Complete demand systems of food in Malaysia

Komplexní systémy poptávky po potravinách v Malajsii

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Abstract: As a one of the most rapidly developing countries in Asia, there have been notable changes in Malaysian food consumption pattern. Such changes in Malaysia play an important role in the outlook for future in Malaysian agri-food industry. By using Household Expenditure Survey 2004/2005 data, this study aims to build a complete demand system of food in Malaysia via Linear Approximate Almost Ideal Demand System (LA/AIDS), with incorporation of the Stone price index and the Laspeyres price index respectively. The empirical results show that the application of the Laspeyres price index produces more plausible estimates of expenditure and own-price elasticities in Malaysia. In the estimation of the LA/AIDS with incorporation of the Laspeyres price index, the estimated expenditure elasticities show that demands for meat (1.4064), fish (1.2440), vegetables (1.1729), and fruits (1.0905) are likely to grow faster than other traditional main calorie sources-rice (0.9091) and bread & other cereals (0.3177) in corresponding to positive income effect in future. This study shows that as Malaysian society becomes more affluent, Malaysian consumers are increasingly seeking for higher value protein based products, as well as functional healthy foods.

Key words: demand for food, Household Expenditure Survey, estimated demande elasticities, LA/AIDS, Malaysia

Abstrakt: Malajsie patří mezi nejrychleji se rozvíjející asijské ekonomiky a vzorec spotřeby potravin se zde proto velmi výrazně změnil. Tyto změny budou hrát podstatnou roli v perspektivním rozvoji malajského potravinářského průmyslu. Studie s využitím dat Statistiky rodinných účtů za roky 2004/2005 směřuje k vytvoření komplexního systému poptávky po potravinách v Malajsii. Základními použitými metodami jsou Linear Approximate Almost Ideal Demand System (LA/AIDS) s využitím Stoneova cenového indexu a Laspeyresova cenového indexu. Empirické výsledky ukazují, že aplikace Laspeyresova cenového indexu poskytuje věrohodnější odhady výdajů a cenové elasticity v Malajsii. Pokud jde o odhady LA/AIDS s využitím Laspeyresova cenového indexu, odhadované elasticity výdajů ukazují, že poptávka po mase (1,4064), rybách (1,2440), zelenině (1,1729) a ovoci (1,0905) pravděpodobně poroste rychleji než po ostatních tradičních zdrojích energie, jako je rýže (0,9091) a chléb a ostatní obiloviny (0,3177) vzhledem k pozitivnímu efektu růstu příjmů v budoucnosti. Studie ukazuje, že jak se malajská společnost stává bohatší, malajští spotřebitelé zvyšují poptávku po produktech s vyšším obsahem bílkovin a rovněž po produktech zdravé výživy.

Klíčová slova: poptávka po potravinách, Statistika rodinných účtů, odhad poptávkové pružnosti, LA/AIDS, Malajsie

As a one of the most rapidly developing countries in Asia, there have been notable changes in the Malaysian food consumption pattern. The most significant changes in the the food consumption pattern are the increasing demand for wheat based products but the decreasing demand for staple food – rice. This decline in the staple food consumption indicates an enhancement in Malaysian society welfare, as laid down by Engel's hypothesis (Mittal 2006). Another perspective observes an increasing demand for meat products in Malaysia. Kumar (1997) pointed out that such diversification shows an improvement of the quality of life by adding to the nutritional status of the population.

Such changes in Malaysia play an important role in the outlook for the future in Malaysian agri-food industry. Understanding of food consumption is able to provide a meaningful indication to commodity consumption, which directly implies on the drive for the feed grain demand and in turn makes a significant impact on the domestic and international feedstuffs market. These have brought policy makers' and industrial players' attention on food demand system in Malaysia. One common means of addressing the

food demand is to build a complete food demand model that comprises all major aggregate food items in Malaysia.

Hence, this study aims to build a complete demand system of food in Malaysia via the Linear Approximate Almost Ideal Demand System (LA/AIDS). To be more specific, the objective of this study is to investigate the performance of the LA/AIDS models that incorporated the Stone price index and the Laspeyres price index respectively. Both of the LA/AIDS models are to be used for estimating expenditure and price elasticities for twelve major aggregate food items.

FOOD CONSUMPTION IN MALAYSIA

Changes of diets with economic development because of the increasing per capita incomes have been well documented in Blandford (1984), Garnaut and Ma (1992), Mitchell et al. (1997) and Wu and Wu (1997). Most of the previous studies (Baharumshah and Mohamed 1993; Mustapha 1994; Mustapha et al. 1999, 2000 and 2001; Ishida et al. 2003) have described that the Malaysian diet has become more westernized. The westernization of the diet is referred to the diminishing role of staple food as the main calorie source but the increasing demand for calories from the non-staple foods, especially wheat and meat based products.

Statistically, Table 1 shows the per capita consumption of the aggregate food items in Malaysia from 1985 to 2003. Overall, it shows that there is a diversification in food consumption among Malaysians as the per capita income increases. It is very significant that the per capita consumption of rice has been declining. It is a common observation amongst the developing and high-income countries. Radhakrishna (2005) argued that this sharp decline in the staple food consumption is 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. Another important factor suggested by Huang and Bouis (1996) is the rural-urban migration. In Malaysia, urbanization has been viewed as a solution to poverty as the employment opportunities and income level are higher in urban areas.

The decreasing trend of the per capita consumption of rice has seen its closest substitute -cereals consumption increased from 33.4 kg per capita in 1985 to 55.4 kg in 2003. The diversification is further illustrated by the increasing per capita consumption of the higher value food items – meats and fish and functional food-vegetables from 1985 to 2003. A unique feature in the statistics shows that Malaysians consumed more fish than meat. This observation is similar to the Japanese consumption pattern as described by Chern et al. (2003).

PREVIOUS STUDIES IN MALAYSIA

Food consumption patterns in Malaysia can be studied on the decade basis. In 1970's, Tee and Thiam

Table 1. Per capita consumption (kg) of foods in Malaysia, 1985–2003

	Rice	Cereals	Meat	Eggs	Fish	Vegetables	Fruits	Spices	Sugar & 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	59.7	57.25	1.28	47.54
1998	88.1	31.5	50.5	57.4	57.4	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	42.4
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	62.8	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), 2007

(1975) used the single equation method to estimate the elasticities and projection of future food demand. The studies indicated that there would be an increasing demand for the staple food – rice – as to fulfill the basic food requirement in 1980's. Similarly, Hussein et al. (1986) incorporated income elasticities in the single equation to do the projection of food demand until 1990's. However, this study predicted that the per capita consumption of rice would be decreased while facing more difficulties in ensuring wheat available to meet the increasing demand for wheat in future.

Since 1990's, many of the previous studies (Baharumshah and Mohamed 1993; Mustapha 1994; Mustapha et al. 1999, 2000 and 2001; Radam et al. 2005) conducted demand analyses by using the Household Expenditure Survey 1990 data. Baharumshah and Mohamed (1993) examined the demand for all meat products by using the Linear Approximate Almost Ideal Demand System (LA/AIDS). The study obtained high expenditure elasticities of demand for poultry (1.432), pork (1.152), mutton (1.117), fish (1.023), and beef (0.906). By using the two-stage budgeting system, Mustapha (1994) incorporated habit factors into the analysis of demand for fish and meat products. The estimated expenditure elasticities in both studies suggested that there would be a positive growth rate in the demand for all the meat and fish products responding to economic development.

The other previous studies by Mustapha et al. (1999, 2000 and 2001) integrated all food components (with rice, bread, flour, and noodle separated) into the estimation of the LA/AIDS model. Mustapha et al. (1999) reported positive and less than unity expenditure elasticities for all the food components, except other foods. To be more specific, the estimated expenditure elasticities for rice, flour, meat, fish, vegetable, and fruit were 0.3061, 0.4298, 0.5168, 0.4221, 0.4565, and 0.5403, respectively. On the other hand, Radam et al. (2005) analyzed the demand for the aggregate food components but with rice, bread, flour, and noodle as one aggregate food item-cereal. Due to the different grouping strategy, the estimated expenditure elasticities in Radam et al. (2005) were generally different and larger than those in Mustapha et al. (1999), namely regarding cereals (0.6680), meat (1.0845), fish (0.6939), and fruit (1.3581).

All the previous studies mentioned above utilized the Stone price index in the LA/AIDS estimation. However, Alston et al. (1994), Asche and Wessells (1997), and Moschini (1995) argued that since prices will never be perfectly collinear, the utilization of the Stone price index will introduce the units of measurement error. This is because the Stone index is variant to changes in the units of the measurement of prices. Moschini (1995) suggested that it is wiser to use the Laspeyres price index in order to overcome this measurement error. The application of the Laspeyres price index will produce more plausible results similar like the original Almost Ideal Demand System. Thus, it is interesting to make comparisons between the applications of the Laspeyres price index and the Stone price index in this study.

By using the cross-sectional data from the Household Expenditure Survey 1973, 1980 and 1993/94, Ishida et al. (2003) investigated the changes in food consumption in Malaysia. In the study, the estimated Engel elasticities of rice, cereal, meat, fish, and vegetable & fruit decreased from 0.34, 0.74, 1.42, 0.67, and 0.86 in 1973 to 0.27, 0.66, 0.97, 0.49, 0.74 in 1993/94. Ishida et al. (2003) suggested that the changing pattern in food consumption among the Malaysians was highly attributed to the population growth, a higher per capita income, rapid urbanization that led to the drastic change in Malaysian lifestyle. However, Ishida et al. (2003) only utilized the data collected in the West Malaysia. Omitting the sample population in the East Malaysia may have the Engel elasticities underestimated. This is because the income level of residence in the East Malaysia was generally much lower than in the West Malaysia in the survey periods.

SOURCES OF DATA AND ESTIMATION PROCEDURES

This study utilizes the data from the Household Expenditure Survey 2004/2005. The Household Expenditure Survey 2004/2005 was conducted by the Department of Statistics, Malaysia. The data consists of 14 084 households throughout Malaysia. The data is to be analyzed via the LA/AIDS model due to the model's simplicity and its empirical application in the Malaysian previous studies. The original AIDS model developed by Deaton and Muellbauer (1980a, 1980b) is difficult to estimate because the price index is not linear in parameters estimated. The LA/AIDS model for the 12 aggregate food items can be estimated as follows:

$$w_i = \alpha_i + \sum_j \gamma_j \log(p_j) + \beta_i \log(x / P^*) + \sum_k \gamma_k H_k + \mu_i \quad (1)$$

where:
i, j = 1, 2, …, 12 food items,
k = 1, 2, …, 14 084 households,
w_i = the budget share of the ith food item,
p = the price of the ith food item,
x = the total expenditures of the aggregate food,

H_k = includes demographic variable of household size and dummy variable of household that resided in urban area, and

P* = the Stone price index defined by:

$$\log(P^*) = \sum_i w_i \log(p_i) \qquad i = 1, \ldots, 12 \qquad (2)$$

As suggested by Moschini (1995), in order to correct the units of measurement error, the Stone price index is replaced with the Laspeyres price index by replacing w_i in Equation (2) by a mean budget share ($\overline{w}_i$). Hence, the Laspeyres price index can be defined as:

$$\log(P^L) = \sum_i \overline{w}_i \log(P_i) \qquad i = 1, \ldots, 12 \qquad (3)$$

Substitution of the Laspeyres price index for the Stone price index in Equation (1) yields a LA/AIDS model as follows:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log(p_j) + \beta_i \log(x / P^L) + \\ + \sum_k \delta_k H_k + \mu_i \qquad (4)$$

The LA/AIDS model is a flexible demand system that satisfies many desirable properties, namely adding-up restriction, and with simple parametric restrictions, homogeneity and symmetry. The adding-up restriction is satisfied with given $\sum_i w_i = 1$ for all *j*:

$$\sum_i \alpha_i = 1, \sum_i \gamma_{ij} = 0, \sum_i \beta_i = 0, \text{ and } \sum_i \delta_{ki} = 0 \qquad (5)$$

The homogeneity restriction is satisfied for the LA/AIDS model in and only if, for all *j*:

$$\sum_k \gamma_{jk} = 0 \qquad (6)$$

The symmetry is satisfied by:

$$\gamma_{ij} = \gamma_{ij} \qquad (7)$$

Following the formulae and procedures of Green and Alston (1990), the demand elasticities of the LA/AIDS models can be computed at sample means. The expenditure elasticities can be estimated by:

$$e_i = \frac{\beta_i}{w_i} + 1 \qquad (8)$$

The Marshallian measures of price elasticities can be computed by:

$$s_{ij} = -\delta_{ij} + \left(\frac{\gamma_{ij}}{\overline{w}_i}\right) - \left(\frac{\beta 1_i}{\overline{w}_i}\right)\overline{w}_j \qquad \forall i, j = 1 \ldots, n \qquad (9)$$

where δ_{ij} is the Kronecker delta that is unity if $i = j$ and zero otherwise.

RESULTS

Tables 2 and 3 present the regression results for both LA/AIDS models. Though most of the parameters are statistically significant, the LA/AIDS that included the Stone price index produces vastly different coefficient estimates from the LA/AIDS that included the Laspeyres price index. The most extreme observations are the different sign of magnitude on the coefficients of expenditure over price index (β_i) between the application of the Stone price index and the Laspeyres price index in rice, fish, eggs, sugar, and others equations. As it is very difficult to comment the performance of both price indexes in the LA/AIDS models, Chern (2000) suggested that it is more appropriate to compare the estimated elasticities.

Table 4 presents the estimated expenditure and own-price elasticities. The centers of comparison are on the rationality of the estimated elasticities of rice in relevance to the estimated elasticities of meat, fish, fruits, and vegetables. The rationality is built on the ground of the current scenarios of per capita consumption in Malaysia. The LA/AIDS that incorporated the Stone price index produces the unreasonable highest estimate of expenditure elasticity of the main staple food – rice (1.3340) among all food items. The estimated expenditure elasticity of rice can be interpreted that the demand for rice has the strongest income effect than other food items. With such finding and interpretation, the questions concerning the rationality of the estimates of expenditure elasticity in the model arises when comparing the estimated expenditure elasticity of rice (1.3340) with meat (1.0318) and fish (0.9425).

In the LA/AIDS that incorporated the Laspeyres price index, the estimated elasticities of the non-staple foods, namely meat (1.4064), fish (1.2440), fruits (1.0905), and vegetables (1.1729) are higher than rice (0.9091). Such findings are rationalized by Chern et al. (2003) that suggested that as there is a limit on the total energy intake, the ratio of the meat products and other foods becomes larger in comparison to the staple food.

Referring to the estimated own-price elasticities, both of the LA/AIDS models produce similar results, showing that Malaysian households are sensitive to own-price change in most of the food items, except bread & other cereals (–0.9272, –0.9262) and milk & dairy (–0.5552, –0.5192). However, the LA/AIDS that incorporated the Stone price index yields an unexpected inelastic estimate of own-price elasticity for fish (–0.8075). By comparing both estimated expenditure and own-price elasticities, the LA/AIDS model that incorporated the Laspeyres price index appears to yield more plausible results than the LA/AIDS that utilises the Stone price index.

Table 2. Maximum likelihood estimates of LA/AIDS with the Stone price index

	Rice		Bread & other cereals		Meat		Fish	
	coef.	std. error	coef.	std. error	coef.	std. error	coef.	std. error
Intercept	–0.0707	(0.0057)***	0.4089	(0.0086)***	0.0504	(0.0069)***	0.1826	(0.0081)***
log (price of rice)	–0.0865	(0.0030)***	0.0821	(0.0047)***	–0.0084	(0.0039)**	–0.0387	(0.0046)***
log (price of bread & other cereals)	0.0053	(0.0009)***	0.0053	–	0.0034	(0.0015)**	–0.0126	(0.0017)***
log (price of meat)	0.0277	(0.0022)***	–0.0079	(0.0019)***	–0.0079	–	–0.0119	(0.0032)***
log (price of fish)	0.0038	(0.0028)	–0.0727	(0.0044)***	0.0363	(0.0027)***	0.0363	–
log (price of milk and dairy)	0.0004	(0.0009)	–0.0223	(0.0014)***	–0.0034	(0.0012)***	0.0241	(0.0007)***
log (price of eggs)	0.0298	(0.0022)***	–0.0308	(0.0035)***	0.0090	(0.0029)***	0.0366	(0.0033)***
log (price of oils and fats)	0.0024	(0.0008)***	0.0122	(0.0013)***	–0.0040	(0.0011)***	–0.0097	(0.0013)***
log (price of fruits)	0.0104	(0.0013)***	–0.0081	(0.0021)***	–0.0045	(0.0017)***	0.0075	(0.0020)***
log (price of vegetables)	0.0079	(0.0023)***	0.0260	(0.0036)***	–0.0192	(0.0030)***	–0.0168	(0.0034)***
log (price os sugar)	–0.0080	(0.0008)***	0.0166	(0.0012)***	–0.0025	(0.0010)**	–0.0125	(0.0012)***
log (price of others)	–0.0038	(0.0009)***	0.0135	(0.0014)***	–0.0030	(0.0012)**	–0.0225	(0.0014)***
log (price of beverage)	0.0106	–	–0.0138	–	0.0044	–	0.0203	–
log (x/P)	0.0323	(0.0009)***	–0.0337	(0.0014)***	0.0040	(0.0012)***	–0.0115	(0.0014)***
Log (household size)	0.0039	(0.0003)***	–0.0103	(0.0004)***	0.0042	(0.0004)***	0.0033	(0.0004)***
Urban	–0.0157	(0.0012)***	0.0093	(0.0020)***	0.0155	(0.0017)***	–0.0247	(0.0019)***
	Milk & dairy		**Eggs**		**Oils & fats**		**Fruits**	
	coef.	std. error	coef.	std. error	coef.	std. error	coef.	std. error
Intercept	0.0833	(0.0057)***	0.0098	(0.0020)***	0.0157	(0.0022)***	0.0787	(0.0057)***
log (price of rice)	–0.0126	(0.0032)***	0.0095	(0.0010)***	–0.0018	(0.0012)	0.0222	(0.0030)***
log (price of bread & other cereals)	–0.0024	(0.0012)**	–0.0004	(0.0004)	–0.0006	(0.0004)	0.0009	(0.0011)
log (price of meat)	–0.0084	(0.0023)***	0.0017	(0.0007)**	0.0015	(0.0008)*	0.0060	(0.0022)***
log (price of fish)	0.0040	(0.0030)	0.0051	(0.0010)***	0.0081	(0.0011)***	–0.0037	(0.0028)
log (price of milk and dairy)	0.0241	–	–0.0016	(0.0003)***	–0.0009	(0.0004)**	–0.0058	(0.0009)***
log (price of eggs)	–0.0088	(0.0007)***	–0.0088	–	0.0014	(0.0009)	–0.0115	(0.0023)***
log (price of oils and fats)	–0.0003	(0.0009)	–0.0063	(0.0002)***	–0.0063	–	0.0054	(0.0009)***
log (price of fruits)	0.0015	(0.0014)	0.0006	(0.0005)	–0.0041	(0.0005)***	–0.0041	–
log (price of vegetables)	0.0060	(0.0024)**	0.0002	(0.0008)	0.0056	(0.0009)***	–0.0137	(0.0014)***
log (price os sugar)	0.0003	(0.0008)	–0.0001	(0.0003)	–0.0018	(0.0003)***	0.0075	(0.0008)***
log (price of others)	0.0000	(0.0010)	–0.0006	(0.0003)*	–0.0022	(0.0004)***	0.0022	(0.0009)**
log (price of beverage)	–0.0034	–	0.0007	–	0.0012	–	–0.0054	–
log (x/P)	–0.0211	(0.0010)***	0.0031	(0.0003)***	0.0033	(0.0004)***	0.0022	(0.0009)**
Log (household size)	0.0013	(0.0003)***	0.0001	(0.0001)	0.0002	(0.0001)	–0.0024	(0.0003)***
Urban	0.0084	(0.0013)***	0.0002	(0.0004)	0.0000	(0.0005)	0.0039	(0.0013)***
	Vegetables		**Sugar**		**Others**		**Beverage**	
	coef.	std. error	coef.	std. error	coef.	std. error	coef.	std. error
Intercept	0.0136	(0.0049)***	0.0534	(0.0028)***	0.0713	(0.0073)***	0.1030	–
log (price of rice)	–0.0096	(0.0026)***	0.0061	(0.0015)***	0.0078	(0.0038)**	0.0299	–
log (price of bread & other cereals)	0.0070	(0.0010)***	–0.0028	(0.0006)***	–0.0079	(0.0014)***	0.0048	–
log (price of meat)	–0.0065	(0.0018)***	0.0046	(0.0011)***	–0.0089	(0.0027)***	0.0101	–
log (price of fish)	0.0182	(0.0024)***	–0.0081	(0.0014)***	–0.0017	(0.0036)	–0.0255	–
log (price of milk and dairy)	0.0071	(0.0008)***	–0.0038	(0.0005)***	–0.0059	(0.0012)***	–0.0120	–
log (price of eggs)	0.0034	(0.0019)*	–0.0002	(0.0011)	–0.0030	(0.0028)	–0.0171	–
log (price of oils and fats)	–0.0024	(0.0007)***	0.0011	(0.0004)***	0.0035	(0.0011)***	0.0044	–
log (price of fruits)	–0.0019	(0.0011)*	0.0010	(0.0006)	0.0008	(0.0017)	0.0010	–
log (price of vegetables)	–0.0137	–	0.0065	(0.0011)***	–0.0068	(0.0029)**	0.0181	–
log (price os sugar)	–0.0020	(0.0003)***	–0.0020	–	0.0183	(0.0011)***	–0.0138	–
log (price of others)	–0.0104	(0.0008)***	0.0011	(0.0004)***	0.0011	–	0.0247	–
log (price of beverage)	0.0107	–	–0.0035	–	0.0027	–	–0.0245	–
log (x/P)	0.0209	(0.0008)***	–0.0014	(0.0005)***	–0.0072	(0.0012)***	0.0092	–
Log (household size)	0.0013	(0.0002)***	0.0003	(0.0001)**	0.0016	(0.0003)***	–0.0033	–
Urban	–0.0038	(0.0011)***	–0.0014	(0.0006)**	–0.0027	(0.0016)*	0.0109	–

Note: Significance levels are denoted by *** for 1%, ** for 5%, and * for 10%

Table 3. Maximum likelihood estimates of LA/AIDS with the Laspeyres price index

	Rice		Bread & other cereals		Meat		Fish	
	coef.	std. error	coef.	std. error	coef.	std. error	coef.	std. error
Intercept	0.0643	(0.0067)***	0.5931	(0.0093)***	−0.0958	(0.0080)***	−0.0143	(0.0095)
log (price of rice)	−0.0839	(0.0032)***	0.0879	(0.0045)***	−0.0123	(0.0038)***	−0.0439	(0.0045)***
log (price of bread & other cereals)	−0.0027	(0.0009)***	−0.0027	–	0.0099	(0.0014)***	−0.0018	(0.0016)
log (price of meat)	0.0293	(0.0022)***	−0.0086	(0.0019)***	−0.0086	–	−0.0120	(0.0032)***
log (price of fish)	0.0218	(0.0031)***	−0.0156	(0.0044)***	−0.0013	(0.0027)	−0.0013	–
log (price of milk and dairy)	−0.0036	(0.0010)***	−0.0273	(0.0014)***	0.0011	(0.0012)	0.0269	(0.0007)***
log (price of eggs)	0.0415	(0.0023)***	−0.0168	(0.0033)***	−0.0035	(0.0029)	0.0183	(0.0033)***
log (price of oils and fats)	−0.0032	(0.0009)***	−0.0068	(0.0013)***	0.0078	(0.0012)***	0.0034	(0.0014)**
log (price of fruits)	0.0058	(0.0014)***	−0.0208	(0.0020)***	0.0041	(0.0017)**	0.0172	(0.0020)***
log (price of vegetables)	0.0098	(0.0024)***	0.0325	(0.0034)***	−0.0227	(0.0029)***	−0.0216	(0.0034)***
log (price os sugar)	−0.0121	(0.0008)***	0.0029	(0.0012)**	0.0085	(0.0010)***	−0.0011	(0.0012)
log (price of others)	−0.0091	(0.0010)***	−0.0011	(0.0014)	0.0056	(0.0012)***	−0.0124	(0.0014)***
log (price of beverage)	0.0065	–	−0.0238	–	0.0114	–	0.0283	–
log (x/P)	−0.0088	(0.0014)***	−0.0934	(0.0020)***	0.0509	(0.0017)***	0.0490	(0.0019)***
Log (household size)	0.0014	(0.0003)***	−0.0122	(0.0004)***	0.0062	(0.0003)***	0.0063	(0.0004)***
Urban	−0.0181	(0.0013)***	0.0089	(0.0019)***	0.0164	(0.0016)***	−0.0230	(0.0019)***
	Milk & dairy		**Eggs**		**Oils & fats**		**Fruits**	
	coef.	std. error	coef.	std. error	coef.	std. error	coef.	std. error
Intercept	0.0412	(0.0065)***	0.0355	(0.0022)***	0.0174	(0.0025)***	0.0660	(0.0064)***
log (price of rice)	−0.0163	(0.0032)***	0.0101	(0.0011)***	−0.0015	(0.0012)	0.0212	(0.0030)***
log (price of bread & other cereals)	0.0020	(0.0012)*	−0.0018	(0.0004)***	−0.0010	(0.0004)**	0.0010	(0.0011)
log (price of meat)	−0.0112	(0.0023)***	0.0017	(0.0007)**	0.0020	(0.0008)**	0.0066	(0.0022)***
log (price of fish)	−0.0008	(0.0032)	0.0102	(0.0010)***	0.0070	(0.0012)***	−0.0076	(0.0030)**
log (price of milk and dairy)	0.0269	–	−0.0024	(0.0003)***	−0.0008	(0.0004)**	−0.0052	(0.0009)***
log (price of eggs)	−0.0072	(0.0007)***	−0.0072	–	0.0015	(0.0009)*	−0.0125	(0.0023)***
log (price of oils and fats)	−0.0001	(0.0010)	−0.0071	(0.0002)***	−0.0071	–	0.0067	(0.0009)***
log (price of fruits)	0.0019	(0.0014)	−0.0006	(0.0005)	−0.0037	(0.0005)***	−0.0037	–
log (price of vegetables)	0.0049	(0.0024)**	0.0008	(0.0008)	0.0055	(0.0009)***	−0.0142	(0.0014)***
log (price os sugar)	0.0018	(0.0009)**	−0.0015	(0.0003)***	−0.0013	(0.0003)***	0.0095	(0.0008)***
log (price of others)	0.0007	(0.0010)	−0.0020	(0.0003)***	−0.0019	(0.0004)***	0.0029	(0.0009)***
log (price of beverage)	−0.0027	–	0.0176	–	0.0070	–	0.0114	–
log (x/P)	−0.0074	(0.0014)***	−0.0050	(0.0004)***	0.0030	(0.0005)***	0.0062	(0.0013)***
Log (household size)	0.0023	(0.0003)***	−0.0003	(0.0001)***	0.0000	(0.0001)	−0.0023	(0.0003)***
Urban	0.0095	(0.0013)***	−0.0002	(0.0004)	0.0000	(0.0005)	0.0037	(0.0013)***
	Vegetables		**Sugar**		**Others**		**Beverage**	
	coef.	std. error	coef.	std. error	coef.	std. error	coef.	std. error
Intercept	0.0236	(0.0055)***	0.0763	(0.0031)***	−0.0295	(0.0080)***	0.2221	–
log (price of rice)	−0.0080	(0.0026)***	0.0056	(0.0015)***	0.0086	(0.0038)**	0.0326	–
log (price of bread & other cereals)	0.0046	(0.0009)***	−0.0038	(0.0005)***	−0.0020	(0.0014)	−0.0017	–
log (price of meat)	−0.0051	(0.0018)***	0.0045	(0.0011)***	−0.0088	(0.0027)***	0.0103	–
log (price of fish)	0.0130	(0.0026)***	−0.0026	(0.0015)*	−0.0211	(0.0037)***	−0.0018	–
log (price of milk and dairy)	0.0067	(0.0008)***	−0.0045	(0.0005)***	−0.0024	(0.0012)**	−0.0153	–
log (price of eggs)	0.0039	(0.0019)**	0.0018	(0.0011)	−0.0131	(0.0028)***	−0.0067	–
log (price of oils and fats)	0.0002	(0.0008)	−0.0012	(0.0004)***	0.0108	(0.0011)***	−0.0035	–
log (price of fruits)	−0.0007	(0.0011)	−0.0004	(0.0007)	0.0056	(0.0017)***	−0.0046	–
log (price of vegetables)	−0.0142	–	0.0071	(0.0011)***	−0.0086	(0.0029)***	0.0207	–
log (price os sugar)	−0.0026	(0.0003)***	−0.0026	–	0.0245	(0.0012)***	−0.0259	–
log (price of others)	−0.0090	(0.0008)***	0.0006	(0.0004)	0.0006	–	0.0250	–
log (price of beverage)	0.0224	–	−0.0052	–	−0.0199	–	−0.0530	–
log (x/P)	0.0185	(0.0011)***	−0.0088	(0.0006)***	0.0236	(0.0016)***	−0.0277	–
Log (household size)	0.0007	(0.0002)***	0.0001	(0.0001)	0.0029	(0.0003)***	−0.0051	–
Urban	−0.0042	(0.0011)***	−0.0018	(0.0006)***	−0.0007	(0.0016)	0.0095	–

Note: Significance levels are denoted by *** for 1%, ** for 5%, and * for 10%

Table 4. Estimated expenditure and own-price elasticities for food items, Malaysia

Food Item	LA/AIDS with Stone price index		LA/AIDS with Laspeyres price index	
	expenditure	own-price	expenditure	own-price
Rice	1.3340	–1.9268	0.9091	–1.8590
Bread & other cereals	0.7536	–0.9272	0.3177	–0.9262
Meat	1.0318	–1.0674	1.4064	–1.1194
Fish	0.9425	–0.8075	1.2440	–1.0553
Milk and dairy	0.6284	–0.5552	0.8698	–0.5192
Eggs	1.1429	–1.4094	0.7675	–1.3277
Oils & fats	1.1158	–1.2245	1.1054	–1.2500
Fruits	1.0325	–1.0623	1.0905	–1.0607
Vegetables	1.1955	–1.1489	1.1729	–1.1508
Sugar	0.9607	–1.0568	0.7458	–1.0675
Others	0.8651	–0.9727	1.4395	–1.0126
Beverage	1.1342	–1.3685	0.5940	–1.7494

CONCLUSIONS

This study constructs a complete food demand system in Malaysia by analyzing the Household Expenditure Survey 2004/2005 data via the LA/AIDS models, with incorporation of the Stone price index and the Laspeyres price index respectively. This study shows that the application of the Laspeyres price index produces more plausible estimates of expenditure and own-price elasticities in Malaysia. This discovery is similar to those documented by Alston et al. (1994), Asche and Wessells (1997), and Moschini (1995). Thus, the further implications of this study are made based on the LA/AIDS models that incorporated the Laspeyres price index.

An increasingly affluent society like Malaysia is no longer short of meeting the basic energy requirement. As the income increases, the diversification in the food basket is more likely to be filled by more non-staple foods for the calories intake. The increasing demand for non-staple foods is also implying a stronger purchasing power of the society to demand for higher value food products (mainly meat and fish) and functional food products (mainly vegetables and fruits). The estimated expenditure elasticities show that the demands for meat (1.4064), fish (1.2440), vegetables (1.1729), and fruits (1.0905) are likely to grow faster than other traditional main energy sources – rice (0.9091) and bread & other cereals (0.3177) in corresponding to the positive income effect.

Consumers also seek for a better welfare when they achieve higher income level. The welfare can be expressed as the food quality, in the term of nutrition, hygiene, organic and other features. Generally, Malaysian consumers have to pay a premium price for quality foods. It arouses the question of how the Malaysian consumers weight quality over quantity of food. However, Regmi and Dyck (2001) suggested that these higher value and quality food products will undergo greater budget adjustments to the income shock while budgets for the staple food products will change the least.

Most of the estimated own-price elasticities are elastic, indicating that Malaysian households are sensitive to price change in a food item itself. Surprisingly, Malaysian households are more tolerant to the own-price change in bread & other cereals (–0.9262) and meat (–1.1194) than rice (–1.8590). These estimated own-price elasticities describe a trend of westernization, showing that the importance of wheat and meat based products has become increasingly important in the Malaysian diet. However, the continuous icrease in oil price has pushed the price of the major commodities to an unexpected level. The price of the commodities may have increased faster than the income growth among the low and middle income consumers. The consumers are forced to look for cheaper substitute or spend more on food items. Thus, it is a subjective sceptical question whether the Engel's law will exist in the future economic development.

Facing such challenge, the Malaysian government intervention is absolutely needed in fostering the food economy. This is particularly important to esure the availability of the major food items, especially rice, wheat, oil, meat, and fish at controlled prices through subsidies. Therefore, achieving the objective of increas-

ing production to achieve high rates of self-sufficiency level for the major commodities like rice, fish, and vegetables as indicated in the Ninth Malaysian Plan is essential to shed off the pressure of price effects.

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Arrived on18th March 2008

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