, Malaysians did not consume as much as the developed countries in terms of healthy food, particularly fruits and vegetables. To be more specific, the per capita consumption of fruits in Malaysia is still very low compared to 61-139 kg/person/year of the developed countries.

Previous Studies on Food Consumption in Malaysia

There are several notable studies of food consumption behaviors in Malaysia. The studies in the 1970s (Tee and Thiam, 1975) and 1980s (Hussein *et al.*, 1986) used a single equation method to estimate elasticities and projection of future food demand. Both the studies indicated that there would be an increasing demand for the staple food rice so as to fulfill the basic food requirement.

In the 1990s, Baharumshah and Mohamed (1993) examined the demand for meat by using LA/AIDS, while Mustapha (1994) examined the incorporating habit in the demand for fish and meat products in Malaysia by using two-stage budgeting system. Both the studies used the same data from the Household Expenditure 1990. It was found that as the per capita income increased, the Malaysians had a tendency to consume more meat and fish. To be more specific, more consumption of poultry based products was observed compared to other meat products.

Mustapha *et al.* (1999, 2000 and 2001) used the same cross-sectional data of Household Expenditure Survey 1990 to examine the income and price elasticities of food demand in Malaysia by applying LA/AIDS model. The income elasticities showed that there would be a steep increase in demand for meat and wheat based products. The studies suggested that there would be a clear move towards high value and superior foods as the per capita income of the Malaysians increases and the level of affluence of Malaysian society rises.

Ishida *et al.* (2003) studied the changes in food consumption expenditure in Malaysia. The study estimated Engel's expenditure elasticities for food items using aggregated cross-sectional data from the Household Expenditure Survey 1973, 1980 and 1993/94. The estimated results indicated that elasticities of meat, fruits, vegetables, milk and dairy products are relatively high. Overall, this study suggested that the food expenditure structure in Malaysia had diversified, adding more meat, fruits and vegetables, and milk and dairy to the most dominant food item, rice. Moreover, this study also showed that the changing pattern of food consumption among the Malaysians is highly attributed to population growth and higher per capita income, coupled with drastic structural changes in the lifestyle of the population which is further complimented by rapid urbanization.

By using the data from Household Expenditure 1990, Radam *et al.* (2005) extended the study on food demand in Malaysia and the elasticities for the major food groups were estimated via LA/AIDS. The study mainly focused on the demand for fruits in Malaysia by investigating the expenditure elasticity and determinants of individual fruit demand in Malaysia via the Working-Leser model. The study indicated that the Malaysians would increasingly demand not only higher value food items but also functional food items like fruits.

Method and Data

The data used in this study is the Household Expenditure Survey 2004 from the Department of Statistics, Malaysia. The purpose of the survey is to collect the information on income and expenditure of households. The data consists of 14,084 households. Such large sample provides the degrees of freedom to estimate a large demand system (Chern *et al.*, 2003).

According to Singh *et al.* (1978), the current income is the most important determinant of consumption expenditure based on their evaluation on the empirical effects of the relative income and the permanent income on aggregate consumption in Canada, India, the Netherlands, and West Germany. Therefore, this study employs expenditure rather than income in the demand system like other studies in Malaysia (Baharumshah and Mohamed, 1993; Mustapha *et al.*, 1999, 2000 and 2001; and Radam *et al.*, 2005).

The Almost Ideal Demand System model developed by Deaton and Muellbauer (1980a, 1980b) is useful to estimate the elasticities (own-price, income and cross-price) of demand for food groups. Most of the literature on Malaysia's food consumption pattern has employed this methodology. The true AIDS model is difficult to estimate as the price index is not linear in the parameters estimated (Chern *et al.*, 2003). Thus, the current study also applied the LA/AIDS to estimate demand elasticities for households in Malaysia.

The LA/AIDS model for the 11 food groups can be estimated as follows:

$$\omega_i = \alpha_i + \sum_j \gamma_{ij} \ln P_j + \beta_i \ln \left(\frac{E}{P^*} \right) \quad \dots(1)$$

where $i, j = 1, 2, \dots, 11$ food groups

ω_i = the expenditure share of the i th food category

P_j = the log price of basic food item, $j = 1, 2, \dots, 11$

E = total expenditure on all food items in the system, and

$\alpha_i, \gamma_{ij}, \beta_i$ = demand parameters to be estimated.

The stone index has been widely used for LA/AIDS estimation (Asche and Wessells, 1997)

$$\ln(P^*) = \sum_i w_i \ln(P_i) \quad \dots(2)$$

where w_i is budget share among eleven commodities.

The results obtained from Equation 1 were used to compute elasticities of demand for the 11 food groups in this study. Following the formulae and procedures of Green and Alston (1990), the elasticities calculated are as follows:

Expenditure elasticities

$$\varepsilon_i = \frac{\beta_i}{\omega_i} + 1 \quad \dots(3)$$

Uncompensated own-price elasticities

$$e_{ii} = \frac{\gamma_{ii}}{\omega_i} - (1 + \beta_j) \quad \dots(4)$$

Uncompensated cross-price elasticities

$$e_{ij} = \frac{\gamma_{ij}}{\omega_i} - \frac{\beta_i \omega_i}{\omega_j} \quad \dots(5)$$

Compensated own-price elasticities

$$\phi_{ii} = -1 + s_i + \frac{\gamma_{ii}}{S_i} \quad \dots(6)$$

Compensated cross-price elasticities

$$\phi_{ij} = s_j + \frac{\gamma_{ij}}{S_i} \quad \dots(7)$$

where ω_i is the budget share of the i^{th} food item

β_i and γ_{ij} are parameters estimated from the LA/AIDS model in (1).

Results

The estimates of expenditure elasticities from LA/AIDS are shown in Table 2. Expenditure elasticity can be explained as a change in the quantity demanded for commodity in response to the income growth. The results indicate that meat, fruits, vegetables, sugar and beverage,

Table 2: Expenditure Elasticities of the LA/AIDS Model	
Food Groups	Expenditure Elasticities
Cereals	0.878
Meat	1.110
Fish	0.910
Dairy	0.732
Eggs	0.890
Oil and Fat	0.960
Fruits	1.341
Vegetables	1.341
Sugar and Beverage	1.039
Spices	0.971
Others	1.115

Table 3: Uncompensated Price Elasticities of the LA/AIDS Model											
Food Groups	Cereals	Meat	Fish	Dairy	Eggs	Oils and Fats	Fruits	Vegetables	Sugar and Beverage	Spices	Others
Cereals	-0.920	-0.183	-0.216	0.026	-0.039	-0.199	0.325	0.240	0.321	-0.098	0.260
Meat	0.008	-1.031	-0.011	-0.267	0.200	0.123	0.027	0.025	0.179	0.098	-0.005
Fish	-0.045	0.109	-0.898	-0.045	0.506	0.319	-0.242	-0.238	-0.110	0.058	-0.087
Milk	-0.085	-0.015	0.133	-0.523	-0.068	-0.039	-0.103	-0.082	-0.200	-0.053	-0.030
Eggs	0.085	-0.016	0.192	-0.120	-1.322	0.108	-0.251	-0.214	-0.184	0.264	-0.027
Oils and Fats	0.046	-0.044	-0.060	-0.014	-0.305	-1.233	0.096	0.089	0.060	-0.022	-0.090
Fruits	0.405	-0.173	-0.175	-0.255	0.123	-0.676	-1.331	-0.340	0.520	-0.433	0.069
Vegetables	-0.431	0.163	0.306	0.314	-0.058	0.679	0.180	-0.848	-0.603	0.727	0.020
Sugar and Beverage	-0.021	0.047	-0.012	0.115	0.038	0.013	-0.045	-0.047	-1.011	-0.015	-0.002
Spices	0.069	0.067	-0.098	0.013	0.057	0.020	0.029	0.027	-0.062	-1.341	0.015
Others	0.012	-0.035	-0.071	0.024	-0.021	-0.075	0.037	0.047	0.052	-0.157	-0.765

and other foods are relatively expenditure elastic with elasticity exceeding one. Expenditure elasticities of commodities in 2004/2005 are generally higher than the 1990s, except oil and fat and sugar and beverage. Such findings are similar to Regmi and Dyck (2001), implying that higher value food products undergo greater budget adjustments to income shock, while budgets for staple food products like cereals, change the least.

Notable attention is paid to the highest estimated expenditure elasticities of fruits (1.341) and vegetables (1.341) among all. The results show that the demand for healthier foods is expected to grow faster than other higher value commodities (especially meat), though a growing demand for meat is expected to continue. This is crucial when comparing the expenditure elasticity of meat (1.110) and cereal (0.878). Chern *et al.* (2003) explain that as there is a limit on the total calorie intake, the ratio of meat products and other foods becomes larger in comparison to staple foods.

Tables 3 and 4 show the price elasticities of various commodities. It is noteworthy that both estimated compensated and uncompensated own-price elasticities for eggs, oil and fat, fruits, and spices are elastic. The results show that the Malaysians are very sensitive to

Table 4: Compensated Price Elasticities of the LA/AIDS Model											
Food Groups	Cereals	Meat	Fish	Dairy	Eggs	Oils and Fats	Fruits	Vegetables	Sugar and Beverage	Spices	Others
Cereals	-0.706	0.087	0.005	0.205	0.178	0.035	0.569	0.567	0.505	0.139	0.248
Meat	0.124	-0.883	0.110	-0.170	0.318	0.251	0.201	0.203	0.281	0.227	-0.041
Fish	0.143	0.347	-0.704	0.111	0.697	0.525	0.046	0.048	0.131	0.265	0.159
Milk	-0.033	0.051	0.187	-0.480	-0.015	0.017	-0.002	-0.002	-0.097	0.005	0.003
Eggs	0.105	0.010	0.213	-0.103	-1.301	0.130	-0.185	-0.183	-0.123	0.287	-0.168
Oils and Fats	0.072	-0.011	-0.032	0.009	-0.278	-1.204	0.123	0.130	0.080	0.008	0.186
Fruits	0.463	-0.098	-0.114	-0.206	0.182	-0.612	-1.241	-0.250	0.484	-0.368	0.117
Vegetables	-0.372	0.237	0.367	0.363	0.001	0.743	0.242	-0.758	-0.412	0.792	0.073
Sugar and Beverage	0.073	0.166	0.085	0.193	0.133	0.116	0.097	0.096	-0.900	0.089	0.141
Spices	0.083	0.084	-0.084	0.025	0.070	0.035	0.047	0.047	-0.034	-1.326	-0.001
Others	0.048	0.011	-0.033	0.054	0.015	-0.036	0.103	0.102	0.086	-0.118	-0.719

price change in spices, followed by fruits and eggs. On the other hand, the Malaysians are least to respond to the price change in dairy based products. Inelastic own-price elasticities of fish and vegetables, along with cereal mean that these commodities are essential in the Malaysian households' food intakes. Compared to the 1990s, own-price elasticities of most commodities in 2004/2005 are higher, except for other food groups.

While the Malaysian food consumption pattern has become more and more westernized, there is still a big gap in expenditure elasticity for commodities between Malaysia and the Western countries. Tables 5 and 6 present the expenditure and own-price elasticities of commodities in the western countries. From the expenditure elasticity of western countries, it is generally seen that the households in the western countries are more likely to increase their consumption on meat than cereals though both are inelastic. The Malaysians are more likely to demand more vegetables than meat in response to the income growth compared to the Western countries. Another significant difference is that the Malaysians are more sensitive to price change in meat than the Western countries (Appendix 1).

Table 5: Expenditure Elasticity of Commodities in Western Countries, 1996								
Country	Beverages and Tobacco	Bread and Cereals	Dairy	Fats and Oils	Fish	Fruits and Vegetables	Meat	Other Foods
Belgium	0.424	0.163	0.369	0.188	0.381	0.273	0.345	0.344
Denmark	0.322	0.124	0.281	0.143	0.289	0.207	0.262	0.261
France	0.431	0.159	0.377	0.187	0.389	0.278	0.353	0.352
Germany	0.402	0.153	0.351	0.177	0.362	0.259	0.328	0.327
United Kingdom	0.432	0.169	0.375	0.194	0.387	0.277	0.351	0.35
United States	0.134	0.050	0.117	0.059	0.121	0.086	0.110	0.109
<i>Source: United States Department of Agriculture, 2007.</i>								

Table 6: Own-price Elasticity of Commodities in Western Countries, 1996								
Country	Beverages and Tobacco	Bread and Cereals	Dairy	Fats and Oils	Fish	Fruits and Vegetables	Meat	Other Foods
Belgium	-0.343	-0.132	-0.299	-0.152	-0.308	-0.220	-0.279	-0.278
Denmark	-0.260	-0.100	-0.227	-0.116	-0.234	-0.167	-0.212	-0.211
France	-0.348	-0.129	-0.305	-0.152	-0.314	-0.225	-0.286	-0.285
Germany	-0.325	-0.124	-0.284	-0.143	-0.292	-0.209	-0.265	-0.264
United Kingdom	-0.349	-0.137	-0.304	-0.157	-0.313	-0.224	-0.284	-0.283
United States	-0.108	-0.040	-0.095	-0.047	-0.098	-0.070	-0.089	-0.088
<i>Source: United States Department of Agriculture, 2007.</i>								

Conclusion

In this study, the researchers estimate the complete demand system of food in Malaysia for 11 food groups, namely cereal, meat, fish, milk, egg, oil and fat, fruit, vegetable, sugar and beverage, spices and others. Own-price, cross-price, and expenditure elasticities of 11 food groups are estimated. The estimated expenditure elasticities show that the demand for all the groups in response to the income is relatively positive, while expenditure elasticities of meat, fruits, vegetables, sugar and beverage, and other foods are elastic. This shows that the Malaysian food consumption pattern is not only moving towards higher value food products (especially meat) but also functional foods (fruits and vegetables) as the per capita income of the Malaysians increases.

As indicated in the Ninth Malaysian Plan, Malaysia is moving towards self-sufficiency in most of the commodities. Such aim is further emphasized by the Northern Corridor Economic Region Plan to increase the production of the commodities. The positive tendency in food demand system in response to income growth stresses more on the need to increase domestic production of certain commodities like vegetables, fish, meat (beef and mutton), rice and milk while targeting a fully self-sufficient level for vegetables and fish.

Own-price elasticities for fruits, vegetables, meat, and fish are relatively high. The prices of these commodities always show an increasing trend throughout the year. Rapid development of hypermarkets and supermarkets in Malaysia has made the domestic food supply chain more efficient and cost effective. Consequently, the prices of commodities are the key determinants to capture the consumers. Having said so, the consumers in Malaysia are generally sensitive to price changes. Hence, government intervention is essential to control prices of commodities in the market. This refers particularly to the beef market, where the beef market is encouraged to be opened to more *halal* abattoirs. Such movement will benefit consumers by eliminating the cartel from dictating the price and supply.

General dietary patterns of Malaysian households can be characterized to be more and more westernized, consuming more wheat and meat, which are not traditional Malaysian foods. Therefore, this study does not indicate the structural differences in food demand at different time periods. Future studies may include other socioeconomic factors like family size and composition, residential location, age and others to predict such structural differences at different times.○

References

1. Asche F and Wessells C (1997), "On Price Indices in the Almost Ideal Demand System", *American Journal of Agricultural Economics*, Vol. 79, pp. 1182-1185.
2. Baharumshah A Z and Mohamed Z A (1993), "Demand for Meat in Malaysia: An Application of the Almost Ideal Demand System Analysis", *Pertanika Social Science and Humanities*, Vol. 1, No. 1, pp. 91-95.
3. Chern W S, Ishibashi K, Taniguchi K and Yokoyama Y (2003), "Analysis of Food Consumption Behavior by Japanese Households", *FAO Economic and Social Development Paper*, No. 152, pp. 1-21.
4. Deaton A and Muellbauer J (1980a), "An Almost Ideal Demand System", *American Economics Review*, Vol. 70, pp. 312-26.
5. Deaton A and Muellbauer J (1980b), *Economics and Consumer Behavior*, Cambridge University Press, United Kingdom.
6. Food and Agriculture Organization of the United Nations (2007a), *FAO Statistical Yearbook, Country Profiles*, [Online]. Available from: http://www.fao.org/ES/ESS/yearbook/vol_1_2/pdf/Malaysia.pdf [accessed June 25, 2007].
7. Food and Agriculture Organization of the United Nations (2007b), *FAOSTAT* [Online]. Available at: <http://faostat.fao.org/site/502/DesktopDefault.aspx?PageID=502> [accessed June 26, 2007].
8. Green R and Alston J (1990), "Elasticities in AIDS Models", *American Journal of Agricultural Economics*, Vol. 72, pp. 442-445.
9. Hussein M A, Mohayidin M G and Shariff S K (1986), "Food Consumption in Malaysia—Present Levels and Future Prospects for Self-Sufficiency", *PKDP Report*, No. 5/86, p. 33.

10. Ishida A, Law S H and Aita Y (2003), "Changes in Food Consumption Expenditure in Malaysia", *Agribusiness*, Vol. 19, No. 1, pp. 61-76.
11. Kumar P (1997), "Food Security: Supply and Demand Perspective", *Indian Farming*, December, pp. 4-9.
12. Mittal S (2006), "Structural Shift in Demand for Food: Projections for 2020", ICRIER Working Paper No. 184.
13. Mustapha R A (1994), "Incorporating Habit in the Demand for Fish and Meat Products in Malaysia", *Malaysian Journal of Economic Studies*, Vol. 31, No. 2, pp. 25-35.
14. Mustapha R A, Aziz A R A, Radam A and Baharumshah A Z (1999), "Demand and Prospects for Food in Malaysia", Paper Presented at Seminar on Repositioning of the Agriculture in the Next Millennium, IDEAL UPM, 13-13 July.
15. Mustapha R A, Radam A and Ismail M M (2000), "Household Food Consumption Expenditure in Malaysia", Paper Presented at the 5th National Seminar on Malaysian Consumer and Family Economics, Malaysian Consumer and Family Economics Association (MACFEA), Universiti Tenaga Nasional, Bangi, Selangor, August 17, 2000.
16. Mustapha R A, Aziz, A R A, Zubaidi B A and Radam A (2001), "Demand and Prospects for Food in Malaysia", Radam A and Fatimah M A (Eds.) in *Repositioning of the Agriculture Industry in the Next Millennium*, pp. 148-159, Universiti Putra Malaysia Press.
17. Radam A, Arshad F M and Mohamed Z (2005), *The Fruits Industry in Malaysia: Issues and Challenges*, University Putra Malaysia Press.
18. Radhakrishna R (2005), "Food and Nutrition Security of the Poor", *Economic and Political Weekly*, Vol. XL, No. 18, pp. 1817-1821.
19. Rao C H H (2000), "Declining Demand for Foodgrains in Rural India: Causes and Implications", *Economic and Political Weekly*, January 22, pp. 201-206.
20. Regmi A and Dyck J (2001), "Effects of Urbanization on Global Food Demand, Changing Structure of Global Food Consumption and Trade", *Economic Research Service/USDA*, WRS-01-1.
22. Singh B, Drost H, and Kumar R C (1978), "An Empirical Evaluation of the Relative, the Permanent Income, and the Life-Cycle Hypotheses", *Economic Development and Cultural Change*, Vol. 26 (January), pp. 281-305.
23. Tee C S and Thiam T B (1975), "Food Consumption in Malaysia – Present Levels and Future Prospects for Self-Sufficiency", Paper Presented at the Conference on Food Self-Sufficiency, Kuala Lumpur.
24. United States Department of Agriculture (2007), International Food Consumption Patterns. Available from: <http://www.ers.usda.gov/Data/InternationalFoodDemand/Index.asp?view=PEF#IFD> [Accessed June 21, 2007].

Appendix 1

Maximum Likelihood Estimates of the LA/AIDS Model											
	Cereals	Meat	Fish	Milk	Eggs	Oils and Fats	Fruits	Vegetables	Sugar and Beverage	Spices	Others
Intercept	0.3549 (50.60)***	0.0731 (13.16)***	0.2731 (41.60)***	0.0977 (28.28)***	0.0142 (8.90)***	0.0286 (16.08)***	0.0081 (2.63)***	0.0082 (2.65)***	0.0967 (19.46)***	0.0218 (18.85)***	0.0236 ^a
Cereals	0.0121 (4.74)***	-0.0208 (-9.98)***	-0.0510 (-20.46)***	-0.0023 (-1.42)	-0.0015 (-2.56)**	-0.0064 (-9.91)***	0.0217 (19.23)***	0.0216 (19.25)***	0.0278 (15.63)***	-0.0016 (-3.85)***	0.0002 ^a
Meat	-0.0021 (-1.12)	-0.0021 ^a	-0.0050 (-1.51)	-0.0180 (-8.25)***	0.0043 (5.20)***	0.0036 (4.00)***	0.0046 (2.92)***	0.0047 (3.00)***	0.0158 (6.36)***	0.0014 (2.48)**	-0.0071 ^a
Fish	-0.0173 (-3.88)***	0.0177 (6.34)***	0.0177 ^a	-0.0061 (-2.22)**	0.0112 (10.52)***	0.0094 (8.16)***	-0.0112 (-5.52)***	-0.0111 (-5.49)***	-0.0089 (-2.81)***	0.0008 (1.06)	-0.0022 ^a
Dairy	-0.0224 (-14.28)***	-0.0012 (-0.88)	0.0273 (36.00)***	0.0273 ^a	-0.0017 (-4.64)***	-0.0013 (-3.18)***	-0.0041 (-5.92)***	-0.0041 (-5.91)***	-0.0167 (-15.44)***	-0.0008 (-3.24)***	-0.0023 ^a
Eggs	0.0199 (5.65)***	-0.0017 (-0.61)	0.0406 (11.96)***	-0.0075 (-9.63)***	-0.0075 ^a	0.0033 (3.56)***	-0.0139 (-8.67)***	-0.0138 (-8.65)***	-0.0156 (-6.14)***	0.0040 (6.82)***	-0.0078 ^a
Oils and Fats	0.0102 (7.01)***	-0.0055 (-4.55)***	-0.0134 (-9.34)***	-0.0013 (-1.40)	-0.0071 (-28.46)***	-0.0071 ^a	0.0062 (9.75)***	0.0066 (10.46)***	0.0053 (5.19)***	-0.0003 (-1.47)	0.0064 ^a
Fruits	0.0966 (23.11)***	-0.0219 (-6.37)***	-0.0387 (-9.41)***	-0.0162 (-6.07)***	0.0027 (2.75)***	-0.0206 (-24.35)***	-0.0206 ^a	-0.0212 (-24.43)***	0.0446 (15.28)***	-0.0066 (-9.78)***	0.0021 ^a
Vegetables	-0.1070 (-24.92)***	0.0226 (6.41)***	0.0641 (15.29)***	0.0176 (6.48)***	-0.0015 (-1.53)	0.0205 (22.23)***	0.0117 (9.36)***	0.0117 ^a	-0.0511 (-17.13)***	0.0111 (15.95)***	0.0003 ^a
Sugar and Beverage	-0.0082 ^a (-4.83)***	0.0078 ^a (5.62)***	-0.0046 ^a (-2.80)***	0.0051 ^a (4.77)***	0.0006 ^a (1.53)	0.0003 ^a (0.64)	-0.0007 ^a (-1.14)	-0.0007 ^a (-1.23)	-0.0007 ^a	-0.0003 ^a (-0.99)	0.0014 ^a

(Contd...)

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Appendix 1

Maximum Likelihood Estimates of the LA/AIDS Model											
	Cereals	Meat	Fish	Milk	Eggs	Oils and Fats	Fruits	Vegetables	Sugar and Beverage	Spices	Others
Spices	0.0165 (10.38)***	0.0091 (7.12)***	-0.0212 (-14.37)***	0.0005 (0.55)	0.0013 (3.48)***	0.0006 (1.52)	0.0021 (3.09)***	0.0021 (3.11)***	-0.0052 ^a (-21.15)***	-0.0052 ^a	-0.0007 ^a
Others	0.0017 ^a	-0.0040 ^a	-0.0159 ^a	0.0008 ^a	-0.0006 ^a	-0.0023 ^a	0.0041 ^a	0.0041 ^a	0.0048 ^a	-0.0024 ^a	0.0099 ^a
Stone Price	-0.0298 (-17.43)***	0.0146 (10.45)***	-0.0192 (-11.57)***	-0.0159 (-14.76)***	-0.0025 (-6.44)***	-0.0012 (-2.86)***	0.0228 (31.30)***	0.0228 (31.43)***	0.0042 (3.52)***	-0.0004 (-1.60)	0.0047 ^a
Note: ^a Derived from imposed homogeneity and symmetry restrictions; ^b Figures in parentheses are values of <i>t</i> -ratio. ***Statistically significant at 1% level of significance. ** Statistically significant at 5% level of significance. * Statistically significant at 10% level of significance.											

Reference # 49J-2008-07-02-01

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