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THESIS

ECONOMIC ANALYSIS OF FOOD AT HOME AND FOOD AWAY FROM HOME CONSUMPTION OF THAI HOUSEHOLDS IN 2004

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A Thesis Submitted in Partial Fulfillment of
the Requirements for the Degree of
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This study aims mainly to analyze the consumption patterns of food prepared at home, prepared food taken home and food eaten away from home of Thai households and to study factors affecting the expenditure pattern of these three food consumptions. Data for this study are taken from the socio-economic survey in 2004 by National Statistical Office. An Engel curve equation derived from the Almost Ideal Demand System (AIDS) is employed to analyze the consumption patterns.

The results indicate that the share of total expenditure going to food away from home increases as the household consumption expenditure increases. All income elasticities are positive indicating the necessity items of food at home and prepared food taken home in all regions. In addition, the food away from home is seemed to be the luxury commodity, excluding in Bangkok and in the South. Furthermore, the greater income elasticity of food away from home consumption comparing to those of food at home and prepared food taken home implies that the consumption for food away from home is more income sensitive than the food at home and prepared food taken home consumptions. Differential regions and household types also affect on these three food consumptions.

The information from this study will be useful as a source of information for policy designs toward marketing strategy development which is one of the primary concerns of food distribution and retail industries.

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Chayada Bhadrakom

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CHAPTER I

INTRODUCTION

Statement of the Problem

Economic growth in Thailand has been growing at considerable rate in a past decade (Figure 1) as a result of successful development in rural infrastructure and rapid development in industrial and service sectors. A high growth in non-agricultural sector induced not only a higher wage rate in urban areas, but also a pressure of labor out migration from rural to urban areas, creating a structural change in socio-demographic and economic structures. While, the family size of Thai households declined from an average of 4.1 in 1980 to 3.5 in 2002, the average income per household of the Thais in the same period rose from 5,625 Baht to 13,736 Baht which was about double (NSO, 2005). The Thai economy is recently adjusting toward the increasing importance of industrial sector despite a disruption of economic crisis in 1997.

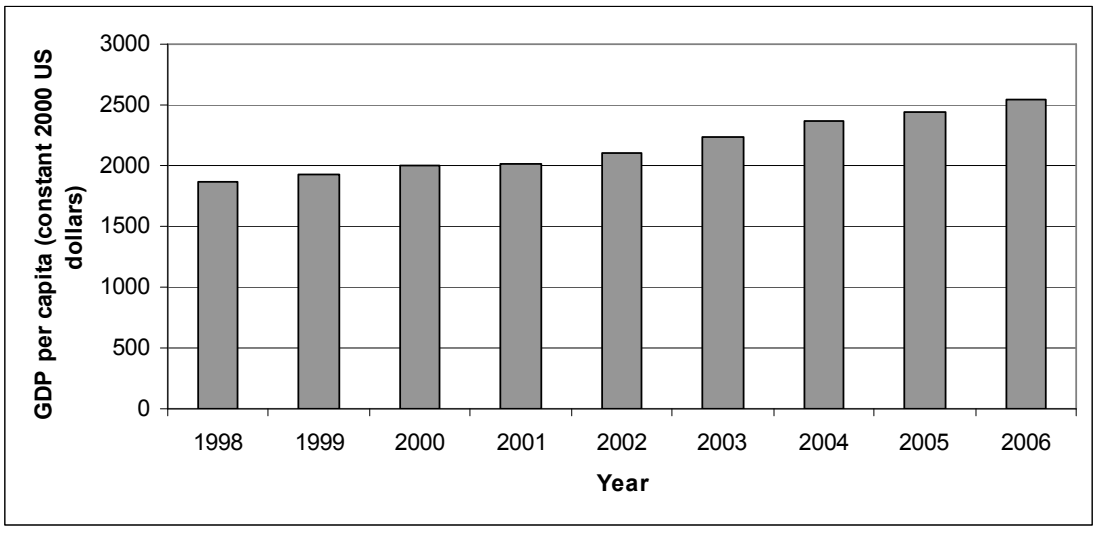

Figure 1.1 Thailand GDP per capita (constant 2000 US dollars), US dollar
Source: ESCAP (2007)

Changes in economic condition as a result of trade liberalization and the globalization may induce a change of food consumption patterns of Thai households. For example, in the recent 20 years, the eating habit has changed dramatically in the emerging "urban middle class" near Bangkok metropolitan area (TADA, 1997). The food consumption behavior of the Thais changes from eating without concerning about quality and nutrition to pay more attention toward the consumption of quality and good proportional food. Globalization which is one of the most important factors is more influential on the trend of food consumption in Asia. It has resulted in rapidly growing international flow of goods, portfolio capital and direct investments (Ljungwall and Sjoberg, 2005). Moreover, the booming franchise system in Thailand also comes from the development of globalization. In 2002, foreign food franchise business accounted for 80% of the total food franchise markets and 80% of the foreign food franchise markets were from U.S.A. (*Italian* Trade Commission – Bangkok, 2002). Similarly, globalization has affected on Asian society especially in the group of women in developing countries. With the establishment of international free trade policies, transnational corporations have been using the profit motive to guide their factories toward developing nations in search of "cheap female labor" (Bacchus, 2005). As a couple has to work outside home, it creates an eating outside patterns which inevitably changes the food consumed at home patterns.

Table 1.1 shows the food consumption quantity of Thai population. From this table, per capita consumption of rice declined by 16.44% from 1990 to 2005. At the same period, the consumption of wheat, vegetable and milk rose significantly by 189%, 76%, and 44%, respectively. The rapid growth of wheat consumption was due to the upward trend of western-style food and bakery consumption while, chicken and pork consumption had increased by 24.56% and 50% respectively between 1990 and 2002. However, after that consumption of chicken meat decreased by 18.91% for the following 3 years because of an epidemic of bird flu whereas, the trend of consumption pork was nearly constant (FAO, 2005). From the previous data, it is observed that there was significant change in food consumption patterns of Thai population in the recent 15 years. Furthermore, for the last 20 years, the Thai household food expenditure patterns have also changed. Household expenditures for

food at home (FAH) as a proportion of household food consumption expenditures have trended downward. Whereas, the proportion spent on food away from home (FAFH) has increased gradually (Table 1.2).

Table 1.1 Food consumption in Thailand in 1990, 2002 and 2005

Unit: quantity/day/capita (g)

year	rice	wheat	soybean	chicken	pork	vegetable	milk	fish	sugar
1990	435.02	16.59	25.12	26.87	18.4	18.87	41.94	11.19	0.19
2002	392.81	36.61	51.63	33.47	27.75	21.51	54.06	20.43	0.48
2005	363.49	48	58.28	27.14	26.74	33.3	60.65	20.56	0.28

Source: FAO (2005)

Table 1.2 Average expenditure spent on food prepared at home, prepared food taken home and food eaten away from home between 1990 and 2006 in Thailand.

Unit: Bath /month/ household

Type	year				
	1990	1994	1998	2002	2006
Food prepared at home	1494 (75.95)	1881 (72.82)	2609 (70.88)	2397 (65.37)	2491 (59.24)
Prepared food taken home	173 (8.80)	251 (9.72)	397 (10.79)	506 (13.82)	611 (14.53)
Food eaten away from home	300 (15.25)	451 (17.46)	675 (18.33)	763 (20.81)	1103 (26.23)
Household size	4.1	3.8	3.7	3.5	3.4

Note: Numbers in parentheses are the percentages of total food expenditure.

Source: NSO (2006)

Theoretically, the patterns of food consumption in Thailand depend on the characteristic of each Thai household such as per capita income, education, lifestyle of each location of residence, the number of members in household and the composition of household. These factors are also major identifiers of household expenditure for food consumption of Thai households. In recent years, many significant demographic, social, economic and lifestyle changes have taken place in Thailand. Labor force participation of women has increased. The proportion of females being employers, employees and having their own businesses rose from 1.1, 34.2 and 20.4 in 1996 to 1.5, 42.9 and 24.0 in 2004 respectively. On the other hand, the trend of females doing in their household businesses without getting wage declined from 44.3 to 31.4 (NSO, 2005). More Thai households have migrated from rural to urban area, and their real incomes have increased noticeably. These changes have been accompanied by new trends of consumption patterns. Expenditure on food away from home has increased because traditional Thai meals need a lot of preparation time compared to processed foods. The increase in the ownership of time-saving durables such as microwave ovens and the change in taste and preference especially the younger generation to western foods have increase the demand for convenience foods. Consequently, identifying and measuring the influence of factors affecting food expenditure is a way in order to verify human's food consumption behavior and can measure the change in social and economic structures greatly.

From the previous literatures in Thailand, most studies analyzed about food consumption behavior of the Thai household however, less of them emphasized about away from home food. Therefore, this research will investigate the food consumption patterns in Thailand by taking the food away from home group into account.

Objectives of the Study

1. To examine factors affecting food consumption patterns and to analyze consumption patterns between FAH and FAFH.

2. To estimate income elasticity of demand for food consumption of Thai households.

Research Contributions

1. To better understand the food consumption patterns and to know the income elasticities of Thai household which are useful for policy analysts and model builders as they could be used to measure the impacts of government policies and to predict future consumption pattern for improving market planning for agricultural producers and planning a policy about food distribution. The types of audiences might be interested in the results of this paper: model builders who need these parameters in their models and researchers who use it to adjust policies.

2. To understand initially the magnitude and nature of demand shifts which is far important in order to document and understand these phenomena for comparing with other Southeast-Asian countries.

Scope of Study

This paper is in order to study the food consumption patterns of Thai households and to estimate their factors affecting. Moreover, this study also analyzes consumption patterns between food at home and food away from home as well as estimates the income elasticity of demand for food consumption by using the secondary data that come from socio-economic survey, 2004 of Economic and Social Statistics Bureau, National Statistical office.

Outline of the Thesis

The thesis is divided into five chapters. This chapter introduces the study. The second chapter provides a review of related theories; review of food consumption pattern and review of food away from home consumption. The third chapter deals with research methodology. The fourth chapter shows the results of the study. The fifth and last chapter discusses research results, recommendations and the conclusion of the thesis.

CHAPTER II

LITERATURE REVIEW

Review of Food Consumption Pattern

A declining trend of direct per capita consumption of cereal as food has been found in the rapidly growing economies of Asian countries such as Japan, Korea and Taiwan. At the same period, the consumption of per capita meat, fish and dairy has increased dramatically over the past three decades. Typically, economists explained such changes in Asian food consumption patterns primarily as resulting from increases in income and change in food price (Ito, Peterson and Grant, 1989; Capps *et al.*, 1994).

In China, there were many paper to study food consumption pattern. Both Huang and Bouis (1996)and Wu (1997), using 1991 Chinese cross sectional data, showed that moving a consumer from a rural to an urban area, would effect the structural changes in the demand for food. However, Wu's study focused only on the grain consumption and also looked at the effect of price and income while, Huang and Bouis leaved expenditure and prices the same as experienced in the rural area. From Huang and Bouis paper, they found that urbanization would produce an increase in consumption of meat and fish by between 5 and 9 kg per year. They also examined cross sectional data from Taiwan for 1981 and 1991, disaggregated by urban and rural areas and occupation. They concluded that the demand for food was substantially influenced not only by growth in incomes and price changes, but also by differences in urban and rural lifestyles, the development of more advanced marketing systems, and occupational changes that were closely linked with increasing GNP per person. In Taiwan, per person consumption of rice had fallen by 35.5 kg: income factors provided and increase in consumption but urbanization had produced a downward trend. At the same period, as a result of Wu's study, demand for flour would be the main source of growth in grain consumption in the urban areas. However, in the process of urbanization, rural people would adopt on urban consumption and tended

to consume less food grain. From both studies, it concluded that the effects of urbanization on food grain would be negative in East Asia.

In 2005, Jabarin estimated the meat demand system in Jordan by using almost ideal demand system (AIDS) the same as Huang and Bouis. However, Jabarin didn't concern on the influence of urbanization on food demand so his majority exogenous variable were commodity's price, annual income and household's size. In this case, the collected data contained many zero consumption for some of the goods, because some of the households did not consume some food items as a result of nonpreference or household inventory. For this reason, the Heien and Wessel generalized Heckman procedure was used in this research to deal with the inclusion of households that reported zeros expenditure of that goods in the analysis. Consequently, the observations were used in two steps in the decision process in estimating the system of equations for the four commodities. In the first stage, Inverse Mill Ratio was estimated by using probit regression model. In the second stage, the estimated variable was included in the AIDS model to estimate food demand elasticities. The results revealed that the demand for mutton and poultry was elastic while the demand for beef and fish was inelastic. The cross-price elasticities indicate that poultry and beef were substitutes to mutton. The expenditure elasticities confirmed that beef and mutton were luxury goods while poultry and fish were necessity goods.

Similarly, Rae (1999) found that the trend was moved away from traditional cereal to higher-value and higher protein food. Nevertheless, he estimated the food consumption patterns and nutrition in urban Java household by the discriminant analysis. This paper indicated that spouse's education and household expenditure were the most important variables in explaining differences among the traditional, transitional and non traditional dietary household groups. The calorie and protein status of households in the `non-traditional' grouping that was associated with higher expenditure and education levels was superior to other groupings. Furthermore, increases in the spouse's education appeared to be associated with the substitution of fat consumption for that of carbohydrates, leaving total protein consumption unchanged. Inevitably, the majority of households with non-traditional diet exceeded

the recommended share of calories derived from fats. Finally, this paper suggested that estimation of change in food consumption patterns as economic development proceed may also be bias if the influence of changes in educational level of household decision- makers was ignored.

In Thailand, there were many previous studies about food consumption pattern as well (eg. Urayart, 2002; Schmidt and Isvilanonda, 2004; Praseartsung, 2004 etc.) In 2004, Schmidt and Isvilanonda estimated the food consumption expenditure in the case of vegetable. They found that with the famous Engel's law, real income increased and consumption expenditure shares shifted from food to non-food items. However, within the food expenditure, the share of vegetable and fruit consumption increased at the expense of basic foodstuff like cereals and rice. This paper used the Socio-Economic Survey Data of 1998 to estimate the structural aspects of vegetable consumption including regional and socio characteristics. This study tried to examine relationships between incomes, regional and socio-demographic factors and household vegetable expenditure by applying single equation models and using Ordinary Least Square (OLS). Their result was quite similarly to the result of Urayart (2002). Her study analyzed and compared the changes in food consumption between agricultural sector and non-agricultural sector as well as studied the response of the food expenditure to household income. Because of fast economic and social development, consumers were able to access many ways of consumption so the intake of grain, cereal, meat and fish etc. decreased while the intake of vegetable, fruit and nut increased.

Prasertsung (2004) analyzed food consumption expenditure by using double-log equation. The OLS was employed to estimate parameters. He found that community characteristics impacted on food consumption expenditure. Overall, income elasticities of all types of food are more than zero but less than one indicating normal goods of all groups. The highest income households spent the large share on fruits, nuts, beverages and meals eaten away from home while, Isvilanonda and Kongrit (2006) studied estimated demand and income elasticities of rice consumption in Thailand. Although the income elasticity of rice was positive and closed to zero in

overall country, each income group had different income elasticity of rice resulting from different patterns of consumption. The households in urban areas tended to have small income elasticities than those in rural area. The households in the highest income rank of 25% had a negative response to the income, indicating the inferior goods of rice in this income group.

Review of Food Away from Home Consumption

There were many studies of food away from home (FAFH) consumption (e.g. Prochaska and Schrimper, 1973; Kirtsey, 1983; Redman, 1980; McCracken and Brandt, 1987). Some of these studies focused their analyses on the socio-demographic and economic factors affecting away from home food consumption and expenditures. Common socio-demographic factors considered are income, household size, urbanization, region, race, employment, and education. Some of the results from these studies were different regarding to the relative importance of these factors on FAFH consumption or expenditures, primarily due to the use of different consumption models, databases, and estimation techniques. For instance, Cij (the j th household's consumption of i th market good) of Prochaska and Schrimper study was measured by the number of meals purchased and consumed away from home while, Kinsey and Redman used aggregate expenditures on FAFH as the dependent variable. For McCracken and Brandt study, they modified Cij from total expenditures on FAFH and expenditures by types of food facilities (restaurants, fast food or other commercial). However, most of them analyzed FAFH consumption by the theoretical context of household production economics.

After that, many papers were more concerned on the effect of labor force participation rate of women on FAFH consumption. In U.S., Nayga and Capps (1992) estimated the demand for food away from home (FAFH), food at home (FAH) and non-food items by using Almost Ideal Demand System (AIDS). Nevertheless, this paper were different from other preview papers because this study investigated the consumption with the use of shorter (monthly) time interval data from 1970 to 1989.The results indicated that the share of total expenditure on FAFH increased as

labor fore participation rate of women increased. Moreover, the demand for FAFH was more price sensitive than the demand for FAH.

Park and Capps (1997) employed Heckman's two-stage procedure to estimate the demand by US households for food prepared outside of the home. Household heads who were younger, more educated and faced greater time constraints were more likely to consume food prepared outside of the home. The income elasticity was estimated to be 0.132. Nayga (1996) studied the effects of wife's labor force participation on the expenditures for FAFH, prepared food and food prepared at home. The expenditure elasticities of FAFH with respect to income and wife's labor hour per week were 0.316 and 0.129, respectively.

Manrique and Jensen (1998) estimated the consumption of FAFH in Spain using a switching regression model. They showed that the consumption patterns in Spain were similar to what was found in US households. The value of women's time, urbanization and income were positively related with the consumption and the level of FAFH. Mihalopoulos and Demoussis (2001) also presented similar consumption patterns of FAFH for Greek households. However, they found that wives' education was associated with a greater level of expenditure on FAFH. The income elasticity is 0.24.

Similarly, in Asia, Keng and Lin (2005) examined the relationship between wives' value of time and expenditures on food away from home (FAFH) in Taiwan between 1983 and 2000. An endogenous switching regression model was used to model the household's consumption decision on FAFH. The empirical results showed that wives' value of time, household income, presence of young children and grandparents, and wives' educational attainment are important factors for both participation in consuming and amount spent on FAFH. The income elasticities of FAFH increased from 0.09 to 0.17 over the sample period. Moreover, other things being equal, the level of spending on FAFH had also increased over time. As well as in China, Ma *et al.* (2006) used national statistical sources and their own data to examine the trends in FAFH during the late reform period and to analyze the

determinants of FAFH demand. A system of multivariate Tobit equations was estimated simultaneously for three categories of foods consumed outside of the home (grains, meats and eggs, and liquor and beverage). The results showed that the rapid increase of FAFH demand, a rise that was fueled by higher incomes, was changing consumption patterns in China's post-reform urban economy.

In addition, many papers (McCracken and Brandt, 1987; Nayga and Capps, 1992; Jensen and Yen, 1995) suggest that a better understanding of the factors associated with FAFH has become increasingly important to explain changes in food market, anticipate implications of changes in eating patterns on dietary quality, design effective nutrition intervention programs and understand factors that motivate consumer behavior related to food choices. Thus, because development of effect marketing policies is one of the primary concerns of the food distribution and retail industry, analysis in FAFH could be used as an aid in making important pricing and policy decisions.

CHAPTER III

RESEARCH METHODOLOGY

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Conceptual Framework

Food is a basic item of household expenditures because its intake provides calories and nutrition to consumers. Traditionally, the dietary habits rely mainly on rice and fish to meet calories and protein needs. In addition to rice and fish, other important foods in the Thai diet are pork, chicken and beef.

Food consumption patterns in Thailand have been gradually changed over the part few decades. There has been an increasing trend in per capita consumption of more nutritive foods such as meats, fruits, vegetables and fat and oil as well as a declining trend in per capita grain and rice consumption. Rapid economic growth, urbanization and changes in household characteristics induce changes in food consumption patterns resulting to change in expenditure for the food items. Figure 3.1 shows the conceptual framework for identifying what factors affect food consumption of Thai households.

In addition, a crucial hypothesis addressed in this study is that the change in socio-demographic and economic structure influents on the change in food consumption patterns. For the change in economy, it is measured by the household income or household consumption expenditure while, the household characteristics consisting of household size, age, gender and education etc. are used for estimating the change in socio-demographic structure. Moreover, the change in food consumption can lead to the change in household expenditure especially on the agricultural and food sectors.

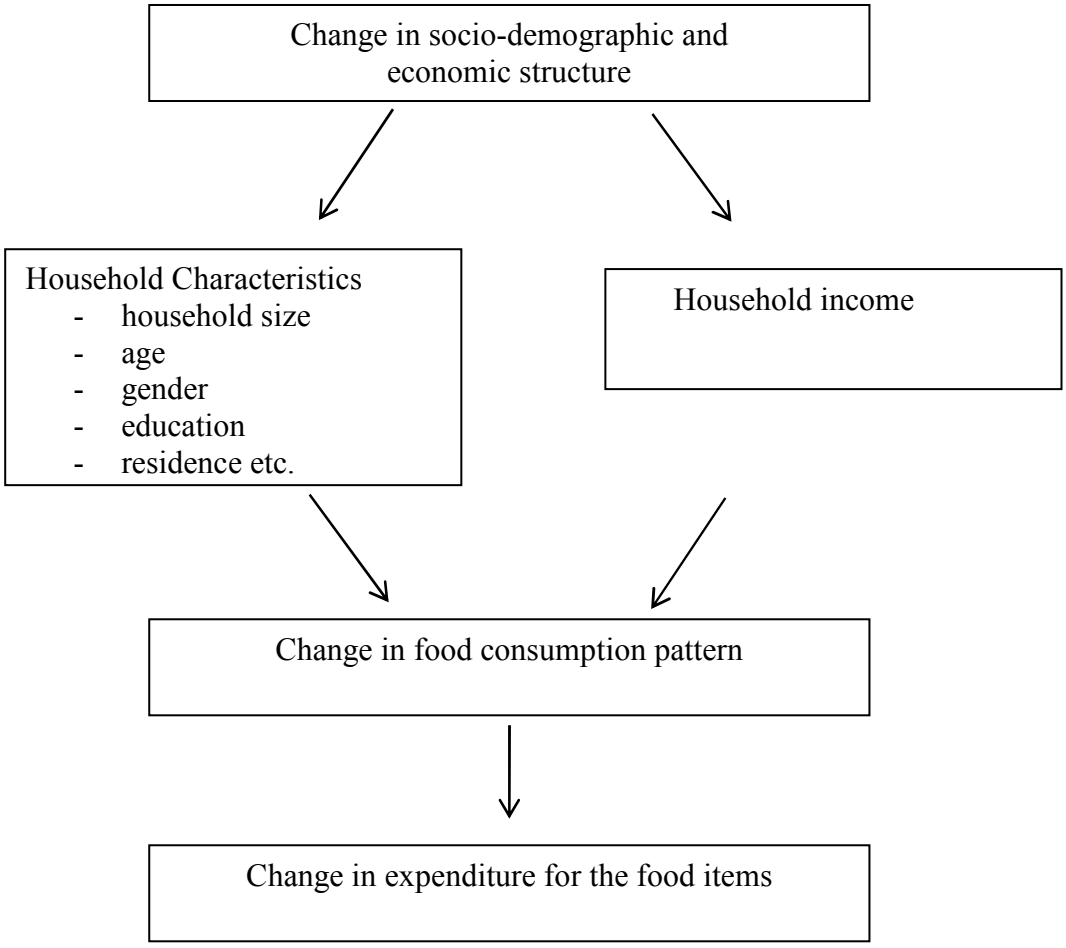

Figure 3.1 Conceptual Framework

Theoretical Framework

Consumer Theory

This model assumes that individuals who constrained by limited income will behave as if they were using their purchasing power in such a way as to achieve the highest utility. To maximize utility, individuals will choose bundles of commodities for which the rate of trade-off between any goods (the MRS) is equal to the ratio of good' market prices (Nicholson, 2004).

With n goods, the individual's objective is to maximize utility from these n goods.

Maximize Utility = $U\ (X_1, X_2, \ldots\ldots, X_n)$ (1)

Subject to the budget constraint:

$I = P_1 X_1 + P_2 X_2 + \ldots\ldots + P_n X_n$ (2)

Or

$I - P_1 X_1 - P_2 X_2 - \ldots\ldots - P_n X_n = 0$ (3)

Where;

U = utility

I = budget

X_i = quantity of good X_i

P_i = price of good X_i; where i = 1,…..,n

Following the techniques developed for maximizing a function subject to a constraint, we set up the Lagrangian expression.

Maximize L = $U\ (X_1, X_2, \ldots\ldots, X_n) + \lambda\ (I - P_1 X_1 - P_2 X_2 - \ldots\ldots - P_n X_n)$ (4)

Setting the partial derivative of L (with respect to $X_1, X_2, \ldots\ldots, X_n$ and λ) equal to 0 yields n+1 equations representing the necessary conditions for an interior maximum :

$$\frac{\partial L}{\partial X_1} = \frac{\partial U}{\partial X_1} - \lambda P_1 = 0$$

$$\frac{\partial L}{\partial X_2} = \frac{\partial U}{\partial X_2} - \lambda P_2 = 0 \quad (5)$$

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$$\frac{\partial L}{\partial X_n} = \frac{\partial U}{\partial X_n} - \lambda P_n = 0$$

$$\frac{\partial L}{\partial \lambda} = I - P_1 X_1 - P_2 X_2 - \ldots\ldots - P_n X_n = 0$$

These n+1 equations can usually be solved for the optimal $X_1, X_2, \ldots\ldots, X_n$ and for λ.

Implications of First-Order Conditions

The first-order conditions represented by equations (5) can be rewritten in a variety of interesting ways. For example, for any two goods, X_i and X_j, we have

$$\frac{\partial U/\partial X_i}{\partial U/\partial X_j} = \frac{P_i}{P_j} \qquad (6)$$

The ratio of marginal utilities of two goods is equal to the marginal rate of substitution between them. Therefore, the condition for an optimal allocation of income become

$$MRS_{ij}\ (X_i \text{ for } X_j) = \frac{P_i}{P_j} \qquad (7)$$

The equation (7) demonstrates that to maximize utility, the individual should equate the psychic rate of trade-off to the market trade-off rate.

Interpreting the Lagrangian Multiplier

Another result can be derived by solving equation (5) for λ

$$\lambda = \frac{\partial U/\partial X_1}{P_1} = \frac{\partial U/\partial X_2}{P_2} = \ldots\ldots = \frac{\partial U/\partial X_n}{P_n} \qquad (8)$$

$$\lambda = \frac{MU_{X1}}{P_1} = \frac{MU_{X2}}{P_2} = \ldots\ldots = \frac{MU_{Xn}}{P_n} \qquad (9)$$

This equation says that at the utility maximizing point, each good purchased should yield the same marginal utility per dollar spent on that good. Each good therefore should have an identical marginal benefit to marginal cost ratio. If this were not true, one good would promise more marginal enjoyment per dollar than some other goods and funds would not be optimally allocated.

Demand Function

In microeconomics theory, consumer's demand can be estimated into 2 approaches which are primal solution (or utility maximization) and dual solution (or expenditure minimization)

1. Primal Solution

Individuals are assumed to behave as if they maximized utility subject to a budget constraint.

Maximize Utility = $U\ (X_1, X_2, \ldots\ldots\ldots, X_n)$

Subject to the budget constraint:

$$I = P_1 X_1 + P_2 X_2 + \ldots\ldots\ldots + P_n X_n$$

After using Lagrangian approach, it will usually be possible to solve the necessary conditions of a utility maximum for the optimal levels of $X_1, X_2, \ldots\ldots, X_n$ (and λ, the Lagrangian multiplier) as function of all prices and income. Mathematically, it can be expressed as n demand functions of the form.

$$\begin{aligned} X_1^* &= X_1\ (P_1, P_2, \ldots\ldots\ldots, P_n, I) \\ X_2^* &= X_2\ (P_1, P_2, \ldots\ldots\ldots, P_n, I) \\ &\vdots \end{aligned} \qquad (10)$$

$$X_n^* = X_n\,(P_1, P_2, \ldots\ldots, P_n, I)$$

The demand functions which come from utility maximization approach are uncompensated demand function or Marshallian demand function.

Then, the optimal values of the X's from (10) are substituted in the original utility function to yield

$$\text{Maximize Utility} = U(X_1^*, X_2^*, \ldots\ldots, X_n^*) \quad (11)$$

$$= V(P_1, P_2, \ldots\ldots, P_n, I) \quad (12)$$

Inward, because of the individual's desire to maximize utility, given a budget constraint, the optimal level of utility obtainable will depend indirectly on the prices of the goods and on the individual's income. This dependence is reflected by the indirect utility function (V). If either prices or income were to change, the level of utility that can be attained would also be affected.

The relationship between indirect utility function and the change in commodities' prices which can be estimated by the envelop theorem called Roy's identity.

$$\frac{-\partial V/\partial P_1}{\partial V/\partial I} = X_1 = dx\,(P_1, P_2, \ldots\ldots, P_n, I) \quad (13)$$

So, the demand functions can be derived from the ratio of partial derivative of indirect utility function respect to price and income.

2. Dual Solution

Many constrained maximum problems have associated "dual" constrained minimum problems. For the case of utility maximization, the associated dual minimization problem concerns allocating income in such a way as to achieve a given utility level with the minimal expenditure. This problem is clearly analogous to the

primary utility maximization problem, but the goals and constraints of the problems have been reversed.

$$\text{Total expenditures} = E = P_1 X_1 + P_2 X_2 + \ldots\ldots + P_n X_n \quad (14)$$

Subject to utility constraint:

$$\bar{U} = U (X_1, X_2, \ldots\ldots, X_n) \quad (15)$$

After using Lagrangian approach, the demand functions can be derived as equation (16). The optimal amounts of $X_1, X_2, \ldots\ldots, X_n$ chosen in this problem will depend on the prices of the various goods and the required utility level.

$$\begin{aligned} X_1^* &= X_1 (P_1 , P_2 , \ldots\ldots, P_n , \bar{U}) \\ X_2^* &= X_2 (P_1 , P_2 , \ldots\ldots, P_n , \bar{U}) \\ &\cdot \\ &\cdot \\ &\cdot \\ &\cdot \\ X_n^* &= X_n (P_1 , P_2 , \ldots\ldots, P_n , \bar{U}) \end{aligned} \quad (16)$$

This function is called compensated demand function or Hicksian demand function.

The individual's expenditure function shows the minimal expenditures necessary to achieve a given utility level for a particular set of prices. That is

$$E = E (P_1 , P_2 , \ldots\ldots, P_n , \bar{U}) \quad (17)$$

Comparison between equation (12) and the equation (17) shows that the expenditure function and the direct utility function are inverse function of one another. Both depend on market prices but involve different constraint (income or utility).

The relationship between indirect expenditure function and change in price of goods which can be estimated by the envelop theorem is called Shephard's lemma

$$\frac{\partial E}{\partial P} = X_1 = h_x\,(P_1, P_2, \ldots\ldots, P_n, \bar{U}) \qquad (18)$$

So, we can get compensated demand functions from the partial derivative of indirect expenditure function respect to price.

In previous topics that we introduced a number of related demand concepts, all of which were derived from the underlying model of utility maximization. Relationships among these various concepts are summarized in Figure 3.2.

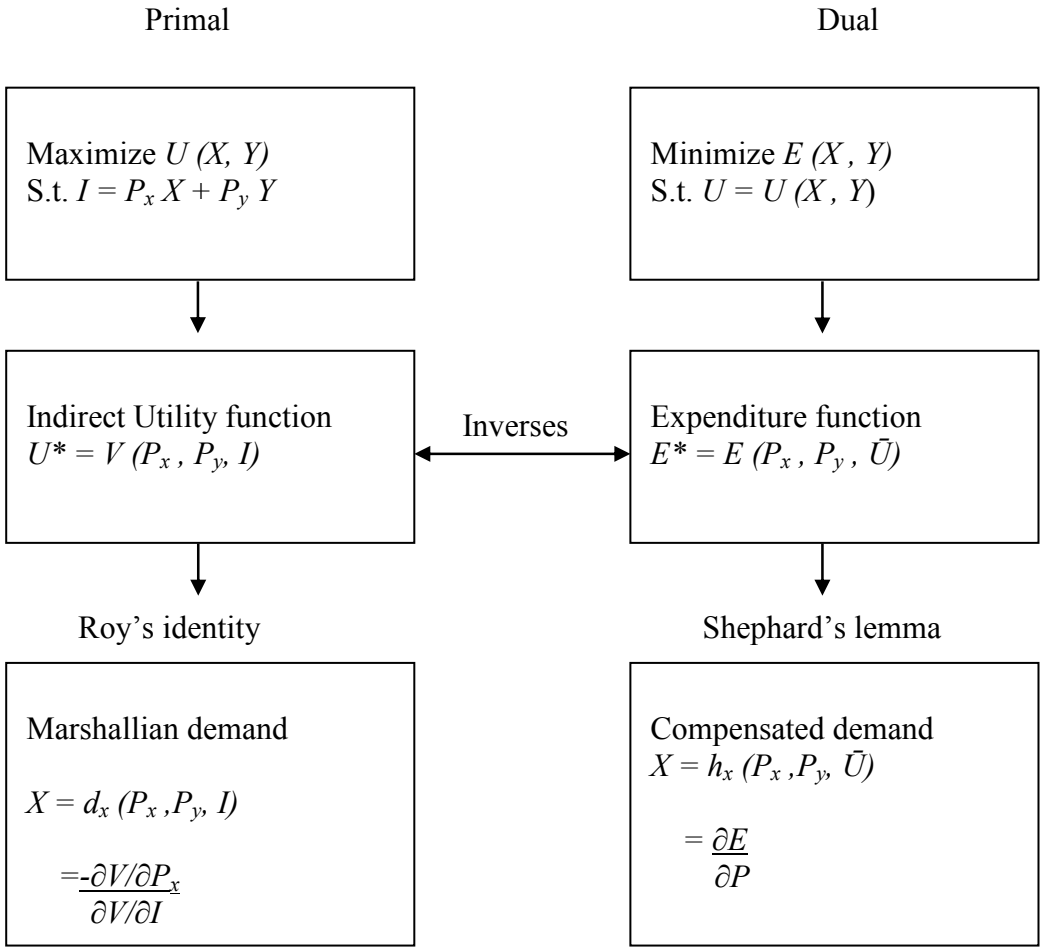

Figure 3.2: Relationship among demand concepts

Source: Nicholson (2004)

Properties of Demands

We are now in the position to provide a reasonably general characterization of the properties of Hicksian and Marshallian deamand functions (Deaton and Muellbauer, 1980).

Property 1: Adding up. The total value of both Hicksian and Marshallian demand is total expenditure, that is

$$\sum P_k h_k(U,P) = \sum P_k d_k(I,P) = I \tag{19}$$

Property 2: Homogeneity. The Hicksian demands are homogeneous of degree zero in prices, the Marshallian demands in total expenditure and price together, that is, for scalar $\theta>0$,

$$h_i(U,\theta P) = h_i(U,P) = d_i(\theta I,\theta P) = d_i(I,P) \tag{20}$$

Property 3: Symmetry. The cross-price derivatives of the Hickian demands are symmetric, that is, for all $i \neq j$

$$\frac{\partial h_i(U,P)}{\partial P_j} = \frac{\partial h_j(U,P)}{\partial P_i} \tag{21}$$

Property 4: Negativity. The n by n matrix formed by the elements $\partial h_i/\partial P_j$ is negative semidefinite, that is, for any n vector ξ, the quadratic form

$$\sum_i \sum_j \xi_i \xi_j \frac{\partial h_i}{\partial P_j} \leq 0 \tag{22}$$

Thus, an increase in price with utility held constant must cause demand for that good to fall or at least remain unchanged.

Estimation of Engel Functions

In those situations where all we have are cross-sectional data from household budget surveys which do not contain observations in price variations, we are limited to estimation of Engel curve: (Sadoulet and Janvry, 1995).

$$q_i = q_i(y,z) \qquad i = 1,2,\ldots,n \tag{23}$$

Where;
q_i = quantity of good i
y = budget
z = household characteristics

Where, z denotes characteristics that vary across households, including family size, education, and geographical location. A question of interest here is how consumption patterns vary between households at different income levels. The parameter to express this is the income elasticity.

The Engel curves specified for estimation should have several desirable properties:

1. They should satisfy the budget constraint (predicted expenditure for each commodity should add up to total expenditure).

2. They should be able to represent luxuries, necessities and inferior goods.

3. They should have variable income elasticity due to the empirical fact that income elasticities tend to decline as income increases.

4. The consumption of many commodities should reach a saturation point as income increases.

Four forms of Engel functions which have been commonly used are the following: Linear, Double logarithmic, Semi logarithmic and Logarithmic reciprocal. The linear form is the only one which satisfies the Engel aggregation equation, but it gives fits that are usually not as good as the other three, which lack theoretical plausibility. However, the Double logarithmic function is the easiest function which is useful for identifying the type of commodity.

The Double logarithmic function is presented as equation (24)

$$\ln q = a + b \ln y \tag{24}$$

Where; a,b = coefficients and income elasticity (E_{qy}) is equal to b

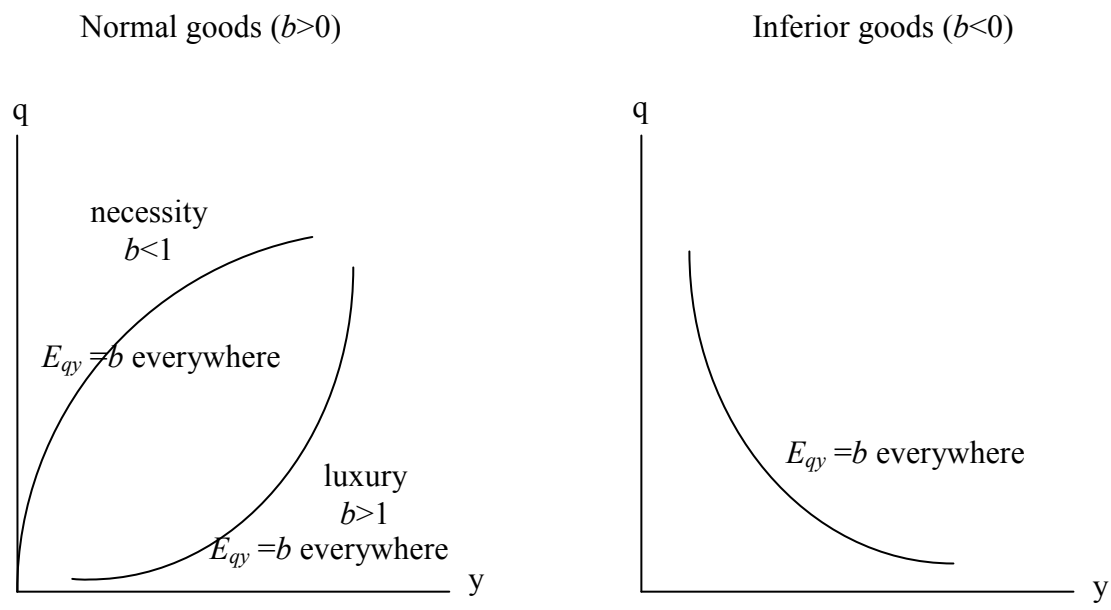

Figure 3.3 Double logarithmic Engel curve
Source: Sadoulet and Janvry (2005)

From figure 3.3, the parameters *b* in Double logarithmic Engel Curve or income elasticity can show whether this good is normal. If *b* is positive, it means that this good is normal good. In contrast, this good is inferior, if *b* is less than zero. For normal good, it can be separated to be necessity or luxury good according to coefficient *b*. This good will be necessity if b is less than 1 while, the luxury good has b which is more than 1. Therefore, these coefficients of Engel Curve are very useful for identifying the type of each commodity.

Income Elasticity of Demand

It measures the proportionate change in quantity demanded in response to a proportionate change in income. In mathematical terms,

$$E_{qy} = \frac{\Delta q/q}{\Delta y/y} = \frac{\Delta q}{\Delta y} \times \frac{y}{q} = \frac{\partial q}{\partial y} \times \frac{y}{q} \tag{25}$$

$$= \frac{\text{\% change in quantity of good (q) of household}}{\text{\% change in household's income}}$$

Whenever, household's income changes, its expenditure will also change. Therefore, the expenditure elasticity with respect to income can be estimates as.

$$E_{cy} = \frac{\Delta c/c}{\Delta y/y} = \frac{\Delta c}{\Delta y} \times \frac{y}{c} = \frac{\partial c}{\partial y} \times \frac{y}{c} \tag{26}$$

$$= \frac{\text{\% change in expenditure of good (c) of household}}{\text{\% change in household's income}}$$

When good's price is constant, the expenditure elasticity with respect to income (E_{cy}) will equal to the income elasticity (E_{qy}) and it can be proved from equation (27) until equation (30).

$$c = p \times q \tag{27}$$

Where, c = expenditure for good i

p = price of good i

q = quantity of good i

$$E_{cy} = \frac{\partial(p \times q)}{\partial y} \times \frac{y}{(p \times q)} \tag{28}$$

To estimate the first derivative of *Ecy* with respect to y

$$E_{cy} = \left(p\frac{\partial q}{\partial y} + q\frac{\partial p}{\partial y} \right) \times \frac{y}{(p \times q)}$$

$$E_{cy} = \left[p\frac{\partial q}{\partial y} \times \frac{y}{(p \times q)} \right] + \left[q\frac{\partial p}{\partial y} \times \frac{y}{(p \times q)} \right]$$

$$E_{cy} = \left(\frac{\partial q}{\partial y} \times \frac{y}{q} \right) + \left(\frac{\partial p}{\partial y} \times \frac{y}{p} \right) \tag{29}$$

$$E_{cy} = E_{qy} + E_{py}$$

Because of remaining price constant, E_{py} will equal 0.

Therefore, $E_{cy} = E_{qy}$ (30)

From equation (30), we can estimate that the expenditure elasticity with respect to income will equal to the income elasticity when price of that good is remained constantly.

Estimation of Completed Demand Systems

Estimate of single demand functions either from time-series data following the pragmatic approach or from price variations across clusters in household survey of cross sectional data creates the problem that the quantity projections obtained may not satisfy the requirements of demand theory, particularly the budget constraint. For this purpose, complete systems of demand equations which are able to take into account

consistently the mutual interdependence of large numbers of commodities in the choices made by consumers need to be specified and estimated.

Three demand systems have received considerable attention because of their relative empirical expediency. They are the Liner Expenditure System (LES) developed by Stone (1954), the Extended Liner Expenditure System (ELES) developed by Lluch *et al.* (1977) and the Almost Ideal Demand System (AIDS) developed by Deaton and Muellbauer (1980).

1. Liner Expenditure System (LES)

LES is the most frequently used system in empirical analyses of demand. It is derived from the Stone-Geary utility function and is a general linear formulation of demand and algebraically imposed theoretical restrictions of additivity, homogeneity, and symmetry. The LES is best used to estimate demand for goods with independent marginal utilities such as large baskets of goods or large categories of expenditures such as clothing, housing, food, and durables. Like all point wise- separable models, the LES model is better applied to large categories expenditure than to individual commodities, since it does not allow for inferior goods and implies that all goods are gross complement (E_{ij} <0)

$$U(q) = \sum_{i=1}^{ni} bi \ln(qi - ci) \qquad \text{with} \quad \begin{cases} 0 < bi < 1 \\ \sum bi = 1 \\ qi - ci > 0 \end{cases} \tag{31}$$

c = minimum subsistence or committed quantities below which consumption cannot fall.

The demand functions derived from maximization of this utility function under a budget constraint constitute the LES:

$$Vi = piqi = cipi + bi(y - \sum_{j} cjpj) \qquad i = 1,2,\ldots,n \tag{32}$$

Where; Vi or $piqi$ = expenditure on each community

bi = marginal budget shares $\left(\frac{\partial piqi}{\partial y}\right)$ which show how expenditure on each commodity changes as income changes. Since bi>0, this system does not allow for inferior good.

$\sum cjpj$ = the subsistence expenditure

y- $\sum cjpj$ = uncommitted or supernumerary income which is spent in fixed proportions bi between the commodities

2. Extended Liner Expenditure System (ELES)

ELES is extended relative to LES. However, there are some differences between these 2 model which are ELES concerning on saving (s). Saving is the difference between income (y) and current consumption expenditure (V). The purpose of saving is in order to use for the future consumption. Where, the consumption of saving is the interest rate.

$$s = y\text{-}V \tag{33}$$

$$U[q(t)] = \int_0^{\infty} e^{-\delta t} \sum fi[qi(t)]dt \qquad \begin{cases} qi(t) > yi \\ bi > 0 \\ \sum bi = 1 \end{cases} \tag{34}$$

Where, $fi[qi(t)] = bi * \log(qi(t) - ci)$ (35)

Therefore, $U[q(t)] = \int_0^{\infty} e^{-\delta t} \sum bi * \log(qi(t) - ci)$ (36)

Because of limit of income ($\sum piqi = y$), the maximum utility under a budget constraint constitute the ELES.

$$Vi = piqi = cipi + bi * (y - \sum pici) \tag{37}$$

Where, Vi or $piqi$ = expenditure on each community

δt = interest rate at period t

t = time

bi^* = marginal propensity to consume out of income

$\sum cjpj$ = the subsistence expenditure

$y - \sum cjpj$ = uncommitted or supernumerary income which is spent in fixed proportions bi between the commodities

3. Almost Ideal Demand System (AIDS)

The concept of completed demand systems has evolved considerably in the last three decades. Advantages of using complete demand systems over using a single commodity or sector model approach include explicit recognition of the interrelationships among commodities and formally incorporating theoretical restrictions, Moreover, the systems approach may alleviate, to a large degree, the problem of multicollinearity among prices, income, and other exogenous factors. The systems approach takes into consideration the budget constraint and thus recognizes the fact that increases in the consumption of some goods must be balanced by decreases in the consumption of others. One such demand system which has attracted unprecedented popularity is the AIDS model, first introduced by Deaton and Muellbauer (1980). It developed from Rotterdam model and Translog model under the conditions of price-independent generalized logarithmic (PIGLOG) consumer preferences. This model allows for consistent aggregation of microlevel demands up to a market demand function. The AIDS model can be derived from the expenditure function:

$$\log c(u,p) = (1-u) \log a(p) + u \log b(p) \qquad (38)$$

Where, $c(u,p)$ = the expenditure function

p = the vector of prices

u = the utility lines between 0 and 1

$a(p)$ = the cost of subsistence

$b(p)$ = the cost of bliss

In particular, the specifications are as follows

$$\log a(p) = \infty_0 + \Sigma_k \infty_k \log p_k + (1/2) \Sigma_k \Sigma_j \gamma_{kj} \log p_k p_j \quad (39)$$

$$\log b(p) = \log a(p) + \beta_o \Pi_k p_k^{\beta k} \quad (40)$$

So, the AIDS cost function is written as

$$\log c(u, p) = \alpha_0 + \sum_k \alpha_k \log p_k + 1/2 \sum_k \sum_j \gamma^*_{kj} \log p_k \log p_j + u\beta_o \prod_k P_k^{\beta_k} \quad (41)$$

The demand functions can be derived directly from equation (41). It is a fundamental property of the cost function that its price derivatives are the quantities demanded $\frac{\partial c(u, p)}{\partial p_i} = q_i$. Multiplying both sides by $\frac{p_i}{c(u, p)}$, we find

$$\frac{\partial \log c(u, p)}{\partial \log p_i} = \frac{p_i q_i}{c(u, p)} = w_i \quad (42)$$

Where, w_i = the budget share of good i

Hence, logarithmic differentiation of equation (41) gives the budget shares as a function of price and utility.

$$\begin{aligned} w_i &= \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i u \beta_0 \Pi p_k^{\beta_k} \\ \gamma_{ij} &= 1/2 (\gamma^*_{ij} + \gamma^*_{ji}) \end{aligned} \quad (43)$$

For the maximum utility of consumer, which is total expenditure y = c(u,p) , equation (43) has to be inverted to give u as a function of p and x (Indirect utility function). Hence, the AIDS demand functions in budget share form as follow: shown in equation (44)

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log\left(\frac{y}{P}\right) \quad (44)$$

Where, *wi* = the expenditure share of the ith commodity

p = the prices

y = total expenditure on all commodities in the system

P = the price index defined as:

$$\log(P) = \alpha_o + \Sigma_k \alpha_k \log p_k + (1/2) \Sigma_j \Sigma_k \gamma_{kj} \log p_k \log p_j \quad (45)$$

Due to the nonlinearity of parameters in the price index expression, the AIDS model is approximated by using Stone's index in lieu of the price index log(P). Stone's index is defined as:

$$\log(p_t^*) = \Sigma_j w_{jt} \log p_{jt} \quad (46)$$

With the use of the Stone's index, w_{it-l} is used in this analysis instead of w_{it} to avoid simultaneity problems. This specification allows the linear approximation of the AIDS model (LA/AIDS). The classical restrictions, on the other hand, are expressed as follows:

For adding-up: $\Sigma_i \alpha_i = 1, \Sigma_i \gamma_{ij} = 0, \Sigma_i \beta_i = 0$

For homogeneity: $\Sigma_j \gamma_{ij} = 0$ (47)

For symmetry: $\gamma_{ij} = \gamma_{ji}$

but also ensure that own-price, cross-price, and expenditure elasticities are consistent with neoclassical theory.

So, η_i or E_{qc} is the expenditure elasticity and is calculated as:

$$\eta_i = 1 + (\beta_i / w_i) \quad (48)$$

Study Method

1. Data Collection

These secondary data come from socio-economic survey, 2004 of Economic and Social Statistics Bureau, National Statistical office. These cross-sectional survey data consist of 34,843 observations. These surveys contain household-level information on geographic location, household size, education, income earned, age and gender of family heads.

2. Data Analysis

2.1 Descriptive Analysis

To explain the socio-demographic and economic structures of Thai household generally and to describe in the forms of tables and simple statistical data.

2.2 Quantitative Analysis

To analyze the relationship of expenditure for that food regard to total consumption expenditure and household characteristics by Econometrics Method. The analytical model that is used to study the expenditure share for food consumption pattern is modified from Almost Ideal Demand System (AIDS) and the commodities can be divided into 4 groups which are

1 = food prepared at home
2 = prepared food taken home
3 = food eaten away from home
4 = non-food

Statistical Model

The analytical model that is used to study the expenditure share for food consumption pattern is modified from Almost Ideal Demand System (AIDS) by Deaton and Muellbauer (1980). This study is the same concept as "Rice consumption demand elasticities of the Thai households" (Isvilanonda, 1993) and "An analysis of expenditure pattern on food consumption of Thai agricultural households" (Longpichai, 2004). This paper is assumed that all commodities are homogeneous and their prices are the same. Consequently, the variation of transfer cost is eliminated. However, this study has no data on the each commodity's price so we assume that commodity's price is not influent on expenditure share for each group of food; while, the concerned variables are total expenditure and household characteristics.

$$\omega_i = \alpha_i + \beta_i \log X + \gamma_i HHSIZE_i + \chi_i AGE_i + \sum_j \lambda_{ij} RD_j + \sum_k \delta_{ik} HD_k + U_i \quad (49)$$

Where,

ω_i = the expenditure share of the ith commodity (per capita expenditure of that food as a proportion of per capita total consumption expenditure)
X = total consumption expenditure (Baht per month)
$HHSIZE$ = the number of household members (person)
AGE = age of household head (year)
Regional dummies
RD_1 = Bangkok
RD_2 = North
RD_3 = Northeast
RD_4 = South

Household type dummies

HD_1 = one person household

HD_2 = head and spouse present household

HD_3 = One parent with unmarried children household

U_i = error term

Where, α_i, β_i, γ_i, χ_i, λ_{ij} and δ_{ik} are coefficients

and i = 1,….,4

1 = food prepared at home

2 = prepared food taken home

3 = food eaten away from home

4 = non-food

Due to constant price during the survey period, the price variable in the model is included in the intercept term. Although this model is not structural demand equation, it is in the form of Engle curve because this equation shows the relationship of expenditure for that food regard to total consumption expenditure and household characteristics or can be called “AID model’s Engel curve”. (Chesher and Rees, 1987)

CHAPTER IV

RESULTS

Descriptive Analysis

In the recent years, the socio-demographic and economic structures of population in Thailand have changed significantly due to economic growth and upward trend of trade liberalization and globalization. Major changes have involves economic and household conditions ,particularly, per capital income, size of households, the number of households with multiple wage earners, the location of residence and social mix of population. Therefore, household food expenditure patterns have changed as well. In this paper, descriptive analysis is divided into 2 parts; the first part provides general household characteristics of sampling households and the second part analyzes food consumption pattern basically by simple mathematic method.

This paper employs the socio-economic survey data in the year 2004 under taken by National Statistical Office. These cross-sectional survey data consist of 34,843 observations and contain household-level information, especially, on geographic location, household size, education, income earned, age and gender of family heads. This information is also the important factors influencing on food consumption pattern of Thai households.

Analysis of General Household Characteristics of Sampled Households

The Numbers and Percentage Shares of Sampled Households Classified by Region and Area Development

Thailand is divided into 4 regions; Central, North, Northeast and South. Despite Bangkok is a part in central, it is separated due to special administrational

city. Moreover, each region has local administration in terms of area development, namely, municipality and non-municipality. From a number of 34,843 surveyed households, the share of household in municipality area is 62.93%. The rest or 12,915 households is in non-municipality area. In regionally, the major group of samples is in Central Region excluding Bangkok Metropolis. It is nearly 30% of total households or 10,374 observations. The other groups are in Northeast, North, South and Bangkok or 25.29%, 23.35%, 15.05% and 5.92% respectively. In consideration by area development, it is remarkable that all regions contain samples from municipality area greater than from non municipality area ,especially, Bangkok Metropolis considered as municipality area as whole province (Table 4.1).

Table 4.1 The numbers and percentage shares of sampled households classified by region and area development, 2004

	Number of households		
Region	Municipality area	Non-municipality area	Total
1. Bangkok	2061	0	2061
	(100.00)	(0.00)	(5.92)
2. Central	6144	4230	10374
	(59.22)	(40.78)	(29.77)
3. North	4832	3304	8136
	(59.39)	(40.61)	(23.35)
4. Northeast	5947	3081	9028
	(65.87)	(34.13)	(25.91)
5. South	2944	2300	5244
	(56.14)	(43.86)	(15.05)
Total	21928	12915	34843
	(62.93)	(37.07)	(100.00)

Note: Numbers in parentheses are the percentages of total observation in each region

Source: Calculated from socio-economic survey data, NSO (2004)

The Numbers and Percentage Shares of Household Head's Education Classified by Region and Area Development

Educational attainment in Thailand is mostly divided into 5 levels: no formal education, elementary level, secondary level, vocational attending and university level. Due to no information about educational level of some household heads, it is separated these observations to be unknown group. From table 4.2, more than 50% of family heads in all regions, excepting Bangkok, graduated at elementary level while the share of this educational level in Bangkok is only 41.78%. For higher educational attainment, family heads in Bangkok who graduated at secondary level, vocational attending and university level have larger shares than other regions particularly, the group at university level which are about double of other regions or 20.77%.

Table 4.2 The numbers and percentage shares of household head's education classified by region, 2004

	Number of households					
Education Attainment	Bangkok	Central	North	Northeast	South	Total
1. No formal education	67	577	828	311	451	2234
	(3.25)	(5.56)	(10.18)	(3.44)	(8.60)	(6.41)
2. Elementary level	861	6370	4994	5908	2888	21021
	(41.78)	(61.40)	(61.38)	(65.44)	(55.07)	(60.33)
3. Secondary level	492	1674	1060	1223	947	5396
	(23.87)	(16.14)	(13.03)	(13.55)	(18.06)	(15.49)
4. Vocational attending	208	803	498	586	457	2552
	(10.09)	(7.74)	(6.12)	(6.49)	(8.71)	(7.32)
5. University level	428	933	740	998	495	3594
	(20.77)	(8.99)	(9.10)	(11.05)	(9.44)	(10.31)
6. Unknown	5	17	16	2	6	46
	(0.24)	(0.16)	(0.20)	(0.02)	(0.11)	(0.13)
Total	2061	10374	8136	9028	5244	34843

Note: Numbers in parentheses are the percentages of total observation in each region

Source: Calculated from socio-economic survey data, NSO (2004)

The higher educational levels of household heads are related to urbanization. The result from table 4.3 has positive direction with this hypothesis. Although household heads either in municipality or in non-municipality area graduated mostly at elementary level or 52.64% in municipality area and 73.40% in non-municipality area. However, the share of household head that graduated at university level in municipality area (14.33%) is bigger than in non-municipal area (3.49%) more than three times. This may due to the fact that in municipality area, households have higher income and chance to get facilities to access to colleges and universities.

Table 4.3 The numbers and percentage shares of household head's education classified by area development, 2004

	Number of households		
Education Attainment	Municipality area	Non-municipality area	Total
1. No formal education	1037	1197	2234
	(4.73)	(9.27)	(6.41)
2. Elementary level	11542	9479	21021
	(52.64)	(73.40)	(60.33)
3. Secondary level	4048	1348	5396
	(18.46)	(10.44)	(15.49)
4. Vocational attending	2127	425	2552
	(9.70)	(3.29)	(7.32)
5. University level	3143	451	3594
	(14.33)	(3.49)	(10.31)
6. Unknown	31	15	46
	(0.14)	(0.12)	(0.13)
Total	21928	12915	34843

Note: Numbers in parentheses are the percentages of total observation in each community

Source: Calculated from socio-economic survey data, NSO (2004)

The Numbers and Percentage Shares of Household Head's Occupation Classified by Region and Area Development

The most interesting occupation of Thai household in 10 years ago is skilled agricultural and fishery worker because it is the largest share or up to 36.5% of total household samples (Jansai, 1996) while nowadays, the share of households associated with this occupation decline to only 16.55% or below to the group of legislators, senior officials and managers (18.19%). In regional ranking, most family heads in Northeast and South are still the agricultural and fishery workers whereas, this occupational group is the smallest share or only 0.58% in Bangkok. For Central Region and North, nearly 20% of household heads are legislators, senior officials and managers however, the group of agricultural and fishery workers is the second large group or approximately 15%. Overall, the smallest occupational share is the group of technicians and associate professionals in every region excluding Bangkok (Table4.4).

Similarly, the group of technicians and associate professionals is the smallest shares both in municipality and non-municipality areas. It's not surprise that the majority of family heads (29.45%) in non-municipality area still work associated with agricultural and fishery while in municipality area, most household heads (17.76%) are clerks, service and market sale workers. In spite of smallest share in both of 2 areas, the shares of professional , technician and associate professional group in municipality is higher than they in non-municipality more than 3 times. Thus, the urbanization can lead to a change from agricultural and fishery occupation to careers that need more skill and higher education.

Table 4.4 The numbers and percentage shares of household head's occupation classified by region, 2004

Occupation	Number of households					
	Bangkok	Central	North	Northeast	South	Total
1. Legislators, senior officials	289	1792	1641	1686	931	6339
and managers	(14.02)	(17.27)	(20.17)	(18.68)	(17.75)	(18.19)
2. Professionals	92	412	359	561	232	1656
	(4.46)	(3.97)	(4.41)	(6.21)	(4.42)	(4.75)
3. Technicians and associate	104	401	201	246	151	1103
professionals	(5.05)	(3.87)	(2.47)	(2.72)	(2.88)	(3.17)
4. Clerks, service workers	429	1496	988	1043	757	4713
and market sale workers	(20.82)	(14.42)	(12.14)	(11.55)	(14.44)	(13.52)
5. Skilled agricultural and	12	913	1294	2299	1247	5765
fishery workers	(0.58)	(8.80)	(15.90)	(25.47)	(23.78)	(16.55)
6. Craft and related trades workers	253	1082	773	542	392	3042
	(12.28)	(10.43)	(9.50)	(6.00)	(7.48)	(8.73)
7. Plant and machine operators	276	906	286	342	305	2115
and assemblers	(13.39)	(8.73)	(3.52)	(3.79)	(5.82)	(6.07)
8. Elementary occupation	183	1181	900	659	341	3264
	(8.88)	(11.38)	(11.06)	(7.30)	(6.50)	(9.37)
9. No occupation and unknown	423	2191	1694	1650	888	6852
	(20.52)	(21.12)	(20.82)	(18.28)	(16.93)	(19.67)
Total	2061	10374	8136	9028	5244	34843

Note: Numbers in parentheses are the percentages of total observation in each region

Source: Calculated from socio-economic survey data, NSO (2004)

Table 4.5 The numbers and percentage shares of household head's occupation classified by area development, 2004

Occupation	Number of households		
	Municipality area	Non-municipality area	Total
1. Legislators, senior officials and managers	3744	2595	6339
	(17.07)	(20.09)	(18.19)
2. Professionals	1411	245	1656
	(6.43)	(1.90)	(4.75)
3. Technicians and associate professionals	930	173	1103
	(4.24)	(1.34)	(3.17)
4. Clerks, service workers and market	3895	818	4713
sale workers	(17.76)	(6.33)	(13.52)
5. Skilled agricultural and fishery workers	1961	3804	5765
	(8.94)	(29.45)	(16.55)
6. Craft and related trades workers	2033	1009	3042
	(9.27)	(7.81)	(8.73)
7. Plant and machine operators and	1549	566	2115
assemblers	(7.06)	(4.38)	(6.07)
8. Elementary occupation	1962	1302	3264
	(8.95)	(10.08)	(9.37)
9. No occupation and unknown	4443	2403	6852
	(20.26)	(18.61)	(19.67)
Total	21928	12915	34843

Note: Numbers in parentheses are the percentages of total observation in each community

Source: Calculated from socio-economic survey data, NSO (2004)

The Numbers and Percentage Shares of Household Head's Gender Classified by Region and Area Development

In recent year, there is more opportunity for females to get better careers as a result of higher education. Thus, it is not surprise that the amount of female heads has growth dramatically or by nearly 10% as compared to 10 years ago (Jansai, 1996). However, most household heads (nearly 70%) are male in every region while, central has the largest number of female family heads (36.82%). In the same way, the amount of male household heads both in municipality and non-municipality areas are greater than female heads; however, the share of female heads in municipality area is more than it in non-municipality area about 4%. (Table 4.6 and 4.7)

Table 4.6 The numbers and percentage shares of household head's gender classified by region, 2004

	Number of households					
Sex	Bangkok	Central	North	Northeast	South	Total
1. Male	1453	6554	5514	6452	3778	23751
	(70.50)	(63.18)	(67.77)	(71.47)	(72.04)	(68.17)
2.Female	608	3820	2622	2576	1466	11092
	(29.50)	(36.82)	(32.23)	(28.53)	(27.96)	(31.83)
Total	2061	10374	8136	9028	5244	34843

Note: Numbers in parentheses are the percentages of total observation in each region

Source: Calculated from socio-economic survey data, NSO (2004)

Table 4.7 The numbers and percentage shares of household head's gender classified by area development, 2004

	Number of households		
Sex	Municipality area	Non-municipality area	Total
1. Male	14603	9148	23751
	(66.60)	(70.83)	(68.17)
2.Female	7325	3767	11092
	(33.40)	(29.17)	(31.83)
Total	21928	12915	34843

Note: Numbers in parentheses are the percentages of total observation in each community

Source: Calculated from socio-economic survey data, NSO (2004)

The Numbers and Percentage Shares of Household Head's Age Classified by Region and Area Development

The age structure of population demonstrates the national socioeconomic problem as well for instance; countries with young populations need to invest more in schools, while countries with older populations (ages 65 and over) need to invest more in the health sector. Consequently, the age structure is useful to predict potential political issues (CLA World Factbook, 2008). This study employs the household head's age to represent the general age structure in Thailand. From the national ranking, the range of household head's age between 41 and 50 years is the largest share or 26.28% followed by, the group of age more than 61 years (23.95%) whereas, the youngest head group is the smallest share or only 9.62%. Excluding Bangkok, each region has the group of household heads in the age range between 41 and 50 years mostly. However, the Bangkok ranking is different because the first rank is the age group between 31 and 40 years (25.52%), followed by the range between 41 and

50 years (23.39%). For the lowest age group, it's remarkable that Bangkok has this group greater than other regions about double (Table 4.8).

Table 4.8 The numbers and percentage shares of household head's age classified by region, 2004

Age level	Number of households					
	Bangkok	Central	North	Northeast	South	Total
1. Less than 30 years	387	11085	561	686	533	3352
	(18.78)	(106.85)	(6.90)	(7.60)	(10.16)	(9.62)
2. 31-40 years	526	2103	1405	1812	1201	7047
	(25.52)	(20.27)	(17.27)	(20.07)	(22.90)	(20.23)
3. 41-50 years	482	2653	2308	2392	1323	9158
	(23.39)	(25.57)	(28.37)	(26.50)	(25.23)	(26.28)
4. 51-60 years	330	1931	1686	2057	938	6942
	(16.01)	(18.61)	(20.72)	(22.78)	(17.89)	(19.92)
5. More than 61 years	336	2502	2176	2081	1249	8344
	(16.30)	(24.12)	(26.75)	(23.05)	(23.82)	(23.95)
Total	2061	10374	8136	9028	5244	34843

Note: Numbers in parentheses are the percentages of total observation in each region
Source: Calculated from socio-economic survey data, NSO (2004)

In municipality area, the age group between 41 and 50 years are also the biggest group or 26.35% while, the household heads in non-municipality area mostly are more than 61 years (27.33%). This result is likely anticipated that the household heads in municipality tend to be younger than in non-municipality area especially the two first lowest age groups (Table 4.9).

Table 4.9 The numbers and percentage shares of household head's age classified by area development, 2004

Age level	Number of households		
	Municipality area	Non-municipality area	Total
1. Less than 30 years	2557	795	3352
	(11.66)	(6.16)	(9.62)
2. 31-40 years	4604	2443	7047
	(21.00)	(18.92)	(20.23)
3. 41-50 years	5779	3379	9158
	(26.35)	(26.16)	(26.28)
4. 51-60 years	4174	2768	6942
	(19.04)	(21.43)	(19.92)
5. More than 61 years	4814	3530	8344
	(21.95)	(27.33)	(23.95)
Total	21928	12915	34843

Note: Numbers in parentheses are the percentages of total observation in each community

Source: Calculated from socio-economic survey data, NSO (2004)

The Numbers and Percentage Shares of Household Head's Monthly Income Classified by Region and Area Development

Theoretically, income can be represented the economic condition. Many papers indicate that income is one of the most important factors affecting the food consumption expenditure (Chesher and Rees, 1987; McCracken and Brandt, 1987 and Huang and Bouis, 1996 etc.) In Thailand, the numbers of household heads which have monthly income less than 3000 Baht are the largest share or 26.62%. The amount of family heads earning monthly income between 3,001 and 6,000 Baht is the second largest group whereas, the least share (5.38%) is the group of heads having monthly income between 12,001 and 15,000 Baht. Both in North and Northeast, about 35% of

household heads earn monthly income less than 3,000 Baht. On the other hand, the biggest shares in Central Region and South have monthly income greater (3,001-6,000 Baht). The monthly income between 12,001 and 15,000 Baht is the smallest share in all regions. In Bangkok, the smallest share or 6.55% is the group of monthly income less than 3,000 Baht. (Table 4.10)

From table 4.11, it's not surprise that the highest share of incomes' household heads in non- municipality area is less than 3,000 Baht per month as well. In contrast, the majority of heads in municipality area have monthly income between 3,001 and 6,000 Baht. Moreover, it's seen that the groups of two lowest income in non-municipality are grater than in municipality area. From table 4.10 and 4.11, the result likely provides that the monthly income of family heads in urban area tend to be greater as compared to rural.

Table 4.10 The numbers and percentage shares of household head's monthly income classified by region, 2004

	Number of households					
Monthly income level	Bangkok	Central	North	Northeast	South	Total
1. Less than 3000 Baht	135	2263	2859	2944	1074	9275
	(6.55)	(21.81)	(35.14)	(32.61)	(20.48)	(26.62)
2. 3001-6000 Baht	291	2446	2022	2205	1284	8248
	(14.12)	(23.58)	(24.85)	(24.42)	(24.49)	(23.67)
3. 6001-9000 Baht	395	1517	859	992	851	4614
	(19.17)	(14.62)	(10.56)	(10.99)	(16.23)	(13.24)
4. 9001-12000 Baht	286	895	482	613	485	2761
	(13.88)	(8.63)	(5.92)	(6.79)	(9.25)	(7.92)
5. 12001-15000 Baht	168	626	338	414	330	1876
	(8.15)	(6.03)	(4.15)	(4.59)	(6.29)	(5.38)
6. More than 1 years	623	1810	1071	1385	943	5832
	(30.23)	(17.45)	(13.16)	(15.34)	(17.98)	(16.74)

Table 4.10 (Continued)

	Number of households					
Monthly income level	Bangkok	Central	North	Northeast	South	Total
Unknown	163	817	505	475	277	2237
	(7.91)	(7.88)	(6.21)	(5.26)	(5.28)	(6.42)
Total	2061	10374	8136	9028	5244	34843

Note: Numbers in parentheses are the percentages of total observation in each region

Source: Calculated from socio-economic survey data, NSO (2004)

Table 4.11 The numbers and percentage shares of household head's monthly income classified by area development, 2004

	Number of households		
Monthly income level	Municipality area	Non-municipality area	Total
1. Less than 3000 Baht	4618	4657	9275
	(21.06)	(36.06)	(26.62)
2. 3001-6000 Baht	4700	3548	8248
	(21.43)	(27.47)	(23.67)
3. 6001-9000 Baht	3118	1496	4614
	(14.22)	(11.58)	(13.24)
4. 9001-12000 Baht	2003	758	2761
	(9.13)	(5.87)	(7.92)
5. 12001-15000 Baht	1423	453	1876
	(6.49)	(3.51)	(5.38)
6. More than 1 years	4690	1142	5832
	(21.39)	(8.84)	(16.74)
Unknown	1376	861	2237
	(6.28)	(6.67)	(6.42)
Total	21928	12915	34843

Note: Numbers in parentheses are the percentages of total observation in each community

Source: Calculated from socio-economic survey data, NSO (2004)

The Numbers and Percentage Shares of Household Types Classified by Region and Area Development

During between 1995 and 2005, the structure of household types has changed in many Asian countries. There was the upward trend of single person households; in contrast, the number of households with couple and children started to decline. As a result of employing cross sectional data, this study cannot provide the change of Thai household type structure; however, the general structure of types of Thai households in the recent year can be demonstrated. In this paper, household types are divided into 4 forms; single person household, head and spouse household, one parent with unmarried children household and all other households.

In national ranking, most households (nearly 65%) are households with head and spouse. The second large group is single person households (12.33%); followed by one person with unmarried children households (10.36%). If we compare the share of single person households in Thailand and in other Asian countries such as Japan, it is found that the share of these households in Thailand is less than that in Japan by nearly 15%.

In Thailand, the share of single person household in Bangkok is greater than that in other regions, In addition, the different amount of single person households between municipality and non- municipality area can be noticed obviously. The share of single person households in municipality is greater than that in non- municipality area by 5.69%. On the other hand, the group of households with head and spouse in non- municipality area has bigger share than that in municipality by nearly 8% (Table 4.12 and 4.13).

Table 4.12 The numbers and percentage shares of household types classified by region, 2004

	Number of households					
Types of family	Bangkok	Central	North	Northeast	South	Total
1. Single person household	302 (14.65)	1360 (13.11)	1059 (13.02)	968 (10.72)	607 (11.58)	4296 (12.33)
2. Head and spouse household	1284 (62.30)	6468 (62.35)	5153 (63.34)	5947 (65.87)	3547 (67.64)	22399 (64.29)
3. One parent with unmarried children household	175 (8.49)	1113 (10.73)	843 (10.36)	933 (10.33)	546 (10.41)	3610 (10.36)
4. All other household	300 (14.56)	1433 (13.81)	1081 (13.29)	1180 (13.07)	544 (10.37)	4538 (13.02)
Total	2061	10374	8136	9028	5244	34843

Note: Numbers in parentheses are the percentages of total observation in each region

Source: Calculated from socio-economic survey data, NSO (2004)

Table 4.13 The numbers and percentage shares of household types classified by area development, 2004

	Number of households		
Types of family	Municipality area	Non-municipality area	Total
1. Single person household	3166 (14.44)	1130 (8.75)	4296 (12.33)
2. Head and spouse household	13490 (61.52)	8909 (68.98)	22399 (64.29)
3. One parent with unmarried children household	2306 (10.52)	1304 (10.10)	3610 (10.36)
4. All other household	2966 (13.53)	1572 (12.17)	4538 (13.02)
Total	21928	12915	34843

Note: Numbers in parentheses are the percentages of total observation in each community

Source: Calculated from socio-economic survey data, NSO (2004)

The Numbers and Percentage Shares of Earners in Household Classified by Region and Area Development

Different numbers of earners in household are expected to go along with different household incomes. For example in United State, households in the lowest income range (under $2,500 per year) have mean number of earners only 0.23 person whereas; the highest income households ($250,000 and above per year) have mean number of earners more than 2 person (US Census Bureau, 2005). So, the number of earner should be considered in the food consumption expenditure study as well. In Thailand, more than 70% of household have earners between 1 and 2 people followed by, the amount of 3-4 earner households is the second largest group (18.22%) and there are only 3 households whose earner more than 9 people. For the group of no earner households, it's noticed that north and northeast have it greater than other regions or 9.43% and 8.43% respectively. While, the percentage of 1-2 earner households in Bangkok is the highest share or nearly 75% (Table 4.14)

Table 4.14 The numbers and percentage shares of groups of earners per household classified by region, 2004

	Number of households					
Groups of earners	Bangkok	Central	North	Northeast	South	Total
1. no earner	136	813	767	761	365	2842
	(6.60)	(7.84)	(9.43)	(8.43)	(6.96)	(8.16)
2. 1-2 people	1545	7502	5940	6200	3831	25018
	(74.96)	(72.32)	(73.01)	(68.68)	(73.05)	(71.80)
3. 3-4 people	337	1833	1335	1889	953	6347
	(16.35)	(17.67)	(16.41)	(20.92)	(18.17)	(18.22)
4. 5-6 people	40	209	91	169	92	601
	(1.94)	(2.01)	(1.12)	(1.87)	(1.75)	(1.72)
5. 7-8 people	3	15	3	9	2	32
	(0.15)	(0.14)	(0.04)	(0.10)	(0.04)	(0.09)
6. More than 9 people	0	2	0	0	1	3
	(0.00)	(0.02)	(0.00)	(0.00)	(0.02)	(0.01)
Total	2061	10374	8136	9028	5244	34843

Note: Numbers in parentheses are the percentages of total observation in each region

Source: Calculated from socio-economic survey data, NSO (2004)

Most surprisingly in table 4.15, the number of no earner households in municipality (8.67%) is more than in non-municipality area (7.29%). Nevertheless, the households in non-municipality tend to have the number of earner more than 3 people (24.07%) greater than in municipality area (17.66%).

Table 4.15 The numbers and percentage shares of number of earners per household classified by area development, 2004

Groups of earners	Number of households		
	Municipality area	Non-municipality area	Total
1. no earner	1901	941	2842
	(8.67)	(7.29)	(8.16)
2. 1-2 people	16152	8866	25018
	(73.66)	(68.65)	(71.80)
3. 3-4 people	3524	2823	6347
	(16.07)	(21.86)	(18.22)
4. 5-6 people	334	267	601
	(1.52)	(2.07)	(1.72)
5. 7-8 people	16	16	32
	(0.07)	(0.12)	(0.09)
6. More than 9 people	1	2	3
	(0.00)	(0.02)	(0.01)
Total	21928	12915	34843

Note: Numbers in parentheses are the percentages of total observation in each community

Source: Calculated from socio-economic survey data, NSO (2004)

Household Characteristics of Samples in Municipality and Non-Municipality Areas

The last topic in this part is comparison between the household characteristics of samples in municipality and non-municipality areas. Table 4.16 and 4.17 can demonstrate them clearly. Firstly, either municipality or non-municipality has the highest share of monthly household income level at the range between 5,001 and 10,000 Baht where, the average income in municipality is 7439.79 Baht or greater than that in non-municipality by 183.03 Baht. Secondly, it's remarkable that the share of other higher income levels (more than 10,001 Baht per household) in municipality is larger than in another area. Finally, this result shows that average monthly income not only per household but also per capita in non- municipality is less than that in municipality at every income level on the other hand, the average household size in rural (3.56 person) is likely more than in urban area (3.21 person).

Table 4.16 Household characteristics of samples in municipality area, 2004

Monthly income per household	Average monthly income per household (Baht)	Number of households	Number of households (%)	Average household Size (person)	Average per capita Income (Baht)
1. 0-5000 Baht	3497.68	2924	13.33	2.34	1954.01
2. 5001-10000 Baht	7439.79	6028	27.49	2.95	3365.09
3. 10001-15000 Baht	12276.16	4195	19.13	3.28	4940.48
4. 15001-20000 Baht	17278.75	2523	11.51	3.46	6485.46
5. 20001-25000 Baht	22355.56	1681	7.67	3.59	8136.83
6. More than 250001 Baht	48140.11	4577	20.87	3.79	15847.83
Total	18610.18	21928	100.00	3.21	6808.69

Source: Calculated from socio-economic survey data, NSO (2004)

Table 4.17 Household characteristics of samples in non-municipality area, 2004

Monthly income per household	Average monthly income per household (Baht)	Number of households	Number of households (%)	Average household Size (person)	Average per capita Income (Baht)
1. 0-5000 Baht	3439.57	3373	26.12	2.83	1541.98
2. 5001-10000 Baht	7256.76	4602	35.63	3.55	2503.41
3. 10001-15000 Baht	12205.62	2181	16.89	3.95	3807.48
4. 15001-20000 Baht	17195.04	1063	8.23	4.02	5359.57
5. 20001-25000 Baht	22346.3	581	4.50	4.21	6612.92
6. More than 250001 Baht	42924.62	1115	8.63	4.25	12791.65
Total	11671.72	12915	100.00	3.56	3780.71

Source: Calculated from socio-economic survey data, NSO (2004)

Analysis of the Food Consumption Pattern

This part will describe the food consumption patterns basically in the form of average household food expenditures and the expenditure shares with respect to income. These information is useful as a background for discussion the food consumption patterns and also for conducting the hypothesis test in the later section. Types of households and the number of earners per household are also demonstrates in this analysis. Moreover, these samples are weighted by the NSO weighted factors before analyzing in order to represent the Thai household population.

Household Food Expenditures Classified by Regions

Thailand has developed her agricultural based economy toward industrialization. At the same time, real income has increased and consumption expenditure shares have shifted from food to non-food items in consistent with the famous Engel's Law. Changing consumption behavior due to pronounced urbanization has enhanced this movement (Schmidt and Isvilanonda, 2004). The results from table 4.18 are seemly synchronized with this statement. In comparing between this study and previous study by Jansai, it's remarkable that the national household food expenditure share declined from 31.69% in 1990 to only 28.93% in 2004. However, different types of food are seemed to have different expenditure patterns. Overall, average food expenditure in Bangkok is largest or 6,973.25 Baht followed by South (4,844.51 Baht) and Central Region (4,723.39 Baht) respectively, but the share toward the food items in the urban city as Bangkok is least or only 23.48%.

In considering grain and cereal consumption by region, households in northeast spent the largest 615.42 Baht or 6.20% of income while this expenditure in Bangkok is only 268.88 Baht (0.91%). For the protein consumption such as meat, poultry and seafood, households in South spent the largest amount on this group (925.57 Baht) followed by Central Region (665.01 Baht) whereas, households in North spend the smallest or only 566.98 Baht. Surprisingly, households in Bangkok

spent the highest amount or 740.10 Baht on fruit and vegetable consumption as compared to the other regions. Moreover, if we consider within food at home expenditure in Bangkok, it's found that people in Bangkok spent on fruit and vegetable consumption greater than other types of food at home.

Despite the share of food prepared at home in Bangkok being the least, the average expenditure of both prepared food taken home and food away from home in Bangkok are greater than other region about 2-3 times. Similarly, households in Bangkok spent on these 2 foods up to 16% of their income while, national share is only 13.95%.

Table 4.18 Comparison of food expenditures classified by regions, 2004

Unit: Baht/ household/ month

Type of commodities	Bangkok	Central	North	Northeast	South	Total
1) Food prepared at home	2,220.86	2,313.92	1,984.93	2,033.98	2,809.55	2,212.98
	(7.48)	(13.39)	(18.57)	(20.48)	(19.73)	(14.98)
- Grain and cereal products	268.88	387.33	433.16	615.42	462.28	464.26
	(0.91)	(2.24)	(4.05)	(6.20)	(3.25)	(3.14)
- Meat,poultry ,fish and seafoods	660.04	665.01	566.98	608.15	925.57	660.97
	(2.22)	(3.85)	(5.30)	(6.12)	(6.50)	(4.47)
- Milk, cheese and eggs	289.76	303.83	251.44	236.12	354.62	276.79
	(0.98)	(1.76)	(2.35)	(2.38)	(2.49)	(1.87)
- Oil and fats	46.97	77.19	56.56	47.24	89.35	61.41
	(0.16)	(0.45)	(0.53)	(0.48)	(0.63)	(0.42)
- Fruits, nuts and vegetables	740.10	552.42	421.45	322.91	607.24	483.80
	(2.49)	(3.20)	(3.94)	(3.25)	(4.27)	(3.27)
- Other food	215.11	328.14	255.34	204.13	370.48	265.75
	(0.72)	(1.90)	(2.39)	(2.06)	(2.60)	(1.80)
2) Prepared food taken home	1,747.24	943.93	494.36	539.83	674.59	790.79
	(5.88)	(5.46)	(4.62)	(5.43)	(4.74)	(5.35)
3) Food eaten away from home	3,005.28	1,465.54	708.66	768.53	1,360.37	1,271.09
	(10.12)	(8.48)	(6.63)	(7.74)	(9.55)	(8.60)
4) Household food expenditure	6,973.38	4,723.39	3,187.95	3,342.35	4,844.51	4,274.86
	(23.48)	(27.34)	(29.82)	(33.65)	(34.03)	(28.93)
5) Household income	29,696.25	17,275.06	10,690.48	9,933.17	14,237.36	14,777.59
Household size	3.15	3.39	3.17	3.68	3.69	3.45
No. of households	2,061	10,374	8,136	9,028	5,244	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Household Food Expenditures Classified by Community Development

As increasing trend of populations move from rural to urban areas, there may be structural shifts in food demand patterns. In many Asian countries, the trend of direct cereal consumption is downward while the consumption of meat, fish and dairy has increased dramatically due to the rapid growth in economy and urbanization (Huang and Bouis, 1996). From table 4.19, households in municipality spent on the food prepared at home group nearly 2,200 Baht per month similar to households in non-municipality area did whereas, the expenditure share in municipality is less than in another area by 10.34%.

In municipality area, the average consumption expenditures on dairy products (milk, cheese and eggs) and consumption of fruits and vegetables tend to greater than these consumption in non- municipality. The interesting groups in table 4.19 are the consumptions of cereal, oil and fat because these average expenditures are seemly less in municipality despite higher income of households in this area. This may be since urban occupations tend to be more sedentary and people engaged in more sedentary careers require fewer calories to maintain a given body weight.

The reason that urban lifestyles may place a premium on foods that require less time to prepare, the expenditures on prepared food taken home and food eaten away from home in municipality are more than these expenditures in another area by 761.12 Baht and 1,901.76 Baht respectively. However, if we concentrate in the form of expenditure shares, it is remarkable that all food at home shares in municipality are less than in non-municipality as a result of higher income in first area (about 22,423.04 Baht per month). In municipality, households tend to spend on prepared food taken home and eating outside greater or up to 5.81% and 9.21% respectively.

Table 4.19 Comparison of food expenditures classified by community development, 2004

Unit: Baht/ household/ month

Type of commodities	Municipality area	Non- municipality area	Total
1) Food prepared at home	2,186.91	2,225.59	2,212.98
	(9.75)	(20.09)	(14.98)
- Grain and cereal products	346.79	521.10	464.26
	(1.55)	(4.70)	(3.14)
- Meat,poultry ,fish and seafoods	632.99	674.51	660.97
	(2.82)	(6.09)	(4.47)
- Milk, cheese and eggs	295.62	267.68	276.79
	(1.32)	(2.42)	(1.87)
- Oil and fats	54.31	64.85	61.41
	(0.24)	(0.59)	(0.42)
- Fruits, nuts and vegetables	602.10	426.56	483.80
	(2.69)	(3.85)	(3.27)
- Other food	255.10	270.90	265.75
	(1.14)	(2.45)	(1.80)
2) Prepared food taken home	1,303.71	542.59	790.79
	(5.81)	(4.90)	(5.35)
3) Food eaten away from home	2,065.86	886.52	1,271.09
	(9.21)	(8.00)	(8.60)
4) Household food expenditure	5,556.47	3,654.71	4,274.86
	(24.78)	(32.99)	(28.93)
5) Household income	22,423.04	11,078.11	14,777.59
Household size	3.17	3.58	3.45
No. of households	21,928	12,915	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Household Food Expenditures Classified by Education of Household Heads

Rae (1990) indicated that the spouse's education and household expenditure were the most important variables for explaining differences among the traditional, transitional and non-traditional dietary household groups. Moreover, he suggested that estimation of changes in food consumption patterns may be bias if the influence of changes in educational levels of household decision makers is ignored because this variable is likely positive with household incomes and expenditures. Thus, it will lead to upwardly-biased expenditure elasticities.

In this study, the household heads are supposed to be household decision makers; therefore, the relationships between food expenditures and household head's education are illustrated in table 4.20. Just like Rae's study, Households with higher education positively relates to household consumption expenditure. However, the patterns of food consumption expenditure tend to differ by each type of food. For example, overall food at home expenditure always increase as household heads graduated at higher education; however, the consumptions of the group of grain and cereal products and the group of oil and fats tend to decline with higher educational attainment. Interestingly, household with highest educational level (university) spent on grain and cereal consumption only 324.45 Baht per month while, the average monthly expenditure on this item is up to 507.50 Baht for households at elementary level. In comparing with the expenditure share, it's not surprise that the shares for all food at home consumption have downward trend with the higher educational household heads especially for the three highest educational levels. It is noticeable that the shares of food at home by finishing higher than secondary school groups are always lower than national expenditure shares. In contrast, prepared food taken home and food away from home consumptions inverse at the low education groups and reach the peak share at the secondary level group.

Table 4.20 Comparison of food expenditures classified by education of household heads, 2004

Unit: Baht/ household/ month

Type of commodities	No formal education	Elementary level	Secondary level	Vocational attending	University level	Total
1) Food prepared at home	1,909.84	2,194.27	2,242.23	2,323.88	2,512.52	2,212.98
	(23.05)	(19.70)	(12.76)	(9.57)	(6.12)	(14.98)
- Grain and cereal products	438.96	507.50	395.03	330.38	324.45	464.26
	(5.30)	(4.56)	(2.25)	(1.36)	(0.79)	(3.14)
- Meat,poultry ,fish and seafoods	570.06	669.65	649.61	658.99	686.43	660.97
	(6.88)	(6.01)	(3.70)	(2.71)	(1.67)	(4.47)
- Milk, cheese and eggs	209.80	253.93	315.72	372.68	398.90	276.79
	(2.53)	(2.28)	(1.80)	(1.53)	(0.97)	(1.87)
- Oil and fats	61.36	63.33	58.15	57.04	52.83	61.41
	(0.74)	(0.57)	(0.33)	(0.23)	(0.13)	(0.42)
- Fruits, nuts and vegetables	395.89	438.11	544.75	613.76	763.19	483.80
	(4.78)	(3.93)	(3.10)	(2.53)	(1.86)	(3.27)
- Other food	233.76	261.76	278.98	291.04	286.72	265.75
	(2.82)	(2.35)	(1.59)	(1.20)	(0.70)	(1.80)
2) Prepared food taken home	476.52	662.52	1,087.28	1,253.04	1,345.22	790.79
	(5.75)	(5.95)	(6.19)	(5.16)	(3.28)	(5.35)
3) Food eaten away from home	660.11	979.24	1,720.50	2,228.78	2,904.01	1,271.09
	(7.97)	(8.79)	(9.79)	(9.18)	(7.07)	(8.60)
4) Household food expenditure	3,046.46	3,836.02	5,050.01	5,805.70	6,761.75	4,274.86
	(36.76)	(34.44)	(28.74)	(23.90)	(16.46)	(28.93)
5) Household income	8,286.37	11,136.89	17,571.40	24,287.32	41,071.20	14,777.59
Household size	3.43	3.59	3.23	2.99	2.95	3.45
No. of households	2,234	21,021	5,396	2,552	3,594	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Household Food Expenditures Classified by Occupation of Household Heads

Occupation is one of the factors affecting the food consumption patterns (Huang and Bouis, 1996). Explained that as the employment opportunity cost of time increases, households will shift to food that require less time to prepare. Moreover, the person engaged in more active occupation needs energy requirement food.

Classifying food expenditures by household head's occupation (table 4.21); the 2 highest income groups (professionals group and technicians or associate professional group) tend to spend monthly expenditure on food products greater than that of other occupations or 6,228.61Baht and 6,094.47 Baht respectively. On the other hand, the least income group (agricultural and fishery workers) spent on food expenditure only 3,333.63 Baht. However, it's different in the form of share because the food expenditure share of agricultural and fishery households are the second largest or 38.83% below the group of elementary workers (38.84%). Although households associated with professionals and with legislators, senior officials and managers spend average expenditure on food at home higher than other occupation groups, the share of food away from home of household heads related to professionals is only 7.02.

From table 4.21, the results imply that household heads related to agricultural and fishery careers spend the highest shares of each food at home as compared to other occupations; however, the share on prepared food taken home and food away from home of households associated with plant and machine operators are seemly higher than those of other occupation groups.

Table 4.21 Comparison of food expenditures classified by occupation of household heads, 2004

Unit: Baht/ household/ month

Type of commodities	Legislators,senior officials and managers	Professionals	Technicians and associate professionals	Clerks,service workers and market sale workers	Skilled agricultural and fishery workers
1) Food prepared at home	2,524.39	2,602.10	2,293.35	2,030.97	2,219.10
	(12.81)	(7.02)	(7.85)	(11.51)	(25.85)
- Grain and cereal products	544.03	362.69	304.14	377.89	587.96
	(2.76)	(0.98)	(1.04)	(2.14)	(6.85)
- Meat,poultry ,fish and seafoods	778.35	730.38	608.93	555.11	682.44
	(3.95)	(1.97)	(2.08)	(3.15)	(7.95)
- Milk, cheese and eggs	314.07	410.05	373.28	288.86	247.07
	(1.59)	(1.11)	(1.28)	(1.64)	(2.88)
- Oil and fats	67.92	57.26	51.42	53.97	63.98
	(0.34)	(0.15)	(0.18)	(0.31)	(0.75)
- Fruits, nuts and vegetables	537.42	732.83	655.60	530.47	385.30
	(2.73)	(1.98)	(2.24)	(3.01)	(4.49)
- Other food	300.60	308.88	299.88	264.66	252.35
	(1.53)	(0.83)	(1.03)	(1.50)	(2.94)
2) Prepared food taken home	832.96	1,109.47	1,314.28	1,198.17	424.67
	(4.23)	(2.99)	(4.50)	(6.79)	(4.95)
3) Food eaten away from home	1,327.87	2,517.04	2,486.83	1,905.14	689.86
	(6.74)	(6.79)	(8.51)	(10.80)	(8.04)
4) Household food expenditure	4,703.22	6,228.61	6,094.47	5,134.28	3,333.63
	(23.86)	(16.81)	(20.86)	(29.10)	(38.83)
5) Household income	19,710.40	37,057.74	29,211.33	17,645.06	8,584.67
Household size	3.71	2.98	2.93	3.01	3.81
No. of households	6,339	1,656	1,103	4,713	5,765

Table 4.21 (Continued)

Unit: Baht/ household/ month

Type of commodities	Craft and related trades workers	Plant and machine operators and assemblers	Elementary occupation	Total
1) Food prepared at home	2,028.94	2,103.44	1,905.22	2,212.98
	(16.81)	(14.16)	(20.16)	(14.98)
- Grain and cereal products	402.14	363.57	401.84	464.26
	(3.33)	(2.45)	(4.25)	(3.14)
- Meat,poultry ,fish and seafoods	591.43	625.29	555.76	660.97
	(4.90)	(4.21)	(5.88)	(4.47)
- Milk, cheese and eggs	250.93	284.38	231.18	276.79
	(2.08)	(1.91)	(2.45)	(1.87)
- Oil and fats	60.51	58.69	60.04	61.41
	(0.50)	(0.40)	(0.64)	(0.42)
- Fruits, nuts and vegetables	459.00	514.05	405.74	483.80
	(3.80)	(3.46)	(4.29)	(3.27)
- Other food	264.94	257.44	250.67	265.75
	(2.19)	(1.73)	(2.65)	(1.80)
2) Prepared food taken home	888.52	1,127.53	717.13	790.79
	(7.36)	(7.59)	(7.59)	(5.35)
3) Food eaten away from home	1,319.43	1,866.64	1,047.97	1,271.09
	(10.93)	(12.56)	(11.09)	(8.60)
4) Household food expenditure	4,236.90	5,097.61	3,670.31	4,274.86
	(35.10)	(34.31)	(38.84)	(28.93)
5) Household income	12,072.60	14,856.84	9,449.66	14,777.59
Household size	3.18	3.30	3.21	3.45
No. of households	3,042	2,115	3,264	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Household Food Expenditures Classified by Age of Household Heads

Not only the number of population but also the age composition might affect overall food demand. There might also be differences in food consumption according to age. For example, elderly people need fewer food calories than people of working age. In this paper, the relationship between age of household heads and food expenditures are considered in table 4.22. Despite older household head have the upward trend with household food expenditure, the pattern of prepared food taken home and food away from home are seemed to differ. Overall, household head group between 41 and 50 years spent on food at home expenditure larger than other age ranges especially on the group of proteins (723.63 baht) and vegetables (509.77 Baht) respectively. For prepared food taken home, younger household tend to buy this food greater. To illustrate, the expenditure on this food in lowest age group (less than 30 years) are very high (1048.55 Baht) or nearly 8.50% of their income while in the oldest group (more than 61 years) spent only 633.26 Baht (5.35%). Moreover, the youngest household head spent for eating outside more than 12% or up to 1517.97 Baht per month.

Household Food Expenditures Classified by Gender of Household Heads

The different gender of households also leads to different food consumption expenditure. From table 4.23, the results illustrate that average of household income with male head is greater than household income with female head by 2,552.28 Baht. Therefore, it's not surprise that the male head households spent on the monthly food expenditure up to 4,428.73 Baht or more than female head group by about 500 Baht. Although the average expenditures of all food types in male head family are more than in female head group, the expenditure share is likely different (table25). Overall, the average and share of expenditures on every food types of both male and female head household have same direction and not differ significantly from national expenditures.

Table 4.22 Comparison of food expenditures classified by age of household heads, 2004

Unit: Baht/ household/ month

Type of commodities	Less than 30 years	31-40 years	41-50 years	51-60 years	More than 61 years	Total
1) Food prepared at home	1,540.48	2,221.01	2,355.80	2,355.14	2,197.57	2,212.98
	(12.49)	(15.03)	(14.84)	(13.99)	(17.10)	(14.98)
- Grain and cereal products	262.88	433.46	497.16	521.66	485.74	464.26
	(2.13)	(2.93)	(3.13)	(3.10)	(3.78)	(3.14)
- Meat,poultry ,fish and seafoods	373.49	637.27	723.63	719.02	677.95	660.97
	(3.03)	(4.31)	(4.56)	(4.27)	(5.27)	(4.47)
- Milk, cheese and eggs	258.22	322.86	274.55	279.85	244.75	276.79
	(2.09)	(2.19)	(1.73)	(1.66)	(1.90)	(1.87)
- Oil and fats	38.95	61.21	66.47	64.75	62.18	61.41
	(0.32)	(0.41)	(0.42)	(0.38)	(0.48)	(0.42)
- Fruits, nuts and vegetables	403.36	492.15	509.77	495.57	470.72	483.80
	(3.27)	(3.33)	(3.21)	(2.94)	(3.66)	(3.27)
- Other food	203.58	247.06	284.21	274.28	256.23	265.75
	(1.65)	(1.67)	(1.79)	(1.63)	(1.99)	(1.80)
2) Prepared food taken home	1,048.55	897.28	843.04	686.08	633.26	790.79
	(8.50)	(6.07)	(5.31)	(4.08)	(4.93)	(5.35)
3) Food eaten away from home	1,517.97	1,446.79	1,531.43	1,159.39	846.03	1,271.09
	(12.31)	(9.79)	(9.65)	(6.89)	(6.58)	(8.60)
4) Household food expenditure	4,107.01	4,565.08	4,730.27	4,200.61	3,676.87	4,274.86
	(33.29)	(30.90)	(29.80)	(24.96)	(28.61)	(28.93)
5) Household income	12,335.59	14,775.12	15,874.74	16,832.31	12,852.75	14,777.59
Household size	2.50	3.46	3.57	3.63	3.53	3.45
No. of households	3,352	7,047	9,158	6,942	8,344	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Table 4.23 Comparison of food expenditures classified by gender of household heads, 2004

Unit: Baht/ household/ month

Type of commodities	Male	Female	Total
1) Food prepared at home	2,296.85	2,015.81	2,212.98
	(14.78)	(15.52)	(14.98)
- Grain and cereal products	493.77	394.87	464.26
	(3.18)	(3.04)	(3.14)
- Meat,poultry ,fish and seafoods	693.16	585.30	660.97
	(4.46)	(4.51)	(4.47)
- Milk, cheese and eggs	284.71	258.19	276.79
	(1.83)	(1.99)	(1.87)
- Oil and fats	63.08	57.50	61.41
	(0.41)	(0.44)	(0.42)
- Fruits, nuts and vegetables	490.79	467.36	483.80
	(3.16)	(3.60)	(3.27)
- Other food	271.35	252.54	265.75
	(1.75)	(1.94)	(1.80)
2) Prepared food taken home	809.05	747.85	790.79
	(5.21)	(5.76)	(5.35)
3) Food eaten away from home	1,322.83	1,149.46	1,271.09
	(8.51)	(8.85)	(8.60)
4) Household food expenditure	4,428.73	3,913.12	4,274.86
	(28.50)	(30.13)	(28.93)
5) Household income	15,539.27	12,986.99	14,777.59
Household size	3.62	3.05	3.45
No. of households	23,751	11,092	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Household Food Expenditures Classified by Monthly Income of Household Heads

Previous studies by Jansai (1996), Schmidt and Isvilanonda (2004) and Longpichai (2004) indicated that household head's monthly income should be more concerned for analyzing in food consumption expenditures because the household income has a positive correlation with its power purchasing. In table 4.24, despite the positive relationship between head income and household food expenditure, the grain and cereal product consumption tend to be highest in the two lowest income groups. Furthermore, the consumptions of vegetable and protein groups are interesting to focus because households in the highest income level (more than 15,000 Baht) spent on these 2 groups greater than national expenditures by up to 305.17 Baht and 210.33 Baht, respectively.

The effect of income on all types of meal in food away from home consumption was demonstrated by Jensen and Yen (1996) since they found a positive and significant effect. In table 4.24, the expenditure of prepared food taken home and food away from home consumption rose dramatically according to higher monthly income groups. In comparing the average expenditure between the highest head income group and the lowest head income group, the different expenditure on the food away from home is seemed to be largest (2,022.82 Baht) followed by the group of food prepared at home (1,022.98 Baht) and prepared food taken home (920.66 Baht) respectively. In the term of share (table 4.24), the expenditure share of all types of food at home consumption declined when household head have higher income.

Table 4.24 Comparison of food expenditures classified by monthly income of household heads, 2004

Unit: Baht/ household/ month

Type of commodities	Less than 3000 Baht	3001-6000 Baht	6001-9000 Baht	9001-12000 Baht	12001-15000 Baht	More than 15000 Baht	Total
1) Food prepared at home	1,904.69	2,079.87	2,150.90	2,273.16	2,387.81	2,927.67	2,212.98
	(28.40)	(22.94)	(16.88)	(13.55)	(11.58)	(6.97)	(14.98)
- Grain and cereal products	482.79	487.94	430.30	406.55	425.24	427.25	464.26
	(7.20)	(5.38)	(3.38)	(2.42)	(2.06)	(1.02)	(3.14)
- Meat,poultry ,fish and seafoods	571.29	617.40	636.61	686.62	687.86	871.30	660.97
	(8.52)	(6.81)	(5.00)	(4.09)	(3.34)	(2.08)	(4.47)
- Milk, cheese and eggs	210.73	253.55	277.59	296.68	334.84	420.88	276.79
	(3.14)	(2.80)	(2.18)	(1.77)	(1.62)	(1.00)	(1.87)
- Oil and fats	57.04	60.41	59.17	61.20	60.65	69.58	61.41
	(0.85)	(0.67)	(0.46)	(0.36)	(0.29)	(0.17)	(0.42)
- Fruits, nuts and vegetables	358.13	406.56	481.04	549.79	579.42	788.97	483.80
	(5.34)	(4.48)	(3.78)	(3.28)	(2.81)	(1.88)	(3.27)
- Other food	224.72	254.01	266.19	272.32	299.81	348.69	265.75
	(3.35)	(2.80)	(2.09)	(1.62)	(1.45)	(0.83)	(1.80)
2) Prepared food taken home	455.27	645.56	922.00	1,095.76	1,139.91	1,375.93	790.79
	(6.79)	(7.12)	(7.24)	(6.53)	(5.53)	(3.28)	(5.35)
3) Food eaten away from home	639.04	963.87	1,349.69	1,707.76	1,916.43	2,661.86	1,271.09
	(9.53)	(10.63)	(10.59)	(10.18)	(9.29)	(6.34)	(8.60)
4) Household food expenditure	2,999.01	3,689.30	4,422.59	5,076.68	5,444.15	6,965.46	4,274.86
	(44.72)	(40.69)	(34.71)	(30.26)	(26.40)	(16.59)	(28.93)
5) Household income	6,706.12	9,066.27	12,742.31	16,775.16	20,620.23	41,989.42	14,777.59
Household size	3.36	3.46	3.28	3.25	3.28	3.51	3.45
No. of households	9,275	8,248	4,614	2,761	1,876	5,832	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Household Food Expenditures Classified by Household Types

Fan *et al.* (2007) suggest that not only the household representative's socio-demographic characteristics (age, education and employment status) but also the family types and number of earners are the important determinants of the identified food expenditure patterns. From 4 types of families in Thailand, most households (head and spouse household) spent on food consumption greater than other type households. Consequently, the average expenditure on all types of food at home in this family type is the largest as compared to other household types especially the expenditure on protein products is 740.59 Baht or more than national expenditure by 79.62 Baht.

As a result of living alone, the one person households earned lowest income and spent on all food types less than other type groups. Surprisingly, the expenditure shares of one parent with unmarried children households are the highest share in each food type, excepting the consumption of prepared food taken home. Although the proportion spent on food at home of one person household type is the least in comparing with other types or only 9.82%, the direction of these households' share on prepared food taken home consumption is significantly different because it is highest or up to 7.70%. Concerning head and spouse household, its shares are not consistent with average expenditure since it is found that the shares on prepared food taken home and food away from home are less than national share by 0.31% and 0.34% respectively (table 4.25).

Table 4.25 Comparison of food expenditures classified by household types, 2004

Unit: Baht/ household/ month

Type of commodities	One person only	Head and spouse present	One parent with unmarried children	All other	Total
1) Food prepared at home	884.92	2,446.71	2,094.62	2,173.48	2,212.98
	(9.82)	(15.25)	(16.38)	(15.03)	(14.98)
- Grain and cereal products	164.58	519.27	430.49	449.09	464.26
	(1.83)	(3.24)	(3.37)	(3.11)	(3.14)
- Meat,poultry ,fish and seafoods	216.54	740.59	627.36	635.76	660.97
	(2.40)	(4.62)	(4.91)	(4.40)	(4.47)
- Milk, cheese and eggs	83.67	307.64	270.58	278.69	276.79
	(0.93)	(1.92)	(2.12)	(1.93)	(1.87)
- Oil and fats	23.88	67.99	62.07	57.36	61.41
	(0.27)	(0.42)	(0.49)	(0.40)	(0.42)
- Fruits, nuts and vegetables	265.01	521.79	449.51	491.62	483.80
	(2.94)	(3.25)	(3.51)	(3.40)	(3.27)
- Other food	131.26	289.44	254.61	260.96	265.75
	(1.46)	(1.80)	(1.99)	(1.80)	(1.80)
2) Prepared food taken home	693.71	808.59	728.34	826.56	790.79
	(7.70)	(5.04)	(5.69)	(5.72)	(5.35)
3) Food eaten away from home	768.76	1,328.21	1,269.42	1,384.81	1,271.09
	(8.53)	(8.28)	(9.93)	(9.58)	(8.60)
4) Household food expenditure	2,347.39	4,583.51	4,092.38	4,384.86	4,274.86
	(26.06)	(28.57)	(32.00)	(30.32)	(28.93)
5) Household income	9,008.85	16,044.16	12,789.57	14,462.02	14,777.59
Household size	1.00	3.83	3.25	3.59	3.45
No. of households	4,296	22,399	3,610	4,538	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Household Food Expenditures Classified by Number of Household Earners

Finally, this paper concentrates on the number of earners per household as well. In table 4.26, it might be error if we concern on the last group (more than 9 earners per household) because there are only 3 samples in this group. Fan *et al.* (2007) indicated that the households with more earners are more likely to consume the food away from home especially the fast food item because of the purchase of this food reduces food preparation time.

From table 4.26, more earner households are positively related to higher food expenditure. Excepting fruit and vegetable expenditure, the 7-8 earner households spend average expenditure on each food greater than other household groups. On the other hand, the share of food at home and prepared food taken home are the highest in the households with no earner; however, the share of food away from home is different since the 7-8 earner households spend the share on food away from home up to 10.21%.

Table 4.26 Comparison of food expenditures classified by number of household earners, 2004

Unit: Baht/ household/ month

Type of commodities	no earner	1-2 people	3-4 people	5-6 people	7-8 people	More than 9 people	Total
1) Food prepared at home	1,383.80	2,092.29	2,773.04	3,770.82	4,601.79	4,372.21	2,212.98
	(16.83)	(14.67)	(15.69)	(13.69)	(14.08)	(27.33)	(14.98)
- Grain and cereal products	273.12	423.91	634.44	840.99	1,030.74	1,190.59	464.26
	(3.32)	(2.97)	(3.59)	(3.05)	(3.15)	(7.44)	(3.14)
- Meat,poultry ,fish and seafoods	389.37	618.33	854.95	1,161.57	1,640.49	1,209.44	660.97
	(4.74)	(4.33)	(4.84)	(4.22)	(5.02)	(7.56)	(4.47)
- Milk, cheese and eggs	169.84	268.16	324.00	487.40	641.63	703.83	276.79
	(2.07)	(1.88)	(1.83)	(1.77)	(1.96)	(4.40)	(1.87)
- Oil and fats	36.66	58.70	76.29	96.13	111.01	93.00	61.41
	(0.45)	(0.41)	(0.43)	(0.35)	(0.34)	(0.58)	(0.42)
- Fruits, nuts and vegetables	351.66	468.70	556.91	766.65	693.39	646.08	483.80
	(4.28)	(3.29)	(3.15)	(2.78)	(2.12)	(4.04)	(3.27)
- Other food	163.16	254.50	326.45	418.07	484.53	29.27	265.75
	(1.98)	(1.78)	(1.85)	(1.52)	(1.48)	(0.18)	(1.80)
2) Prepared food taken home	615.50	773.83	850.66	1,424.76	1,811.60	481.51	790.79
	(7.49)	(5.42)	(4.81)	(5.17)	(5.54)	(3.01)	(5.35)
3) Food eaten away from home	667.76	1,279.87	1,350.15	2,368.08	3,335.25	1,751.60	1,271.09
	(8.12)	(8.97)	(7.64)	(8.60)	(10.21)	(10.95)	(8.60)
4) Household food expenditure	2,667.05	4,145.98	4,973.84	7,563.66	9,748.65	6,605.32	4,274.86
	(32.45)	(29.06)	(28.15)	(27.46)	(29.84)	(41.29)	(28.93)
5) Household income	8,220.14	14,265.92	17,668.80	27,544.13	32,674.88	15,996.82	14,777.59
Household size	2.00	3.11	4.76	7.18	9.55	13.67	3.45
No. of households	2,842.00	25,018	6,347	601	32	3	34,843

Note: Numbers in parentheses are the percentages of expenditure shares respect to household income

Source: Calculated from socio-economic survey data, NSO (2004)

Results from Statistical Models

The AIDS model's Engel curves, as share in equation 42 in Chapter III are estimated by using Seemingly Unrelated Regression (SUR) method. To be consistent with consumer theory, the models are estimated with homogeneity and symmetry imposed. Because the conditional consumption system is expressed as a budget share, the non-food equation, was dropped from the system. Excluding the non-food equation automatically implies the adding-up restriction. Thus, three equations in this study are emphasized consisting of three categories, namely, food prepared at home, prepared food taken home, food eaten away from home, plus non-food.

The results illustrate the relationship between the three food consumption modes and the household consumption expenditures or household incomes in Thailand at the national level and by region. The system of these three equations consists of 3 variables and 2 dummies i,e. regional and household type dummies. In the analysis, Central Region (RD_5) and other household type (HD_4) are used as the base cases.

Where, X = household consumption expenditure (Baht)

$HHSIZE$ = the number of household members (person)

AGE = age of household head (year)

Regional dummies

RD_1 = Bangkok

RD_2 = North

RD_3 = Northeast

RD_4 = South

RD_5 = Central plain

Household type dummies

HD_1 = One person household

HD_2 = Head and spouse present household

HD_3 = One parent with unmarried children household

HD_4 = Other household type

Furthermore, these models are estimated twice. The first time estimates the samples without using weighted factors, the second estimates the samples weighted by the NSO weighted factors before the analysis in order to represent the Thai household population. This way the estimated coefficients in each equation can be separated into 2 columns: unweighted estimated coefficients and weighted estimated coefficients for comparing, contrasting and looking at the effect of using weighted factors.

Estimated Result of the Expenditure Share Equations of Food Prepared at Home, Prepared Food Taken Home and Food Eaten away From Home

Table 4.27 shows the estimated results: the fitted equations are significant; the coefficient of determinants, R^2, for food prepared at home (1), prepared food taken home (2), and food eaten away from home (3) are 0.5152, 0.0754 and 0.1387, respectively, for the unweighted equations; and 0.5511, 0.1081 and 0.1672 for weighted equations. This indicates the percentage of independent variables in the models explaining the dependent variables.

The estimated coefficients from the weighted equations are significant at 99% confidence interval; similarly, most estimated coefficients from the unweighted equations are significant at 99% confidence interval. The exceptions are the HD_3 dummies in equation (2) and (3), which are significant at 95% confidence interval, and the RD_4 dummy in equation (3), which is not statistically significant. Overall, the signs of estimated coefficients from unweighted and weighted equations are similar; however, their values are slightly different.

The negative signs of household consumption expenditure variable (logX) in equations (1) and (2) indicate that as household consumption expenditure increases, the shares of food at home and prepared food taken home tend to decline. On the other hand, the positive sign of log(x) in equation (3) implies that the share of food eaten away from home rises as the household expenditure increases.

Household size, “HHSIZE”, is significant and positive for equation (1) and (3), reflecting the increasing share of food at home and food away from home as household size increases. The opposite is found for the share of prepared food taken home in equation (2).

Age of household head, “AGE”, is significant and positive for equation (1) but negative for equation (2) and (3); the older the household head is, the higher is the share of food at home and the lower are the shares of prepared food taken home and food eaten away from home.

Regional dummy variables, RD_i, reflect the geographical differences. By using the Central Region (RD_5) as the base in estimation, the positive and significant signs of RD_2, RD_3 and RD_4 in equation (1) suggest that households in the North (RD_2), Northeast (RD_3) and South (RD_4) spend relatively higher shares for food at home than households in the Central Region. However, the negative sign of RD_1 indicates the relatively smaller share of food at home of households in Bangkok. In contrast, the RD_1 dummy in prepared food taken home is positive while RD2, RD_3 and RD_4 dummies for this food are negative. This implies that only the households in Bangkok spend a higher share of prepared food taken home, while those in the North, Northeast and South spend a relatively smaller share on prepared food taken home.

For food away from home weighted equation, the regional dummies of RD_2 and RD_3 are negative while those of RD_1 and RD_4 are positive. The negative signs reflect that households in the North and Northeast spend relatively less on food away from home while households in Bangkok and the South spend relative more on food away from home. The RD_4 dummy from unweighted equation is likely differs from the result of weighted equation because the share of food away from home of households in the south does not differ significantly from that of households in the Central Region, as the samples were not weighted before analysis.

Using the other type household (HD_4) as the base case, the household type dummies in equation (1) are significant and positive for HD_2 and HD_3 indicating that the household whose head has a spouse (HD_2) and the household with one parent and unmarried children (HD_3) spend a relative larger share of food at home compared to the other household types. However, the household with one person tends to have a relatively smaller share of food taken at home i.e. the dummy sign is negative. Equation (2) and (3) dummy signs are different from equation (1); the share of prepared food taken home is likely positive with HD_1 and negative with HD_2 and HD_3. Unlike equation (2), the shares of food away from home in equation (3) are positive with HD_1 and HD_3 but negative with HD_2.

Table 4.27 Estimated coefficients of food prepared at home, prepared food taken home and food eaten away from home

	Food prepared at home (1)		Food prepared at home (2)		Food prepared at home (3)	
	unweight	weight	unweight	weight	unweight	weight
Intercept	1.3083	1.3384	0.2606	0.2656	0.1415	0.1268
	(166.13) **	(3550.22) **	(38.21) **	(860.09) **	(18.22) **	(350.99) **
log(X)	-0.1305	-0.1326	-0.0144	-0.0166	0.0036	0.0046
	(-160.8) **	(-3375.83) **	(-20.49) **	(-514.74) **	(4.47) **	(121.49) **
HHSIZE	0.0194	0.0196	-0.0038	-0.0031	0.0131	0.0129
	(51.64) **	(1132.94) **	(-11.73) **	(-214.81) **	(35.37) **	(775.02) **
AGE	0.001	0.0008	-0.0004	-0.0003	-0.0018	-0.0017
	(27.32) **	(496.69) **	(-13.67) **	(-249.72) **	(-52.00) **	(-1119.10) **
RD_1	-0.0268	-0.0319	0.029	0.0399	0.0405	0.0464
	(-11.7) **	(-383.04) **	(14.62) **	(585.17) **	(17.94) **	(581.03) **
RD_2	0.0146	0.023	-0.0245	-0.0309	-0.0223	-0.0246
	(10.32) **	(315.56) **	(-19.96) **	(-517.08) **	(-16.00) **	(-351.37) **
RD_3	0.012	0.017	-0.0093	-0.0165	-0.0166	-0.0161
	(8.73) **	(254.86) **	(-7.85) **	(-303.30) **	(-12.29) **	(-251.86) **
RD_4	0.0287	0.045	-0.0168	-0.0219	0.0018	0.0031
	(18.03) **	(561.30) **	(-12.20) **	(-332.74) **	(1.14) ns	(40.28) **
HD_1	-0.0707	-0.0781	0.0223	0.0269	0.0088	0.0074
	(-32.2) **	(-742.49) **	(11.71) **	(312.70) **	(4.05) **	(73.43) **
HD_2	0.0254	0.0223	-0.0056	-0.0021	-0.0257	-0.0242
	(16.41) **	(311.15) **	(-4.20) **	(-36.40) **	(-16.86) **	(-352.49) **
HD_3	0.0065	0.0084	-0.0042	-0.0037	0.005	0.0018
	(3.09) **	(85.97) **	(-2.33) *	(-45.88) **	(2.41) *	(19.67) **
R^2	0.5152	0.5516	0.0754	0.1081	0.1387	0.1672
χ^2	3703.44	2.06E+07	283.99	2.03E+06	561.08	3.36E+06
No. of samples	34843	34843	34843	34843	34843	34843

Note: Values in parentheses are the t-statistics

** statistically significant at 99% confidence interval

* statistically significant at 95% confidence interval

ns not statistically significant

Estimated Results of the Expenditure Share Equations of Food Prepared at Home, by Region

By separating the expenditure share of food at home by region, and taking out Bangkok from the central region, the R^2 of each equation is shown in table 4.28. All estimated coefficients from weighted equations are significant at 99% confidence interval. As a result of non weighted samples, most unweighted estimated coefficients in all equations are also significant at 99% confidence interval excluding the HD_3 dummies in all equations are not significant. As expected, the signs of estimated coefficient from weighted and unweighted equations are similar; however, the values are slightly different.

The log(X) variables are negative and significant for food at home in all regions. This means that, in all regions, the larger consumption expenditure of household results in a lower share of food at home. Household size (HHSIZE) and age of household head (AGE) variables are positive in all equations reflecting the positive effect of size of household and age of the household head on the share of food at home.

The household type dummies from weighted equations are positive for HD_2 and HD_3 but negative for HD_1, implying that one-person households in all regions spend relatively less share on food at home compared to other household types. Similar to the results from weighted equations, the HD_1 dummies from unweighted columns are significant and negative and the sign are positive for HD_2 in all equations. However, the shares of food at home of households with a parent with unmarried children do not differ significantly from that of other household types as the samples are not weighted.

Table 4.28 Estimated coefficients of food prepared at home, by region

	Bangkok (4)		Central (5)		North (6)		Northeast (7)		South (8)	
	unweight	weight	unweight	weight	unweight	weight	unweight	weight	unweight	weight
Intercept	0.7184	0.7147	1.2496	1.2859	1.4737	1.5593	1.3753	1.5461	1.3507	1.4196
	(27.09)**	(832.75)**	(84.75)**	(1689.52)**	(91.14)**	(1867.61)**	(94.82)**	(2294.34)**	(61.95)**	(1271.10)**
log(X)	-0.0722	-0.0724	-0.1243	-0.1279	-0.1471	-0.1540	-0.1342	-0.1499	-0.1323	-0.1357
	(-24.95)**	(-768.72)**	(-80.03)**	(-1597.07)**	(-87.71)**	(-1762.34)**	(-88.66)**	(-2054.72)**	(-59.21)**	(-1182.16)**
HHSIZE	0.0168	0.0166	0.0181	0.0179	0.0228	0.0238	0.0201	0.0214	0.0153	0.0133
	(12.63)**	(382.21)**	(27.44)**	(529.15)**	(24.75)**	(496.57)**	(27.66)**	(707.92)**	(17.52)**	(309.86)**
AGE	0.0011	0.0012	0.0011	0.0011	0.0006	0.0004	0.0006	0.0001	0.0011	0.0009
	(8.85)**	(297.32)**	(18.17)**	(343.19)**	(8.17)**	(91.99)**	(8.51)**	(31.22)**	(12.79)**	(210.05)**
HD_1	-0.0517	-0.0504	-0.0609	-0.0637	-0.0670	-0.0798	-0.0910	-0.0964	-0.0680	-0.0810
	(-7.50)**	(-233.04)**	(-16.18)**	(-320.10)**	(-14.04)**	(-317.76)**	(-20.37)**	(-476.32)**	(-11.28)**	(-253.57)**
HD_2	0.0233	0.0253	0.0215	0.0223	0.0287	0.0206	0.0190	0.0128	0.0384	0.0353
	(4.72)**	(164.16)**	(8.02)**	(160.90)**	(8.55)**	(118.30)**	(6.28)**	(100.90)**	(8.76)**	(155.79)**
HD_3	0.0077	0.0089	0.0046	0.0088	0.0043	0.0055	0.0046	-0.0021	0.0100	0.0108
	(1.05)ns	(37.87)**	(1.26)ns	(46.43)**	(0.94)ns	(23.11)**	(1.11)ns	(-12.07)**	(1.75)ns	(36.37)**
R^2	0.2871	0.2831	0.432	0.4512	0.5233	0.5121	0.5139	0.4690	0.456	0.4334
χ^2	138.36	820091.54	1315.23	3.16E+06	1488.68	3.46E+06	1590.52	4.72E+06	732.7	1.67E+06
No. of samples	2,061	2,061	10,374	10,374	8,136	8,136	9,028	9,028	5,244	5,244

Note: Values in parentheses are the t-statistics

** statistically significant at 99% confidence interval

ns not statistically significant

Estimated Results of the Expenditure Share Equations of Prepared Food Taken Home, by Region

In weighted columns, with the exception of HD3 dummy in equation (11), all estimated variables are significant at 99% confidence interval. On the other hand, some estimated coefficients from unweighted equations do not appear to be statistically significant. Only intercept and household consumption expenditure are significant in equation (9); while most estimated variables in equations (10) to (13) are significant at 99%, However, household expenditure variable in equation (11), HD_2 dummies in equation (10) and (12), and HD_3 dummies in equations (11) to (13) are not statistically significant, and HD_3 dummy in equation (10) is significant only at 95%.

As expected, the estimated variables between unweighted and weighted equations have similar signs but different values. The coefficients of log(X) in weighted columns are negative in all equations excluding equation (11), reflecting the decline of the expenditure share on prepared food taken home of households in all regions, except the North where the household consumption expenditure rises. Nevertheless, the results from unweighted equations show that the change in household expenditure will not affect the share on prepared food taken home in the North. As a result of non weighted samples, the other variables do not seem to have an effect on the share of prepared food taken home among households in Bangkok. However, these variables in weighted column in equation (9) are significant but have different directions from those of equations (11) to (13). Therefore, the discussion on equation (9) will consider only the estimated coefficients in the weighted column.

The household size " HHSIZE" and household head's age "AGE" are positive only in equation (9) of weighted columns but negative in equations (10) to (13) of either unweighted or weighted columns. It appears that it is only in Bangkok where a larger household size or an older household head increases the expenditure share of prepared food taken home; in all other regions the share declines as household size or age of household head increases.

Furthermore, the household type dummies in equation (9) in weighted column likely differ from equations (10) to (13). The negative sign for HD_1 in weighted equation (9) reflects that one-person households in Bangkok spend relatively less share on prepared food taken home than other types of household. The non significant HD_1 in unweighted column shows that in Bangkok, the share of prepared food taken home of a one-person household does not differ significantly from that of other household types.

On the other hand, the weighted equation reflecting the shares of prepared food brought home in Bangkok and the Northeast are positive with HD_2 and HD_3. The not significant HD_3 dummy in equation (11), indicates that the share of prepared food brought home of one parent with unmarried children households in the North does not differ significantly from that of other household types. The results from unweighted equations have a similar direction to those of weighted equations; nevertheless, the HD_2 and HD_3 dummies in many equations are not statistically significant.

Table 4.29 Estimated coefficients of prepared food taken home, by region

	Bangkok (9)		Central (10)		North (11)		Northeast (12)		South (13)	
	unweight	weight	unweight	weight	unweight	weight	unweight	weight	unweight	weight
Intercept	0.7759	0.8162	0.3355	0.3098	0.1167	0.0790	0.2159	0.1605	0.1861	0.1367
	(24.16)**	(773.30)**	(25.03)**	(458.91)**	(8.77)**	(127.38)**	(17.84)**	(327.15)**	(10.61)**	(168.82)**
log(X)	-0.0677	-0.0733	-0.0215	-0.0188	0.0016	0.0009	-0.0121	-0.0093	-0.0086	-0.0058
	(-19.34)**	(-632.70)**	(-15.21)**	(-264.36)**	(1.17)ns	(13.47)**	(-9.56)**	(-175.89)**	(-4.76)**	(-69.81)**
HHSIZE	0.0003	0.0018	-0.0039	-0.0033	-0.0040	-0.0045	-0.0023	-0.0018	-0.0040	-0.0031
	(0.16)ns	(34.71)**	(-6.53)**	(-110.01)**	(-5.28)**	(-124.93)**	(-3.78)**	(-83.35)**	(-5.73)**	(-100.27)**
AGE	0.0001	4.47E-05	-0.0006	-0.0007	-0.0003	-0.0002	-0.0003	-1.6E-05	-0.0002	-0.0001
	(0.62)ns	(9.21)**	(-10.92)**	(-234.91)**	(-4.04)**	(-66.14)**	(-5.15)**	(-7.25)*	(-2.72)**	(-36.14)**
HD_1	-0.0159	-0.0087	0.0137	0.0139	0.0250	0.0360	0.0414	0.0415	0.0195	0.0401
	(-1.90)ns	(-32.71)**	(4.01)**	(78.78)**	(6.36)**	(192.99)**	(11.09)**	(281.76)**	(4.03)**	(173.29)**
HD_2	0.0062	0.0102	-0.0034	-0.0094	-0.0087	-0.0034	0.0034	0.0020	-0.0144	-0.0073
	(1.03)ns	(53.62)**	(-1.39)ns	(-76.63)**	(-3.17)**	(-26.67)**	(1.35)ns	(21.40)**	(-4.08)**	(-44.21)**
HD_3	0.0008	0.0023	-0.0074	-0.0154	-0.0028	-0.0002	0.0012	0.0033	-0.0047	-0.0014
	(0.09)ns	(8.08)**	(-2.24)*	(-91.73)**	(-0.74)ns	(-1.13)ns	(0.35)ns	(26.67)**	(-1.03)ns	(-6.39)**
R^2	0.2104	0.2127	0.0707	0.0715	0.0376	0.0473	0.0637	0.0463	0.0577	0.0671
χ^2	91.55	560949.03	131.62	295560.80	52.92	163904.51	102.35	259626.69	53.48	157380.65
No. of samples	2,061	2,061	10,374	10,374	8,136	8,136	9,028	9,028	5,244	5,244

Note: Values in parentheses are the t-statistics

** statistically significant at 99% confidence interval

* statistically significant at 95% confidence interval

ns not statistically significant

The Estimated Results of the Expenditure Share Equations of Food Eaten Away from Home, by Region

After weighting the samples, all estimated variables are significant at 99% confidence interval excepting HD_1 dummy in equation (15). Similarly, the log(X), HHSIZE and AGE variables in unweighted equations are seemly significant at 99% confidence interval excluding the log(X) variable in equation (15) is significant at only 95% confidence interval and the log(X) variable in equation (8) is not statistical significant. However, the household type dummies from unweighted columns are mostly not significant especially, the HD_1 dummies which are not significant in all equations excluding equation (16). The HD_2 in equation (14) and HD_3 in equation (16) to (18) are also not statistical significant. As expected, the estimated coefficients from unweighted and weighted equations have similar signs but there are slight differences in their values.

In weighted equations, the coefficient at log(X) are positive in all equations excluding equation (14), implying the increasing share on food away from home of households in all regions, excepting Bangkok, as the household consumption expenditure rises. The results from unweighted equations have similar directions with those of weighted equations; however, the share of food away from home in south does not change when there is the increasing in household consumption expenditure. Both the results from weighted and unweighted equations present the positive sign of household size variable, "HHSIZE", in all equations indicating that as household size is bigger, the share on food away from home of households in all regions tend to increase. In contrast, the higher age of household head stimulates the lower expenditure share of food away from home in all regions due to the negative signs of "AGE" variable.

Due to weighting the samples before estimating, the household type dummies are positive for HD_1 and HD_3 but negative for HD_2 reflecting that only household head with spouse households in all regions spend relatively less share on food away from home as compared to other type household. However, the share of food away from

home of one person households in central plain does not differ significantly from that of other type household as a result of not significant HD_1 dummy in equation (15).

From unweighted equations, the negative signs for HD_2 report the same results as weighted equations. However, the non significant HD_1 dummies in unweighted columns indicate that one person households in all regions excluding in north do not spend the share of food away from home differently from other type households. In addition, the share of food away from home of one parent with unmarried children households in north, northeast and south do not differ significantly from those of other type households.

Table 4.30 Estimated coefficients of food eaten away from home, by region

	Bangkok (14)		Central (15)		North (16)		Northeast (17)		South (18)	
	unweight	weight	unweight	weight	unweight	weight	unweight	weight	unweight	weight
Intercept	0.4256	0.3834	0.1508	0.1246	0.0389	0.0082	0.0944	0.0298	0.1700	0.1390
	(11.03) **	(304.66) **	(9.80) **	(159.60) **	(2.74) **	(12.33) **	(6.96) **	(50.78) **	(7.63) **	(126.21) **
log(X)	-0.0204	-0.0148	0.0036	0.0055	0.0113	0.0137	0.0059	0.0114	0.0001	0.0029
	(-4.85) **	(-107.17) **	(2.21) *	(67.43) **	(7.67) **	(196.09) **	(4.19) **	(179.48) **	(0.05) ns	(25.93) **
HHSIZE	0.0122	0.0118	0.0121	0.0111	0.0125	0.0109	0.0134	0.0143	0.0164	0.0161
	(6.29) **	(185.61) **	(17.58) **	(321.11) **	(15.45) **	(284.81) **	(19.79) **	(544.99) **	(18.28) **	(379.76) **
AGE	-0.0022	-0.0023	-0.0019	-0.0018	-0.0016	-0.0014	-0.0016	-0.0015	-0.0018	-0.0018
	(-12.31) **	(-401.24) **	(-30.47) **	(-557.17) **	(-22.74) **	(-423.99) **	(-23.89) **	(-543.47) **	(-19.84) **	(-403.84) **
HD_1	0.0185	0.0109	0.0005	0.0003	0.0132	0.0045	0.0099	0.0066	0.0115	0.0180
	(1.84) ns	(34.54) **	(0.13) ns	(1.62) ns	(3.14) **	(22.58) **	(2.38) ns	(37.50) **	(1.87) ns	(57.11) **
HD_2	-0.0140	-0.0201	-0.0236	-0.0207	-0.0249	-0.0227	-0.0277	-0.0229	-0.0320	-0.0323
	(-1.95) ns	(-88.88) **	(-8.43) **	(-145.94) **	(-8.45) **	(-162.86) **	(-9.81) **	(-206.35) **	(-7.14) **	(-144.82) **
HD_3	0.0305	0.0259	0.0080	0.0021	0.0073	0.0034	0.0009	0.0022	0.0016	0.0029
	(2.85) **	(75.01) **	(2.11) *	(10.61) **	(1.81) ns	(17.80) **	(0.23) ns	(14.64) **	(0.28) ns	(10.05) **
R^2	0.0975	0.0914	0.1086	0.1015	0.1134	0.1115	0.106	0.1302	0.1224	0.1273
χ^2	37.12	208947.60	210.65	433648.90	173.35	413783.93	178.36	800094.69	121.89	318923.05
No. of samples	2,061	2,061	10,374	10,374	8,136	8,136	9,028	9,028	5,244	5,244

Note: Values in parentheses are the t-statistics

** statistically significant at 99% confidence interval

* statistically significant at 95% confidence interval

ns not statistically significant

In comparing the estimated coefficients from unweighted and weighted equations, the empirical results show that many estimated variables from unweighted equations are not statistically significant while most estimated coefficients from weighted equations are significant at 99% confidence interval. Weighting the observations before analysis might have resulted in the parameters from weighted equations being close to the parameters of the population and very small standard errors from weighted method. Thus, the t-statistics from weighted equations are very high as compared to those from unweighted equations. As a consequence of large t-statistics, the p-values are tiny leading to a statistical significant result at very high confidence level of weighted estimated coefficients. From table 4.27 to 4.30, the signs of coefficients from weighted and unweighted equations have similar direction; however, the values between these two columns differ slightly.

Using the estimated coefficients of consumption expenditure from each equation in the model, the estimated expenditure elasticities can be calculated as follows

$$n_i = 1 + (\beta_i / w_i)$$

Where,

n_i = the expenditure elasticity of i^{th} commodity

β_i = the coefficient of the household consumption expenditure of i^{th} commodity

wi = the expenditure share of the i^{th} commodity

The positive n_i indicates the normal goods; on the other hand, if n_i is less than zero, it implies an inferior goods. Where n_i is positive but less than 1, it is considered as a necessity goods. However, if n_i is larger than 1, it can be interpreted as a luxury goods.

Estimated Expenditure Elasticities of Food Prepared at Home

All expenditure elasticities of food at home from weighted and unweighted methods, in the whole kingdom and in each region, are positive but less than 1 (table 4.31). This implies that food at home isa necessity. When household consumption expenditure or household income increases, households in every region tend to increase their expenditure on food at home but at a lower growth rate.

From the weighted column, the change in consumption of food at home is highest in the South, followed by the Northeast, North, Bangkok and Central Region in that order, as household consumption expenditure or household income changes. The results from the unweighted column show the inverse between the two first rankings. However, the household consumption expenditure coefficients from table 4.28 are negative in all regions. The probable reason for this is that households tend to increase spending on food at home when household expenditure or income rises. The growth rate of food at home expenditure is slower than other commodities so that the share of food at home declines.

Table 4.31 Estimated expenditure elasticities of food prepared at home

Region	ω		β		η	
	unweight	weight	unweight	weight	unweight	weight
Total	0.2509	0.2693	-0.1305	-0.1326	0.4799	0.5077
Bangkok	0.1308	0.1311	-0.0722	-0.0724	0.4480	0.4477
Central	0.2227	0.2273	-0.1243	-0.1279	0.4419	0.4374
North	0.2820	0.3107	-0.1471	-0.154	0.4784	0.5043
Northeast	0.2782	0.3193	-0.1342	-0.1499	0.5176	0.5306
South	0.2588	0.2899	-0.1323	-0.1357	0.4888	0.5319

Estimated Expenditure Elasticities of Prepared Food Taken Home

All estimated expenditure elasticities of prepared food taken home from weighted and unweighted methods, in the whole kingdom and in each region, are positive and most of them are less than 1. The exception is the North in weighted column. (Table 4.32)

Thus, the prepared food taken home from unweighted method is necessity goods in all regions. The weighted column shows that prepared food taken home is a necessity in Bangkok and the Central, Northeast and Southern regions. On the other hand, the estimated expenditure elasticity in the North is larger than 1 implying that prepared food taken home is a luxury in the region.

The weighted and unweighted results illustrate that the change in the consumption of prepared food taken home is highest in the North followed by the South, Northeast, Central Region and Bangkok, in that order, as household consumption expenditure or household income changes. Similar to the consumption of food at home, most household consumption expenditure coefficients from table 4.29 are negative in all regions except the North. The reason for this result might be the same as that for the food at home consumption.

Table 4.32 Estimated expenditure elasticities of prepared food taken home

Region	ω		β		η	
	unweight	weight	unweight	weight	unweight	weight
Total	0.0860	0.0809	-0.0144	-0.0166	0.8326	0.7948
Bangkok	0.1189	0.1243	-0.0677	-0.0733	0.4306	0.4102
Central	0.0938	0.0876	-0.0215	-0.0188	0.7708	0.7854
North	0.0741	0.0642	-0.0016	0.0009	0.9784	1.0140
Northeast	0.0865	0.0762	-0.0121	-0.0093	0.8601	0.8779
South	0.0754	0.0648	-0.0086	-0.0058	0.8859	0.9105

Estimated Expenditure Elasticities of Food Eaten Away from Home

All income elasticities of food away from home, in the whole kingdom and in all regions are positive and most of them are more than 1, except Bangkok in the weighted column and Bangkok and the South in the unweighted column. (Table 4.33) Thus, food away from home is a luxury commodity in most regions. As a result of weighted samples, only food away from home in Bangkok is necessity goods (less than 1 estimated expenditure elasticity), while the estimated expenditure elasticities from unweighted method are less than 1 in Bangkok and the South. For the unweighted column, when household consumption expenditure or household income increases, most regions except Bangkok and the South tend to spend more and at an increasing rate of growth on food away from home. Households in Bangkok and the South also spend more on food away from home but at at a lower growth rate.

The weighted and unweighted results illustrate that the change in consumption of food away from home is highest in the North followed by the Northeast, Central Region, South and Bangkok, in that order, as household consumption expenditure or household income changes. From table 4.30, the household consumption expenditure coefficients are positive in every region except Bangkok. These results show that households in all regions tend to spend increasingly on food away from home at a higher growth rate than on other commodities. In sum, the share on food away from home increases as household expenditures or incomes grow.

Table 4.33 The estimated expenditure of food eaten away from home

Region	ω		β		η	
	unweight	weight	unweight	weight	unweight	weight
Total	0.1072	0.1069	0.0036	0.0046	1.0336	1.0430
Bangkok	0.1644	0.1674	-0.0204	-0.0148	0.8759	0.9116
Central	0.1152	0.1130	0.0036	0.0055	1.0313	1.0487
North	0.0853	0.0783	0.0113	0.0137	1.1325	1.1749
Northeast	0.0977	0.0931	0.0059	0.0114	1.0604	1.1225
South	0.1191	0.1160	-0.0001	0.0029	0.9992	1.0250

The particular findings of this study on estimated expenditure elasticities are consistent with those of previous studies carried out in other countries (eg. Lamm, 1982; Craven and Haidacher, 1987; Nanya and Capps, 1992). The expenditure elasticities of both food at home and food away from home are positive and the expenditure elasticities estimated for food away from home are higher than those for food at home. It is important to note that the food away from home appeared as a luxury item in the Craven and Haidacher study and this study. However, the expenditure elasticities of food away from home in Lamm's study and Nanya and Capps' study yield the interpretation that food away from home is not considered as a luxury good. (Table4.34)

Table 4.34 Estimated expenditure elasticities of food prepared at home and food eaten away from home from other studies

Expenditure elasticity	Food at home	Food away from home
Lamm's study	0.5070	0.9950
Craven and Haidacher' study	0.4000	1.1000
Nanya and Capps' study	0.1850	0.8120
This study (unweighted)	0.4799	1.0336
This study (weighted)	0.5077	1.0430

CHAPTER V

CONCLUSION AND RECOMMENDATION

Conclusion of the Study

Sociodemographic and economic factors which affect food consumption pattern through changes in the expenditures of food prepared at home, prepared food taken home and food eaten away from home are analyzed in the context of AIDS model's Engel curves. Moreover, this paper studies the food consumption patterns in the form of average food expenditures and the expenditure shares with respect to income in order to understand initially these 3 food consumption including each type of food at home.

Consistent with other studies, the results indicated the important of household's composition, education, the number of households with multiple wage earners, the location of residence and per capita income on the food consumption expenditures. Therefore, the analysis of the relationships between the food expenditures and household characteristics can demonstrate the food consumption pattern of Thai household and can be summarized that

1. In urban areas such as municipality and the big city as Bangkok, the expenditure share of food prepared at home is less than this share in the lower development area. On the other hand, households in municipality tend to spend their proportion on prepared food taken home and eating outside larger than people in non-municipality. The reason may be likely as Sahn and Alderman' suggestion that the urban lifestyles may place a premium on food which requires less time to prepare due to increasing in opportunity cost of their time.

2. Consideration the average expenditures within the food at home consumption, it is notice that despite higher income of households in municipality area, their expenditures on grain and cereal product as well as oil and fat group are less than these expenditures of households in non-municipality; whereas, the expenditures on dairy products, fruits and vegetable tend to be high in municipality. This might be the consequence from changes in urban occupations because urban occupations tend to be more sedentary and people engaged in more sedentary careers require fewer calories to maintain a given body weight. Similarly, food expenditure always increase as household heads graduated at higher education; however, the consumption of not only the grain and cereal products but also the oil and fat group tend to decline according to higher education of household head.

3. Although older household head have the upward trend with household food expenditure, the pattern of prepared food taken home and food away from home are seemed to opposite. Just like the previous study by McCracken and Brandt, the result indicates that the higher age of household head is negatively correlated to the expenditure for food away from home. Within food at home consumption, household head group between 41 and 50 years spent on food at home expenditure larger than other age ranges especially on the group of proteins and vegetables.

4. The result reflects that the head and spouse present households spend on food at home greater than other household types; on the other hand, the expenditure of each food of households with single person tend to be the smallest as a result of living alone. However, the share on prepared food taken home of single person households is the highest as compared to other households.

According to quantitative analysis, previous studies in Thailand determined that the household consumption expenditure and household characteristics such as household size are the important factors affecting on food consumption patterns of Thai households. Thus, these factors were included in their statistical models; however, this study captures on the effect of household types and age of household

heads as well. In addition, the consumptions of food at home, prepared food taken home and food away from home are analyzed by regions.

As expected, results indicated that the share on food away from home increases as the household consumption expenditure increases. However, the expenditure shares of food at home and prepared food taken home in all regions, excepting the share of prepared food taken home in north, decline according to the growth in household expenditure implying that households tend to rely more on food away from home than food at home and prepared food taken home as their opportunity costs of time become higher.

In accordance with economic theory, expenditure elasticities of these 3 foods in all regions are positive indicating the necessity items of food at home and prepared food taken home in all regions. In addition, the food away from home is seemed to be the luxury commodity, excluding in Bangkok and South. However, the results from weighted samples before analysis have slight differences. The expenditure elaticities from weighted method reflect the necessity goods of food at home and prepared food taken home in all regions, excepting prepared food taken home in the north. Whereas, the food away from home is the luxury items in all regions, excluding in Bangkok.

Thus, when households have higher consumption expenditures or incomes, they tend to spend on food at home, prepared food taken home and food away from home increasingly. Nevertheless, the growth rates of food at home and prepared food taken home expenditures are likely less than the growth rates of the expenditures on food away from home and non-food reflecting the greater sensitivity in the consumption for food away from home relative to food at home as a rise in consumer incomes or expenditures.

The differential impacts of household size and age of household head have important implications. This study suggests that marketing efforts by the food service industrials should generally focus on households which don’t currently consume food away from home such as the smaller households and households with older heads in

order to expense their businesses. Furthermore, the difference of these 3 food expenditure patterns at different household types is evident. For example, households with single person spend the expenditure share on food at home relatively less than other type households; on the other hand, the shares on prepared food taken home and food away from home are relative higher for the single person households. Consequently, single person households should be considered as the interesting target group for food away from home and prepared food taken home businesses.

This study documents the consumption pattern on food at home, prepared food taken home and food away from home of Thai households and the factors affecting these consumptions in order to be as a source of information for policy designs toward marketing strategy development which is one of the primary concerns of food distribution and retail industry.

Recommendations

1. The empirical result determines that a rise in consumer incomes or expenditures would signal sensitivity in the consumption trend for food away from home relative to food at home. Likewise, retail food stores must monitor these changes since less food may flow though retail grocery stores. The retail food chain industry has actually recognized this fact in recent years by offering on-premise food services in grocery stores. However, if Thai economy's recovery from the recession as well as the rise in consumer incomes continues to be sluggish, the food away from home industry might realize a slow down in its sales.

2. The results from this study are compatible with the expectations that the urbanization and economic expansion could lead to the growth of food away from home consumption. Therefore, the government should pay attention to the upward trend of food away from home businesses by controlling this food processing to produce safe, healthy and nutritional products as well as monitoring and assessing the future outcomes.

3. As a result of employing data from NSO, the limitation in this study is no some important information for analyzing the food consumption behaviors such as commodity's price, the quantity of each good and social characteristics etc. Consequently, this study demonstrates only the direction of food consumption patterns but not be able to provide the food demands of Thai households. The future researchers interested in this topic should invest these neglect information in order to conduct more efficient study.

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APPENDICES

Appendix A

Calculation of Income Elasticity

The expenditure elasticity can be estimated from equation (44) in Chapter3 by

$$w_i = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log Y - \beta_i \log P$$

$$\frac{c_i}{Y} = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log Y - \beta_i \log P$$

$$c_i = \alpha_i Y + \sum_j \gamma_{ij} \log p_j (Y) + \beta_i \log Y(Y) - \beta_i \log P(Y)$$

$$\frac{\partial c_i}{\partial Y} = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log Y + \beta_i Y\left(\frac{1}{Y}\right) - \beta_i \log P = w_i + \beta_i$$

$$\frac{\partial c_i}{\partial Y} \times \frac{Y}{c_i} = \left(\frac{c_i}{Y} \times \frac{Y}{c_i}\right) + \left(\beta_i \times \frac{Y}{c_i}\right)$$

So, η_i is the expenditure elasticity and is calculated as:

$$n_i = 1 + (\beta_i / w_i)$$

Due to $E_{cy} = E_{qy} + E_{py}$

If price is constant, E_{py} will equal 0. Therefore, we can estimate that the expenditure elasticity with respect to income will equal to the income elasticity when price of that good is remained constantly.

Appendix B

Descriptive Statistics of Thai Household Characteristics

Appendix Table B1 Descriptive statistics of household consumption expenditure of Thai households

Descriptive statistics	Total	Bangkok	Central	North	Northeast	South
Minimum	689	2594	987	689	794	751
Maximum	428263	428263	378162	151102	231713	155659
Mean	11914.45	21817.35	12871.14	9564.03	10202.73	12723.38
Std. Deviation	12752.07	24705.16	12348.9	10079.65	10779.12	11261.35
n	34843	2061	10374	8136	9028	5244

Source: Calculated from socio-economic survey data, NSO (2004)

Appendix Table B2 Descriptive statistics of Thai household size

Descriptive statistics	Total	Bangkok	Central	North	Northeast	South
Minimum	1	1	1	1	1	1
Maximum	19	14	19	12	15	14
Mean	3.34	3.22	3.29	3.12	3.51	3.55
Std. Deviation	1.67	1.73	1.71	1.49	1.66	1.80
n	34843	2061	10374	8136	9028	5244

Source: Calculated from socio-economic survey data, NSO (2004)

Appendix Table B3 Descriptive statistics of household head's age of Thai households

Descriptive statistics	Total	Bangkok	Central	North	Northeast	South
Minimum	11	13	12	13	11	12
Maximum	99	96	99	98	99	99
Mean	49.56	44.68	49.12	51.24	49.99	49.00
Std. Deviation	14.86	14.84	15.22	14.57	14.23	15.13
n	34843	2061	10374	8136	9028	5244

Source: Calculated from socio-economic survey data, NSO (2004)

BIOGRAPHICAL DATA

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