EXPENDITURE PATTERNS ON FOODSERVICE IN MALAYSIA

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ABSTRACT

Rapid changes have occurred in the way food is prepared, in the way it is cooked, and in the places it is consumed. Foodservice has become increasingly important in the composition of the food account among Malaysians. The objective of this study is to analyze consumers' expenditure pattern on foodservice in Malaysia. Several functional forms and a Heckman two-step methodology to account for censored-response bias are employed in the analysis of Household Expenditure Survey 2004/2005 data. Regardless of functional forms, the empirical estimates of income elasticity of demand for foodservice are significantly bigger than income elasticity of demand for food at home. This study shows positive prospect for foodservice industry in Malaysia, where an increase in income has the propensity to lead to an increase in expenditure (demand) on foodservice.

Keywords: Expenditure pattern, Foodservice, Heckman two-step, Income elasticity.

INTRODUCTION

The affluence of Malaysian is reflected by higher household expenditure on consumer goods over the years. Statistically, the Malaysian household average monthly expenditure on consumer goods (both food and non-food) is recorded in Household Expenditure Survey 1973, 1980/82, 1993/94, 1998/99, and 2004/05 individually.

The increase in household monthly expenditure on consumer goods started from RM412 in 1973 to RM732 in 1980/82. It then recorded higher expenditure of RM1,631 in 1993/94, followed by an average positive rate of 7.0 per cent between 1993/94 and 1998/99. More rapid development in Malaysian economic after economic crisis in 1997 observed the Malaysian average monthly household expenditure on consumer items surged even further from RM1,161 in 1998/99 to RM1,937 in 2004/2005.

Aggregate food expenditure share (both food at home and foodservice) decreased from 38.3 per cent in 1973 to 31.2 per cent in 2004/2005. By zooming in, it is recorded that food at home (FAH) expenditure share declined steadily from 33.7 per cent in 1973 to 20.4 per cent in 2004/2005. Foodservice expenditure share raised from 4.6 per cent in 1973 to 10.8 per cent in 2004/2005. Such statistics imply that rapid changes have occurred in the way food is prepared, in the way it is cooked, and in the places it is consumed as foodservice has become increasingly important in the composition of the food account among Malaysians.

Though it has been an increasing trend for the foodservice expenditure share, the foodservice expenditure share in Malaysia has been relatively lower compared with the United States (36.5 % in 1992), Canada (32% in 1992), and other developed countries as reported in Jensen and Yen (1996). Hence, foodservice growth in Malaysia is expected to continue because of the rising income and rapid urbanization.

Taking into account of the increasing trend of expenditure on foodservice, the objective of the paper is to provide a better understanding of demand by analyzing consumers' expenditure pattern on foodservice in Malaysia. This is crucial as Malaysian's agri-food industry is increasingly market-led with consumers being one of the main drivers for change. The future food choices will have implications for the organizational structure of the agri-food industry and for the economic well-being of farmers, food processors, retailers and other participants in the food production and marketing system.

LITERATURE REVIEW

Demand for foodservice has been studied extensively in other countries. Tobit model, Box-Cox double hurdle model, and Heckman's two-step estimation are the commonly used in the studies of demand for foodservice. Angulo et al. (2002) suggested that the choice to use either one of the models is laid on the reasons of zero expenditure on foodservice. Zero expenditure happened when households did not purchase foodservice during the survey period.

Tobit model has been found to be appropriate when zero purchases are caused only by economic factors such as high prices or low income. McCrachen and Brandt (1987) examined the foodservice expenditure behaviors by type of food facility via Tobit model. By using data from Household Expenditure Survey 1998/1999 in Malaysia, Radam et al. (2004) estimated income elasticity of demand for foodservice and Lee and Tan (2006) examined the influence of socio-demographic factors on foodservice expenditure via Tobit model.

However, Cragg (1971) argued that the Tobit model is very restrictive. This is because the Tobit model assumes that the determinants of consumption are the same as the determinants of participation. Two-stage estimators such as the double hurdle model and Heckman's two-step methodology are typically used in analyses of this nature to overcome this restriction. Another plausible advantage

of these two-stage procedures is its ability to tackle the problem of incorporating censored dependent variables in a panel data framework.

Yen (1993) suggested that if zero expenditure is due to either abstention or economic factors, the Double-Hurdle Model must be applied. Yen (1993) utilized the Box-Cox double hurdle model to examine the working wives' expenditure patterns on foodservice expenditure in Taiwan. On another hand, Keelan et al. (2005 and 2006) found that the double hurdle model outperformed the Tobit model in their studies on Irish households' foodservice expenditure patterns.

The data of Household Expenditure Survey 2004/2005, which to be used in this study do not provide any information whether the zero purchases are caused only by economic factors or abstention. In such case, Bryne et al. (1996) suggested that Heckman's two-step estimation will produce more plausible results than other demand models. Haines et al. (1988) explained that this is mainly because this procedure is less restrictive than the Tobit estimation technique. The first stage is a participation stage, the decision of whether or not to consume foodservice is made. The second stage is the decision is made with respect to the level of consumption or expenditure.

DATA AND ESTIMATION TECHNIQUES

The data of Household Expenditure Survey 2004/2005 from the Department of Statistics, Malaysia consists of 14,084 households. Every household in the data spent on FAH during the survey month. Therefore, no household submitted zero expenditure for FAH. However, not all households purchased foodservice. Thus, followed Bryne et al. (1996), the two-step procedure of Heckman is used to circumvent the censored-response problem in the case of foodservice.

In the first stage, the decision for the household is modeled as a dichotomous choice problem:

$$I_h = b_1 \log(Y_h) + b_2 \log(hhsize_h) + b_3 \log(age_h) + b_4 urban_h + b_5 employed_h + b_6 penin_h + b_{7i} swak_h + b_8 male_h + b_9 malay_h + b_{10} cina_h + b_{11} indian_h + e \quad (1)$$

From Equation (2), the inverse Mills ratio, IMR_h, for every household can be computed as:

$$IMR_h = \frac{f_h(x, g)}{\Phi_h(x, g)} \quad (2)$$

where x and g are the vector of expenditures and the vector of demographic variables for the household, respectively. ϕ_h is the density probability function, and Φ_h is the cumulative probability function.

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In the second step, the following Working-Leser model and other demand functional forms incorporating the computed inverse Mills ratio, IMR_h, as an instrument variable is estimated:

Working-Leser:

$$s_h = a_1 + a_2\log(Y_h) + a_3\log(hhsize_h) + a_4\log(age_h) + a_5urban_h +$$
$$a_6employer_h + a_7penin_h + a_8swak + a_9male_h + a_{10}malay_h + a_{11}cina_h \qquad (3)$$
$$+ a_{12}indian_h \{+a_{13}IMR_h\} + \varepsilon$$

From equation (4), the income elasticity can be estimated as below:

$$e_y^h = 1 + \frac{a_2}{s_h} \qquad (4)$$

Semi-Logarithmic:

$$EXP_h = b_1 + b_2\log(Y_h) + b_3\log(hhsize_h) + b_4\log(age_h) + b_5urban_h +$$
$$b_6employer_h + b_7penin_h + b_8swak + b_9male_h + b_{10}malay_h + b_{11}cina_h \qquad (5)$$
$$+ b_{12}indian_h \{+b_{13}IMR_h\} + \varepsilon$$

From equation (6), the income elasticity can be estimated as below:

$$\lambda_y^h = b_2 + \frac{1}{EXP_h} \qquad (6)$$

Double-Logarithmic:

$$log(EXP_h) = c_1 + c_2\log(Y_h) + c_3\log(hhsize_h) + c_4\log(age_h) + c_5urban_h +$$
$$c_6employer_h + c_7penin_h + c_8swak + c_9male_h + c_{10}malay_h + c_{11}cina_h \qquad (7)$$
$$+ c_{12}indian_h \{+c_{13}IMR_h\} + \varepsilon$$

From equation (8), the income elasticity can be estimated as below:

$$\theta_y^h = c_2 \qquad (8)$$

Quadratic:

$$log(EXP_h) = d_1 + d_2\log(Y_h) + d_3\log(Y_h)^2 + d_4\log(hhsize_h) + d_5(\log(hhsize_h)^2 +$$
$$d_6\log(age_h) + d_7urban_h + d_8employer_h + d_9penin_h + d_{10}swak + d_{11}male_h + \qquad (9)$$
$$d_{12}malay_h + d_{13}cina_h (9)+ d_{14}indian_h \{+d_{15}IMR_h\} + \varepsilon$$

Income elasticity can be computed upon the estimation of equation (9). According to Blundell et al. (1993), the income elasticity can be estimated as below:

$$\eta_y^h = d_2 + 2d_3 \log(Y_h) \tag{10}$$

The variables used in these analyses are listed in Table 1.

Table 1: Definitions of variables used in the models

Variable	Definition
i	Food grouping; $i = 1, 2, 3$
h	Surveyed household; $h = 1,..., 14,084$
i_h	Is one if a household purchased foodservice (i.e., $w_h > 0$), and zero otherwise.
s_{ai}	Expenditure share for the ith food grouping and the hth household; thus, share could be for Total Food (TotFood), Foodservice (Fserv), or Food At Home (FAH).
EXP_{hi}	Expenditure in ringgit for the ith food grouping and the hth household.
$\log(EXP_h)$	Logarithm of expenditure for the FOODSERVICE by the hth household
$\log(Y_h)$	logarithm of monthly income of the hth household
$\log(hhsize_h)$	Logarithm of household size of the hth household
$\log(age_h)$	Logarithm of age of household head of the hth household
urban	The hth household resides in urban area (0, 1). Base = rural area
employer	The hth household head is employed (0, 1). Base = unemployed
penin	The hth household resides in Peninsular Malaysia (0, 1). Base = Sabah
swak	The hth household resides in Sarawak (0, 1). Base = Sabah
male	The hth household head is a male (0, 1). Base = female
malay	The hth household head is a Malay (0, 1). Base = other race/ethnic
cina	The hth household head is a Chinese (0, 1). Base = other race/ethnic
indian	The hth household head is an Indian (0, 1). Base = other race/ethnic
ε	Random disturbances assumed with zero mean and constant variance.

RESULTS

Table 2 presents the household expenditures on total food, FAH, and foodservice. It is very clear that Malaysian households spent most of their food expenditure on FAH rather than foodservice. Statistically, Malaysian households allocated monthly RM101.82 or 25% of their total expenditures on FAH in 2004/2005.

Table 2: Household expenditures on total food, FAH, and foodservice

Variable	Sample size	Mean	Standard Deviation
Monthly Food Expenditures (RM)			
Total food	14084	166.61	122.64
FAH	14084	101.82	72.5
Foodservice	14084	64.78	88.6
Monthly Food Budget Shares			
Total food	14084	0.36	0.13
FAH	14084	0.25	0.13
Foodservice	14084	0.11	0.1

Appendix tables 1, 2, 3, and 4 show the Working-Leser, semi-logarithmic, double-logarithmic, and quadratic functional form parameter estimates for total food, FAH, and foodservice. The Working-Leser structure reported negative and statistically significant parameter estimates for the logarithm of monthly income for total food, FAH, and foodservice. The semi-logarithmic, double-logarithmic, and quadratic forms reported positive and statistically significant parameter estimates for the logarithm of monthly income in all instances.

All three of these functional forms and Working-Leser structure reported negative and statistically significant coefficients for the logarithm of household size. Previous studies (Moffit, 1989; Girma and Kedir, 2002; Binkley, 2005) found that as household size increases the budget allocated to food declines due to the economies of scale enjoyed as family size expands. For all three expenditure groups, the quadratic form reported negative and statistically significant coefficients for the squares of logarithm of monthly income; postitive and statistically significant coefficients for the squares of logarithm of household size. The signs and significance of the estimated coefficients associated with the socio-demographic terms varied by expenditure group and functional form.

Table 3 presents the income elasticities of demand for total food, FAH, and foodservice. For total food expenditures, income elasticities ranged from 0.2133 (quadratic) to 0.6655 (Working-Leser). For FAH, income elasticities ranged from 0.1623 (quadratic) to 0.5534 (Working-Leser. Lastly, for foodservice, income elasticities ranged from 0.8315 (semi-logarithmic) to 0.9197 (quadratic).

Table 3: Income Elasticities of demand for total food, FAH, and foodservice

	Income Elasticity		
	Total food	**FAH**	**Foodservice**
Working-Leser functional form	0.6655	0.5534	0.9075
Semi-Logarithmic functional form	0.6320	0.5045	0.8315
Double-Logarithmic functional form	0.5914	0.4553	0.9197
Quadratic functional form	0.2133	0.1623	0.8369

CONCLUSION

The objective of this study is to analyze consumers' expenditure pattern on foodservice in Malaysia. Several functional forms and a Heckman two-step methodology to account for censored-response bias are employed in the analysis of Household Expenditure Survey 2004/2005 data. Regardless of functional forms, the empirical estimates of income elasticities of demand for foodservice are significantly bigger than income elasticities of demand for food at home. Based on the income elasticities, the trend of favoring foodservice is expected to continue into the near future, with expenditures on foodservice are expected to grow at a faster rate than expenditures on FAH. This study shows positive prospect for foodservice industry in Malaysia, where an increase in income has the propensity to lead to an increase in expenditure (demand) on foodservice.

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