



FOOD CONSUMPTION BEHAVIOR OF THE MALAYS IN MALAYSIA

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ABSTRACT

The objective of this study is to provide an insight into demand patterns of Malay consumers for specific food categories in Malaysia. By utilizing Household Expenditure Survey 2004/2005, a system of equations of Linear Approximate Almost Ideal Demand System (LA/AIDS) model for 12 aggregated food products is estimated using a two-step estimation procedure. A Working-lesser form of Engel function is also estimated to derive income elasticities from the estimated expenditure elasticities. This study shows that Malay consumers appear to have different food consumption patterns as compared to the general Malaysian diets. Malay consumers tend to increase their consumption of rice more than higher-value (meat and fish) and functional (vegetables and fruits) foods. Malay consumers are found to be very sensitive to the own-price of most of the food products, especially rice.

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1. INTRODUCTION

The diversity of the ethnic composition within Malaysian communities is rapidly becoming a marketing challenge as well as an opportunity. For instance, the Malay population had the most dramatic growth during the past decade, numbering 13.77 million and accounting for 54.5% percent of the Malaysian population in 2007 (Department of Statistics, 2007). The Malay household income had increased on average at 6.4% since 2000. It then reached RM2,711 in 2004 (Department of Statistics, 2007). The increasing household income can be directly translated as stronger purchasing power, suggesting that the Malay population could be considered the leading market growth sector in Malaysia. This growth is obviously an opportunity to address market opportunity for *Halal* agri-food products.

The opportunity is well translated with the Malaysian government aim to develop Malaysia as a world's *Halal* food hub, which is not only to serve the local market, but also for other nations. Literally, Chern (2000) suggested developing countries in the same region are likely to experience similar food consumption patterns as they reach higher per capita incomes like developed countries. Having said so, the underlying reference to business development is the consumption patterns of the Malay ethnic group, which is representative of Muslims (including non-Malay Muslims) in the country, and possibly for South East Asian countries as well. Hence, this study attempts to analyze the food consumption behavior among Malay consumers in Malaysia.

2. DATA

The data set used in this study is from the *Household Expenditure Survey 2004/2005*. The data provides detailed expenditure information along with various socio-demographic characteristics for 14,084 respondents in the survey. The data consists of 7,966 Malay respondents, 3,200 Chinese respondents, 810 Indian respondents, and 2,108 respondents from other groups. This study will only focus on the data of the Malay respondents.

Table 1 presents the trend of per capita allocations on the food budget on various food products by Malay consumers in 1999/2000 and 2004/2005. The share of cereals in total food expenditure is generally the largest, though the budget share had decreased slightly from 24% in 1999/2000 to 23.8% in 2004/2005. This is immediately

followed by the shares on fish, meat, and vegetables that recorded 21.8%, 10.4%, and 10.2% in 1999/2000 and 22.1%, 11.3%, and 9.5% in 2004/2005 respectively.

It is worthy to note that cereals made up a bigger share than meat in total food expenditure. A similar observation was reported in Japan by Chern *et al.* (2003). The budget share of the cereal group (0.2388) is formed by rice (0.9049) and bread and other cereals (0.1439). One can see that the purchase of rice (4.62kg/person) and cereal (3.03kg/person) is greater than meat (1.65kg/person) at RM1.92/kg, RM5.37kg, and RM7.5/kg respectively in 2004/05. It shows that the community is still very much calorie based.

TABLE 1
Budget shares of various food items by Malay consumers,
1999/2000 and 2004/2005

	1999/2000		2004/2005	
	Sample Size	Mean of budget share	Sample Size	Mean of budget share
Cereal	4601	0.2408	7966	0.2388
Meat	4601	0.1042	7966	0.1132
Fish	4601	0.2180	7966	0.2209
Milk & eggs	4601	0.0799	7966	0.0781
Oils & fats	4601	0.0314	7966	0.0285
Fruit	4601	0.0823	7966	0.0674
Vegetable	4601	0.1029	7966	0.0955
Sweet	4601	0.0268	7966	0.0381
Beverage	4601	0.0541	7966	0.0552
Other	4601	0.0566	7966	0.0639

3. METHODOLOGY AND SPECIFICATION

Previous studies (Baharumshah and Mohamed, 1993; Nik Mustapha, 1994; Nik Mustapha *et al.*, 1999, 2000 and 2001; Radam *et al.*, 2005; Tey *et al.*, 2007) of food consumption patterns in Malaysia utilized the premise of Linear Approximate Almost Ideal Demand System (LA/

AIDS). This is mainly due to the estimation simplicity of the linearized model compared to original non-linear Almost Ideal Demand System (AIDS) that was developed by Deaton and Muellbauer (1980a, 1980b). However, there are two main shortcomings in the application process of the LA/AIDS model in the previous studies.

The ease of estimation of the LA/AIDS model is mainly attributed to the application of the Stone price index that linearized the model. However, prices will never be perfectly collinear. Alston, Foster and Green (1994), Asche and Wessells (1997) and Moschini (1995) argued that the application of the Stone price index introduce the units of measurement error. Moschini (1995) suggested that Laspeyres price index is able to overcome this measurement error. Chern (2000) and Chern *et al.* (2003) found that application of the Laspeyres price index also yielded plausible elasticities like the non-linear AIDS model.

All of the previous studies did not correct the possible bias created by the presence of zero consumption of food items. Zero consumption happens when respondents do not purchase food items during the survey period. In order to handle the zero consumption problem, Heien and Wessells (1990) suggested a two-step estimation procedure that produces an inverse Mills' ratio (IMR) via the probit model and incorporates the IMR in the second step. The two-step estimation procedure was remarkably used by Gao and Spreen (1994), Gao *et al.* (1997), Nayga (1995), Park *et al.* (1996), and Chern (2000) in food demand analyses.

By adopting the techniques to overcome the shortcomings, this study utilizes a two-stage procedure used by Chern (2000). In the first stage, the two-step estimation procedure of Heien and Wessells (1990) is utilized to obtain IMRs via the probit model. The IMRs are then incorporated into LA/AIDS model. The LA/AIDS model for the 12 food items can be estimated as follows:

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log(p_j) + \beta_i \log\left(\frac{x}{P^L}\right) + \sum_k \gamma_k H_k + \theta_i imr_i + \mu_i \quad (1)$$

where $i, j = 1, 2, \dots, 12$ food products, w_i is the budget share of the i th food product, p is the price of the i th food product, x is the aggregate total expenditure of food, H_k includes household size and dummy

variable of urban, μ_i 's are random disturbances assumed with zero mean and constant variance, and P^L is Laspeyres price index for the aggregate food that can be defined by:

$$\log(P) = \sum_i \bar{w}_i \log(P_i) \quad (2)$$

The adding-up, homogeneity and symmetry restrictions are imposed for the LA/AIDS model. The adding-up restriction is satisfied if:

$$\begin{aligned} \sum_i w_i &= 1 \text{ for all } j, \\ \sum_i \alpha_i &= 1, \\ \sum_i \gamma_{ij} &= \sum_i \beta_i = \sum_i \theta_i = \sum_i \kappa_{ki} = 0. \end{aligned} \quad (3)$$

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

$$\sum_k \gamma_{jk} = 0 \quad (4)$$

The symmetry is satisfied by:

$$\gamma_{ij} = \gamma_{ji} \quad (5)$$

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

$$e_i = \frac{\beta_i}{w_i} + 1 \quad (6)$$

The Marshallian measures of price elasticities can be computed by:

$$s_{ij} = -\delta_{ij} + \left(\frac{\gamma_{ij}}{w_i} \right) - \left(\frac{\beta 1_i}{w_i} \right) w_j \quad \forall i, j = 1, \dots, n \quad (7)$$

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

4. RESULTS AND DISCUSSION

The central focus of this study is on the demand elasticities. Table 2 presents the estimated own-price and expenditure elasticities for the various food items by Malay consumers. Generally, Malay consumers are found to be very sensitive to most of the food prices, except bread and other cereals (-0.9488), fish (-0.9560), milk and dairy (-0.4667), and other foods (-0.9528). The demand for fish (-0.9560) is less price elastic than meat (-1.0468). This may indicate that Malay consumers are insensitive to changes in the price of fish. Facing similar results, Pomboza and Mbaga (2007) suggested that an increase in the expenditure on fish may not be caused by a price decrease but instead may be caused by an increase in income and probably also by the increase in the health consciousness of consumers.

TABLE 2
Estimated Own-price and Expenditure Elasticities for Food Items
by Malay consumers

	Own-price Elasticity	Expenditure Elasticity
Rice	-2.0241	1.2140
Bread & other cereals	-0.9488	0.8066
Meat	-1.0468	1.0260
Fish	-0.9560	0.9897
Milk & dairy	-0.4667	0.8040
Eggs	-1.4673	1.0997
Oils & fats	-1.1717	1.0966
Fruits	-1.0645	1.0415
Vegetables	-1.0642	1.1177
Sugar	-1.0672	0.9905
Other foods	-0.9528	0.9338
Beverage	-1.3479	1.0491

Unexpectedly, the estimated own-price elasticity for rice (-2.0241) is very elastic while bread and other cereals (-0.9488) are nearly least inelastic. This indicates that Malay consumers are sensitive to price changes in rice. The rice group in the data did not differentiate local rice (ST5%, SST10%, and SST15%) and other imported rice. In fact, only local rice ST15%, which was specially to cater for the poor, was set with a retail ceiling price (RM1.80/kg). Prices for other rice were floated in 2004/05. Yeah (2008) revealed that the local rice ST15% is of such low quality (with only 10 percent market share) that consumers do not buy it as they tend to go for higher-quality varieties as per capita income increases and vice-versa. In short, the data could be a representative of price sensitivity for higher-quality (more expensive) rice varieties. It does not imply substitution effect with other food groups. Indeed, there is internal substitution between rice categories in the group.

The United States Department of Agriculture (2007) stated that expenditure elasticity shows how the quantity purchased changes (how sensitive it is) in response to a change in the consumer's expenditure, which is a proxy for income. Therefore, the estimates of expenditure elasticities in this study must not be more than unity. This is because as income rises, the proportion of income spent on food falls, even if actual expenditure on food rises, according to Engel's law.

However, the estimated expenditure elasticities of seven food products are more than unity. Hence, this study follows Chern *et al.* (2003) and Chern (2000) to estimate an Engel function, which is useful to derive income elasticities from the estimated expenditure elasticities. The Engel function can be expressed as:

$$s = \alpha_0 + \alpha_1 \log X + \beta \log P^L + \sum_k \gamma_k H_k + \varepsilon \quad (8)$$

where s is share of aggregate food in total expenditures, X is total expenditures of food and non-food consumer goods and services, P^L is Laspeyres price index for the aggregate food, and ε is random disturbances assumed with zero mean and constant variance.

The responsiveness of expenditure on food items by income change can be derived by,

$$e_e = 1 + \frac{\alpha_1}{s} \quad (9)$$

Hence, income elasticity can be estimated as follows:

$$e_y = e_i e_e$$

(10)

From equation (9), the responsive of expenditure on food items by income change is estimated to be 0.5334. By multiplying the estimate of expenditure elasticity (0.5334) with the estimated expenditure elasticities of various food products, Table 3 reports the estimated income elasticities for the various food products by Malay consumers in Malaysia. Overall, the estimated income elasticities are less than unity, showing that all of the food products are normal goods.

It is noteworthy that income elasticity for rice (0.6476) is the highest among all. This is followed by vegetables (0.5962), eggs (0.5866), oils and fats (0.5849), fruits (0.5555), and meat (0.5472). Surprisingly, the estimates of income elasticities for bread and other cereals (0.4303) and milk and dairy (0.4289) are relatively low. This means that Malay consumers are expected to increase their consumption of rice, vegetable, fruit, and meat faster than cereal based and dairy based products as per capita income increases.

TABLE 3
Estimated Income Elasticities for Food Items by Malay consumers

	Income Elasticity
Rice	0.6476
Bread & other cereals	0.4303
Meat	0.5472
Fish	0.5279
Milk & dairy	0.4289
Eggs	0.5866
Oils and fats	0.5849
Fruits	0.5555
Vegetables	0.5962
Sugar	0.5284
Other foods	0.4981
Beverage	0.5596

CONCLUSION

The objective of this study is to provide an insight into demand patterns of the Malay consumers for specific food categories in Malaysia. By utilizing Household Expenditure Survey 2004/2005, a system of equations of the LA/AIDS model for 12 aggregated food products is estimated using a two-step estimation procedure. A Working-lesser form of Engel function is also estimated to derive income elasticities from the estimated expenditure elasticities.

This study shows that Malay consumers appear to have interesting food consumption patterns. Malay consumers tend to be sensitive to price changes in rice, suggesting an internal substitution effect between rice categories in the group. While other food own prices are elastic, bread and other cereals, fish, milk and dairy, and other foods are inelastic.

Rice is still an important staple food in the community. This is because Malay consumers are likely to increase their consumption of rice more than higher-value (meat and fish) and functional (vegetables and fruits) foods in accord with income growth. Hence, Malays' consumption behavior found in this study provides a useful key indicator to forecast the future consumption patterns of Muslims in Malaysia. It could possibly apply to the region as well. Similar estimates would be required for other countries in South East Asia before drawing an absolute conclusion for them.

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