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RESEARCH ARTICLE

Microeconometric Analysis of the Eating-out Behavior of Modern Filipino Households: The Tobit, the Craggit and the Heckit Models

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Abstract: Despite the economic and commercial importance of food consumption away from home, very limited attempt has been made to investigate the evolution and economics of this type of food consumption among Filipinos over time. This study hopes to set the pace among local researchers in taking advantage of the availability of high quality primary data of nationwide household surveys to generate useful insights on the “eating out” behavior of modern Filipinos. The study will endeavour to establish the linkage between food demand behaviours and socioeconomic and demographic characteristics of households, highlighting on the difference between wealthy/not wealthy consumers and the increasing role of time constraint on the part of household members in their decision to “eat out”. To supply the dynamic content of the analysis, public use raw data files of several rounds of the Family Income and Expenditure Survey (FIES) are used. Relevant microeconometric models which address censoring, truncation and sample selectivity issues as well as the complex nature of the survey are also implemented. Results of the study confirm the empirical ascendancy of the Heckit model and the significant co-variation of FAFH consumption of Filipino households with its postulated determinants. Also established is the relevance of Engel’s Law to FAFH consumption and the establishment of FAFH as a necessity during the modern era.

Keywords: Food-away-from-home expenditures, Sampling design consistent estimation, Limited dependent variable models, Engel curves, Microeconometrics

JEL classification: C24, C42, D11, D12

Food has traditionally been the top priority item in any household’s consumption basket. Whether consumed at home or outside the home, households usually apportion about half of their total budget on food. In the modern times however, because of the shifting consumer preferences and dramatic growth in income, especially in the cities, there has been a remarkable change in household’s food consumption patterns. In the Philippines, the proliferation of vast arrays of food service facilities such as conventional full-service and fast food restaurants, coffee shops, food courts, roadside stalls, canteens, delicatessens, and so forth, together with improved purchasing power, growing time constraints among household members, and incessant bombardment of promotional ads across various media collectively create a strong impetus among Filipinos to eat out. The result could be a steady convergence of the consumption incidences of food eaten at home (FAH) and that of food eaten away from home (FAFH).

Unfortunately, the issue of the increasing economic, commercial, and nutritional importance of FAFH has not been a priority area among local researchers and policy makers as there is an obvious dearth of research studies, as well as executive and legislative concerns related to it. This apparent oversight induced the researcher to undertake a study that will empirically and analytically examine available nationwide household survey data (Family Income and Expenditure Survey [FIES]) undertaken after turn of the current century, particularly during the period 2003 - 2012, in search for the answer to the following research question:

> To what extent has the emergence of the modern Filipino society brought about significant changes in the household consumption patterns on food, particularly in their behavior of spending on food consumed away from home?

In pursuit of the above research agenda, the study aims to achieve the following specific objectives:

1. To determine through appropriate descriptive methods whether there really is a steadily growing convergence of the consumption incidences of FAH and FAFH over time.
2. To establish survey-design-consistent stylized facts on important household consumption indicators and statistics with regards to FAH and FAFH.
3. To analytically determine the different factors (socio-demographic, locational and economic) that shape households decision in allocating budget for FAFH using alternative state-of-the-art microeconometric models.
4. To examine the continued relevance (or statistical regularity) of the theoretical predictions of Engel's Law on FAFH during the modern era.
5. To establish statistically and econometrically adequate estimates of FAFH elasticity relevant to policy making among the following stakeholders: food industry experts/analysts, entrepreneurs, marketing managers, agribusiness analysts, fitness and health experts, academicians, legislators, fiscal planners, medical professionals, and so forth.

Brief Review of Literature

Empirical research on consumption of FAFH is widely developed in the international economic literature. Various angles of the phenomenon (e.g., behavioral patterns, fitness and nutrition, visit frequency, role of time constraint, food security, commercialization, type of meals & facilities, etc.) have been scrutinized in different country settings with wide ranging policy implications. These studies are mostly concerned with the determination of the various social, demographic, and economic factors that promote dining out that boost away-from-home food spending (in the United States: Byrne, Capps, & Saha, 1998; Binkley, 2008; McCracken & Brandt, 1987; Guthrie, Lin, & Frazao, 2002; and Zan & Fan, 2010; in Malaysia: Tey et al., 2009; in China: Fang & Beghin, 2002; in Spain: Molina, 1994; and Manrique & Jensen, 1998).

Almost all of the published works on FAFH employ large scale household survey data, however, I did not find any study in the literature searched that employed estimation techniques that take into account the complex design of the survey. Another missing element in the literature is the existence of any study on FAFH which feature the Philippines.

Much of the early literature on FAFH has been descriptive in nature, for example, LeBovit (1967), Manchester (1977); Van Dress (1980). Succeeding researchers recognized the importance of rigorous economic foundation to the analysis of eating out behavior of households. Most of these authors cite the work of Becker (1965) and Prochaska and Schrimper (1973) in justifying their inclusion of the different factors that shape households demand for FAFH. In particular, the framework proposed by Becker stresses the allocation of household time between market and nonmarket activities, making the inclusion of those variables that put value on household time important (see McCracken & Brandt, 1987; Capps, Prochaska & Schrimper, 1973; Redman, 1980).

Using causal research designs, studies on the FAFH almost exclusively employed OLS estimation prior to the study of McCracken and Brandt (1987) who saw the importance of the heavy censoring needed for observations with zero consumption incidence on FAFH (which are rather numerous in varied settings). Insisting on the use of least squares methods will render results to be both biased and inconsistent as shown in other applications and the theoretical literature. Succeeding researchers on FAFH took heed, by using either the Tobit or the Heckman models to address censoring, truncation and selectivity biases, or other techniques like count and duration models when frequency of FAFH incidence during the reference period is being modeled (e.g. Dong, Byrne, Saha, & Capps, 2000). When zero FAFH consumption is seen to be due to purchase infrequency, especially when reference period is as short as weekly, the Box-Cox Double Hurdle model is applied (e.g. Yen, 1993; Yen & Jones, 1996; Shonkwiler & Yen, 1999). When abstinence or inaccurate data capture may be the reasons for zero observations, the Cragg's double hurdle model may be justified (e.g. Ogundari & Arifalo, 2013). However, despite the sophistication of these selectivity bias mitigating models, estimation biases may still linger when the complexity of the sampling design of the underlying survey is ignored (Deaton, 1997; Heeringa, West, & Berglund, 2010; Haughton & Haughton, 2011) in studies that employ large scale survey data.

Evidence on the applicability of the Engel's Law on FAFH consumption has also been investigated in the literature, particularly in the United States (see Byrne et al., 1996; Yen, 1993; McCracken & Brandt, 1987; Holcomb, Park, & Capps, 1995) by showing that FAFH is a necessity, through the estimated magnitudes of the expenditure elasticities using various functional specifications of Engel curves. Most of the studies on Engel curves of FAFH use the Working-Leser form, estimated through Heckman two stage procedure (selection stage and consumption stage) to address selectivity issues in consuming FAFH (see Heien & Wessells, 1990; Tey et al., 2009).

Gaps in the Literature

The proposed study is expected to fill yawning gaps in the literature revealed by my brief survey, which are the following:

1. The lack of empirical study on Filipino households' consumption pattern of FAFH, and
2. The dearth of empirical works that employ survey-design consistent methodologies in making inferences concerning microeconomic agents' behavioral patterns concerning FAFH.

Methodology

Incorporating the Sampling Design of the Survey in Inference

It has been one of the goals of this study to compute parameter estimates of the models together with the necessary descriptive measures and standard errors with full consideration of the complex design of the survey. This is made clear at the onset since I would like to distinguish this study from most statistical investigations that employ survey data. More often than not, statistical inferences in most of these researches are done with the assumption that the data collection is undertaken using simple random sampling (SRS) without replacement (Heeringa et al., 2010, p. 18), with the elements of the target population having equal chance of being included in the sample. Although computationally convenient and conforming with the i.i.d. requirement of most econometric procedures, it is theoretically flawed when complex design was used in the survey (Deaton, 1997).

The main data source of the study, the Family Income and Expenditure Survey (FIES) in particular, employs a multi-staged stratified sampling design aimed at economizing on the sample size without sacrificing the precision of the sample representation. As a consequence, each population element has varying probabilities of inclusion in the sample. As such, there is a need to take into consideration the sampling weights (sometimes called raising factors) which represent the inverse of the selection probabilities for each sample element (Cochran, 1977) in making inference using the sample. These sampling weights are needed to correct for differential representation and the effect of the sampling design on the estimates and their respective standard errors (Deaton, 1997; Haughton & Haughton, 2011). This will ensure the unbiasedness and consistency of the estimates, resulting in better inference.

Theoretical Framework

According to the household production theory proposed by Becker (1965), purchases of certain items being consumed by households are influenced by traditional factors like prices, income, demographic characteristics of the household, as well as non-traditional influences like life stages and time constraints faced by household members. This extension of the traditional demand theory can be adopted in the analysis of FAFH by representing the associated demand function (either amount consumed or budget share) of FAFH as a function of the usual demand determinants plus other factors in the context of Becker (1965) and Prochaska and Schrimper (1973), emphasizing the value of household time in the preparation of home-consumed food items and those related to the opportunity cost of household member's time or foregone earnings. Such demand function(s) is/(are) supposed to be the steady-state solution to the first order condition of the household's budget and time constrained utility maximization problem. The arguments concerning the existence of such solution was articulated and convincingly demonstrated by Becker (1965) and the resulting theoretical demand function has been empirically adopted in numerous consumer demand studies on FAFH (e.g. Capps et al., 1985; Prochaska & Schrimper, 1973; Redman, 1980; McCracken & Brandt, 1987; Yen, 1993).

The Tobit Model (Tobin, 1958)

If y_i^* is the latent (unobserved) utility maximizing FAFH consumption (or budget share) by the ith household:

$$y_i^* = x_i^{'}\beta + u_i \tag{1}$$

$$y_i = y_i^* \text{ if } y_i^* > 0$$

$$y_i = 0 \text{ if } y_i^* \leq 0$$

In this specification, y_i and x_i are respectively equal to the actual (observed) consumption (or budget share) of FAFH and the vector of household attributes postulated to affect consumption, β is a vector of regression parameters, and error term u_i ~ iid $N(0,\sigma^2)$. Both y_i and x_i are observed, while y_i^* is a latent (unobserved) variable.

This model is the standard Tobit model, censored at $y_i = 0$. It is called a censored regression model since the regressors (the elements of the vector x_i) are observed for all values of y_i^*, but the regressand y_i is observed only when $y_i^* > 0$, that is, the dependent variable is left censored at $y_i = 0$, suggesting a corner solution to the utility maximization problem. The standard Tobit model presupposes a single hurdle process, or the household's decision to participate in consumption of FAFH, and the decision on "how much" to consume are done simultaneously as a single process.

The likelihood function of the sample in this model is given by:

$$L_{Tobit} = \prod I(y_i = 0)\left[1 - \Phi(\frac{x_i^{'}\beta}{\sigma})\right]\prod I(y_i = y_i^*)\left[\frac{1}{\sigma}\phi(\frac{y_i - x_i^{'}\beta}{\sigma})\right] \tag{2}$$

with the indicator function $I(.) = 1$ at the argument, zero otherwise; $\Phi(.)$ and $\phi(.)$ as respectively the cumulative distribution function and the probability density function of the standard normal distribution at the argument. Maximizing the logarithm of this likelihood function (log likelihood) will give the Maximum Likelihood Estimates (MLE) of the parameters of the Tobit model (the β's and the σ).

The Craggit Model (Cragg, 1971)

One very unrealistic assumption of the Tobit Model is the single hurdle process underlying both decisions to participate in consumption and on the amount to consume. Many economists are uncomfortable with this assumption, particularly J. Cragg who proposed an alternative formulation to the Tobit Model by suggesting two separate latent variables y_{1i}^* which represents the utility of consumer i from "participation", and y_{2i}^* as the unobserved utility of consumer i from "consumption", effectively breaking down the single hurdle process of the Tobit model into a double hurdle process (Cragg, 1971). In this model, the hurdles are modeled *independently* into:

$$y_{1i}^* = x_{1i}^{'}\beta_1 + u_{1i} \tag{3}$$

for the "participation" hurdle which is a binary response model whose observed variable $w_{1i} = 1$ when $y_{1i}^* > 0$, and = 0 when $y_{1i}^* \leq 0$

$$y_{2i}^* = x_{2i}^{'}\beta_2 + u_{2i} \qquad (4)$$

for the "consumption" hurdle which is a truncated normal regression model with the observed consumption $y_{2i} = y_{2i}^*$ when $y_{1i}^* > 0$, and $y_{2i} = 0$ when $y_{1i}^* \leq 0$.

In this formulation, the stochastic pair (u_{1i}, u_{2i}) is taken from an i.i.d. bivariate normal distribution. Here, the means $E(u_{1i}) = E(u_{2i}) = 0$ and constant variances σ_1^2 and σ_2^2 respectively. The elements of the regressors vector x_{1i} are observed for all i but the variables in x_{21} are only observed when the utility from participation is positive ($y_{1i}^* > 0$). Hence, some observations in the "consumption stage" are effectively *truncated*. The likelihood function of the sample in the Craggit model as formulated by Cragg (1971) is given by:

$$L_{Craggit} = \prod P(y_{1i}^* \leq 0) \prod P(y_{1i}^* > 0) \prod f(y_{2i} \mid y_{1i}^* > 0) \quad (5)$$

which Amemiya (1984) rewrote/clarified, for independent u_{1i} and u_{2i} as:

$$L_{Craggit} = \prod I(y_{1i}^* \leq 0)[1 - \Phi(\frac{x_{1i}^{'}\beta_1}{\sigma_1})\prod I(y_{1i}^* > 0)\Phi($$

$$\Phi(\frac{x_{1i}^{'}\beta_1}{\sigma_1})\frac{1}{\sigma_2}\phi(\frac{y_{2i} - x_{2i}^{'}\beta_2}{\sigma_2}) \qquad (6)$$

Maximizing the logarithm of this function (log likelihood) will give the MLE estimates of the parameters of the Craggit model (the β's and the $\sigma's$).

The Heckit Model (Heckman, 1979)

When the observed level of consumption $y_i = 0$ is due to an unobservable response brought about by sample selection issues, James Heckman (1979) proposed a model that can improve on the results of the Craggit model by relaxing the hurdles independence assumption of Cragg (1971). Like the Craggit model, the Heckit model involves a two-hurdle process—participation and consumption (or intensity of participation) —hence two latent variables are involved, each representing the dependent variable of their hurdle equation.

$$y_{1i}^* = x_{1i}^{'}\beta_1 + u_{1i} \quad \text{the participation equation, and} \quad (7)$$

$$y_{2i}^* = x_{2i}^{'}\beta_2 + u_{2i} \quad \text{the consumption or intensity of participation equation} \quad (8)$$

Here, $y_{ji} = y_{ji}^*$ if $y_{1i}^* > 0$ and $y_{ji} = 0$ if $y_{1i}^* \leq 0$ for j = 1,2. Furthermore, the ordered pair (u_{1i}, u_{2i}) is taken from a *bivariate normal distribution* with mean zero and constant variances σ_1^2 and σ_2^2 with covariance $\sigma_{12} \neq 0$. By assumption y_{1i} and y_{2i} are observed for as long as $y_{1i}^* > 0$ (i.e., both hurdles are crossed when the first hurdle is crossed) and y_{2i} is censored at zero when the first hurdle is not crossed (incidental truncation). Standard OLS regression techniques applied to the consumption equation are deemed to yield biased results. Heckman (1979) provided the basis of producing consistent and asymptotically efficient estimates for all the parameters in such models through Full Information Maximum Likelihood (FIML) estimation (Greene, 2012). The likelihood function of the sample in the Heckit model is given by:

$$L_{Heckit} = \prod I(y_{1i}^* \leq 0)[1 - \Phi(\frac{x_{1i}\beta_1}{\sigma_1})] \prod I(y_{1i}^* > 0) f(y_{1i}, y_{2i}) \quad (9)$$

)with ($f(.,.)$ is the) bivariate normal joint probability density function. Maximizing the logarithm of this function will give the MLE estimates of the parameters of the Heckit model (the β's and the $\sigma's$).

The other alternative estimation strategy for the Heckit model, which involves the augmentation of the second hurdle equation by the so-called *Inverse Mills ratio* $\hat{\lambda} = \phi(z_i\hat{\gamma}) / \Phi(z_i\hat{\gamma})$, generated from the MLE estimated probit equation of the first hurdle (with dummy regressand $d_i = 1$ for participation of the ith household and regressors vector z_i and parameter vector γ) to correct for selectivity bias and estimated via the least squares method (Greene, 2012), is not pursued in this study.

Tobit or not Tobit—that is the question!

In any empirical comparison of alternative econometric models, a key decision to make is the choice of the most appropriate model describing available data. In the present study, the question is which of the limited dependent variable models—the Tobit, the Craggit, or the Heckit—adequately represents the data generating process underlying the eating-out behavior of modern Filipino families.

Tobit vs Craggit Models

Examining the description and the likelihood functions of the Tobit and the Craggit models, one will note that the Tobit model is nested with the Craggit model. Restricting some parameters of the first hurdle equation of the Craggit model will result in the Tobit model. Hence, employing the Likelihood Ratio (LR) test to validate these restrictions will empirically justify the use of either model. With the null hypothesis Ho: Restrictions are valid (i.e. Tobit Model) vs. the Craggit alternative, the LR statistic to be used is:

$$LR = -2[\log(L_{Tobit}) - \log(L_{Craggit})] \qquad (10)$$

which has χ^2_q distribution with q degrees of freedom, which is the number of restricted coefficients in the Craggit model (Lin & Schmidt, 1984; Greene, 2012).

Craggit vs Heckit

To undertake the empirical comparison of the Craggit and the Heckit models, the phenomenon of dependence/independence of the hurdles will provide the necessary evidence whether the Craggit (hurdles independence) or the Heckit (hurdles dependence) is appropriate. The LR test statistic under hurdles independence (Ho: Craggit) is part of the Stata full maximum likelihood estimation command of implementing the Heckman sample selection model (a.k.a. the Heckit). The likelihood-ratio test reported at the bottom of the output is an equivalent test for Ho: $\rho = 0$ and is computationally the comparison of the joint likelihood of an independent probit model for the selection equation (first hurdle) and a truncated regression model of the intensity equation (second hurdle). A p-value of less than 0.05 will justify the Heckman sample selection model.

The difficulty associated with this LR testing procedure lies in the reparameterization of the hurdles correlation ρ featuring the inverse hyperbolic tangent transformation $\tau = (1/2)\ln[(1+\rho)/(1-\rho)] = a\tanh(\rho)$ to adhere to the constraint $-1 < \rho < 1$, resulting in highly complex likelihood function, for which the LR test for hurdles independence is based.

Engel Curve: The Working-Leser Model (Working, 1943 and Leser, 1963)

The equation to be established for each of the three limited dependent variable models described above is that of the Engel Curve equation for FAFH, not its demand function in order to analyze behavior of households in terms of their budget allocation process on FAFH. Hence the dependent variable in the second hurdle equation or the "consumption intensity equation" of each model in this study is deemed to be budget shares of FAFH, instead of the actual household consumption of FAFH.

The traditional approach in estimating Engel curves using cross section data is based on full system parametric models which simultaneously consider the income expansion paths of all items in the consumption basket, meeting certain rigorous restrictions of consumer demand theory (e.g. additivity, symmetry, etc.). The most common specifications are the Almost Ideal Demand System (Deaton & Muellbauer, 1980) and the Linear Expenditure System (Stone, 1954)—favored by researchers because of their representative agent and exact aggregation properties, the main drawback however has been the recurrent problem of model misspecification (see Deaton & Muellbauer, 1980; Molina, 1994). Working (1943) proposed a log-linear budget share specification, which eventually became known as the Working-Leser model, since Leser (1963) found that this functional form fits better than most full system and single equation alternatives. The popularity of the Working-Leser model among modern consumer demand researchers is its non-linear form and its more direct basis of classifying consumption items as either necessity or luxury to supply the empirical content to the predictions of Engel's law.

The basic Working-Leser Engel curve presents the budget share (proportion of the total expenditure accounted for by FAFH expenditure) of j^{th} consumption item as a function of the (natural) logarithm of household's income:

$$S_{ij} = \alpha_j + \zeta \log(Y_i) + u_{ij} \tag{11}$$

where S_{ij} is the budget share of the j^{th} item for the i^{th} household, and Y_i is the income of the i^{th} household.

The relationship being represented by an Engel curve is that of consumption and income. However, households' consumption patterns also respond to relevant socio-demographic characteristics and geographical location of the households (both regional and urbanization), hence specification (2) can be extended as:

$$S_{ij} = \alpha_j + \zeta \log(Y_i) + \gamma_j^{'} X_{ij} + u_{ij} \tag{12}$$

with X_{ij} is the vector of socio-demographic, economic and locational attributes of the i^{th} household influencing the budget share of the j^{th} consumption item, with corresponding parameter column vector γ_j. The augmented Working-Leser curve (12) is the functional specification implemented in all models (the censored regression equation of Tobit and the second hurdle equations of Craggit and Heckit models).

Working-Leser Elasticity Estimation

The income elasticity of FAFH consumption is the economic relationship coefficient of interest in this study. Using the specification (12), this elasticity can be shown to be represented by the formula (see: Rufino, 2013):

$$\hat{\varepsilon}_{S_{j|Y}} = \frac{\partial S_{ij}}{\partial Y_i}\frac{Y_i}{S_{ij}} = 1 + \frac{\hat{\zeta}}{\bar{\bar{S}}_j} \tag{13}$$

The statistical significance, algebraic sign, as well as the magnitude of the income or expenditure elasticity estimates will be the basis of ascertaining whether FAFH consumption by modern Filipinos may show evidence of subscribing to the predictions of Engel's law (Byrne et al., 1996; Holcomb et al., 1995).

Data

The public use file of the FIES 2012, which is the survey's latest available round from the National Statistics Office (NSO), is considered as the main database of the study as it deems to represent the most modern period. The raw data files of the earlier rounds of FIES (2009, 2006, and 2003) are also used to account for the dynamic nature and basis of inter-temporal comparison of both FAH and FAFH consumption. Sampling design consistent stylized facts for the different eras are generated to give policy makers unbiased and consistent descriptive scenarios on how the pattern of food consumption away from home among Filipinos evolves over time. Design consistent estimates of all analytical models in the study are likewise generated to avoid the ill-effects of SRS inspired procedures.

Empirical Results

Descriptive Statistics

Based on the 2012 FIES survey round, 89.61% of Filipino households consumed food away from home (FAFH) from a figure of just 75.43% during the previous round of 2009. This pattern of consumption is noted to be monotonically increasing over time (67.03% in 2003 and 71.66% in 2006), which unmistakably represent an interesting behavioral shift in the manner modern Filipino families are consuming food. Using survey design consistent estimation, the evolution of this behavioral pattern is summarized graphically in Figure 1, showing the budget shares of the household total expenditures devoted to food consumption (FOOD), food consumption at home (FAH), and food consumption away from home (FAFH).

The bar graphs of Figure 1 show the relatively slow convergence of the shares FAH and FAFH of the household budget during the earlier FIES survey rounds, with FAH going down and FAFH going up: 40.96% in 2009, 40.67% in 2006 and 42.88% in 2003 for FAH and 4.93%, 4.57% and 4.24% respectively for 2009, 2006, and 2003. In 2012 however, the percent gap of these food consumption categories reached its narrowest at 37.95%. This narrowing difference in the propensities of families to consume FAH and FAFH is replicated in most regions of the country, particularly those with highly urbanized locales, namely Region 13 (Metro Manila), Region 41 (Calabarzon), and Region 3 (Central Luzon).

The statistics presented in Figure 1 are extracted from Table 1, which features along with the budget

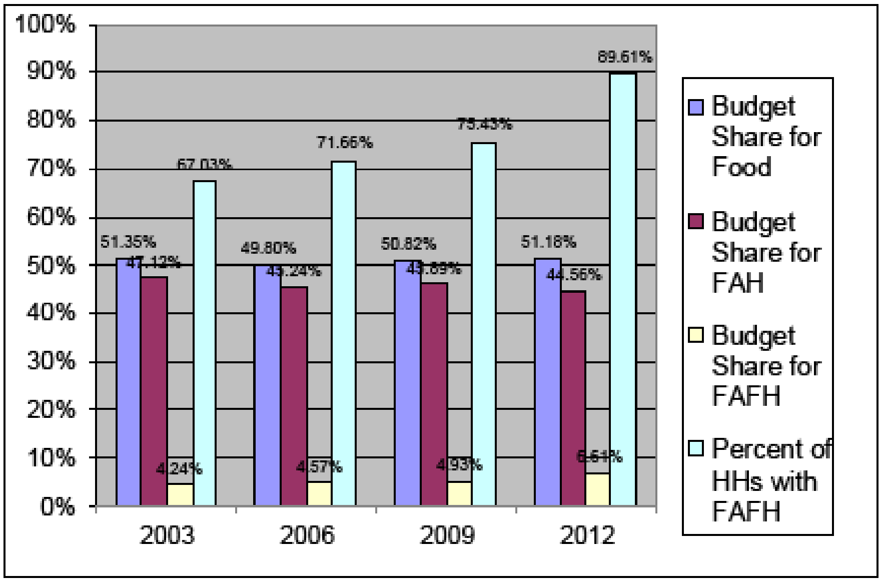

Figure 1. *Evolution of budget shares of FOOD, FAH, FAFH and proportion of HH with FAFH Philippines: 2003, 2006, 2009, and 2012.*

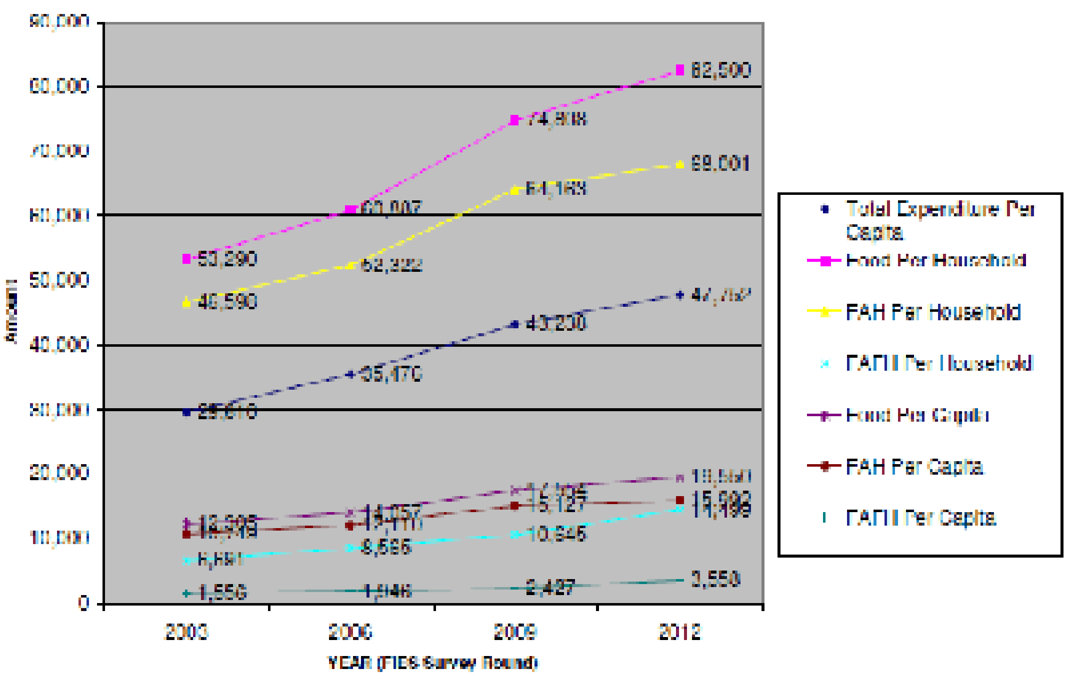

Figure 2. *Weighted mean estimates of the food, FAH, and FAFH expenditures per household and per capita figures on total, food, FAH, and FAFH expenditures: Philippines 2003, 2006, 2009, and 2012.*

Table 1. *Design Consistent Mean Estimates of Food, FAH and FAFH Consumption 2003 to 2012*

		Linearized					Linearized		
2003	Mean	Std. Err.	[95% Conf. Interval]		2006	Mean	Std. Err.	[95% Conf. Interval]	
Totex PC	29,610.19	186.51	29,244.64	29,975.75	Totex PC	35,475.63	372.92	34,744.16	36,207.09
Food	53,289.58	187.78	52,921.52	53,657.64	Food	60,887.04	350.43	60,199.69	61,574.39
FAH	46,598.46	146.78	46,310.75	46,886.16	FAH	52,321.92	283.77	51,765.33	52,878.51
FAFH	6,691.12	65.87	6,562.02	6,820.23	FAFH	8,565.12	113.14	8,343.20	8,787.04
Food PC	12,304.94	44.71	12,217.30	12,392.58	Food PC	14,056.59	85.67	13,888.55	14,224.64
FAH PC	10,748.53	34.18	10,681.53	10,815.53	FAH PC	12,110.39	66.63	11,979.69	12,241.09
FAFH PC	1,556.41	18.29	1,520.56	1,592.26	FAFH PC	1,946.21	30.70	1,885.98	2,006.43
Food Share	51.35%	0.07%	51.21%	51.49%	Food Share	49.80%	0.13%	49.55%	50.06%
FAH Share	47.12%	0.08%	46.96%	47.27%	FAH Share	45.24%	0.14%	44.97%	45.50%
FAFH Share	4.24%	0.03%	4.18%	4.30%	FAFH Share	4.57%	0.04%	4.48%	4.65%
With FAFH	67.03%	0.23%	66.57%	67.49%	With FAFH	71.66%	0.37%	70.94%	72.37%

		Linearized					Linearized		
2009	Mean	Std. Err.	[95% Conf. Interval]		2012	Mean	Std. Err.	[95% Conf. Interval]	
Totex PC	43,237.54	645.44	41,971.96	44,503.13	Totex PC	47,751.64	708.89	46,361.70	49,141.58
Food	74,808.35	608.71	73,614.80	76,001.90	Food	82,499.84	677.96	81,170.56	83,829.12
FAH	64,163.01	428.64	63,322.53	65,003.49	FAH	68,000.98	441.50	67,135.32	68,866.63
FAFH	10,645.34	228.89	10,196.54	11,094.14	FAFH	14,498.86	297.31	13,915.92	15,081.81
Food PC	17,554.29	151.26	17,257.68	17,850.89	Food PC	19,549.65	165.72	19,224.73	19,874.58
FAH PC	15,127.46	107.40	14,916.86	15,338.05	FAH PC	15,991.84	106.15	15,783.70	16,199.98
FAFH PC	2,426.83	56.38	2,316.27	2,537.39	FAFH PC	3,557.81	76.32	3,408.17	3,707.45
Food Share	50.82%	0.18%	50.47%	51.16%	Food Share	51.18%	0.18%	50.81%	51.54%
FAH Share	45.89%	0.22%	45.46%	46.31%	FAH Share	44.56%	0.23%	44.11%	45.01%
FAFH Share	4.93%	0.07%	4.79%	5.07%	FAFH Share	6.61%	0.08%	6.45%	6.78%
With FAFH	75.43%	0.47%	74.51%	76.36%	With FAFH	89.61%	0.33%	88.96%	90.25%

Table 2. *Weighted Mean Consumption per Household and Per Capita of Total Food, FAH, FAFH and Incidence of FAFH, by Survey Rounds 2003 – 2012*

Weighted Mean	2003	2006	2009	2012
Total Expenditure Per Capita	29,610.19	35,475.63	43,237.54	47,751.64
Food Consumption per HH	53,289.58	60,887.04	74,808.35	82,499.84
FAH Consumption per HH	46,598.46	52,321.92	64,163.01	68,000.98
FAFH Consumption per HH	6,691.12	8,565.12	10,645.34	14,498.86
Food Consumption Per Capita	12,304.94	14,056.59	17,554.29	19,549.65
FAH Consumption Per Capita	10,748.53	12,110.39	15,127.46	15,991.84
FAFH Consumption Per Capita	1,556.41	1,946.21	2,426.83	3,557.81
Budget Share for Food	51.35%	49.80%	50.82%	51.18%
Budget Share for FAH	47.12%	45.24%	45.89%	44.56%
Budget Share for FAFH	4.24%	4.57%	4.93%	6.61%
Percent of HHs with FAFH	67.03%	71.66%	75.43%	89.61%

Table 3. *Annual Growth of Selected Variables Over the Period 2003-2012*

Period	Totex per capita	Food per capita	FAH per capita	FAFH per capita	Food Per HH	FAH Per HH	FAFH per HH
2003	29,610	12,305	10,749	1,556	53,290	46,598	6,691
2012	47,752	19,550	15,992	3,558	82,500	68,001	14,499
Annual Growth	5.31%	5.14%	4.41%	9.19%	4.86%	4.20%	8.59%

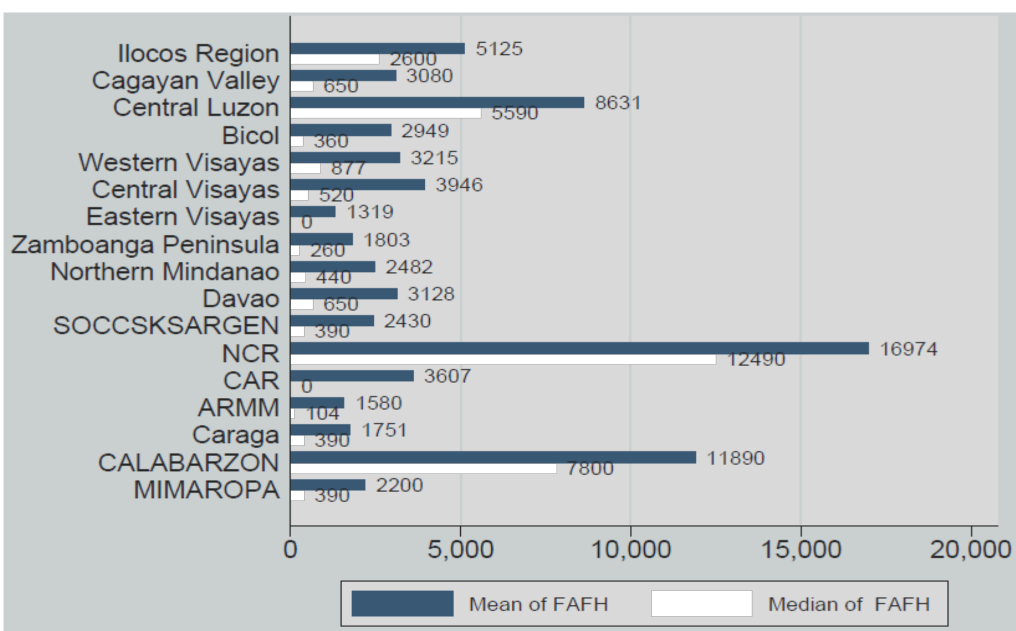

Figure 3. *Regional design consistent mean and median FAFH consumption, 2003.*

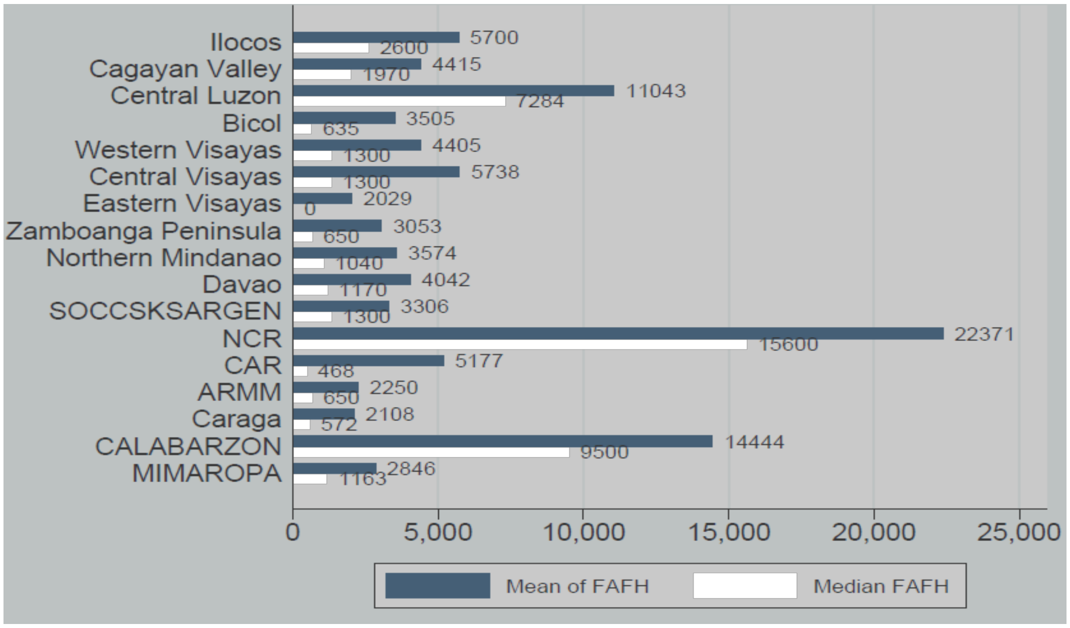

Figure 4. *Regional design consistent mean and median FAFH consumption, 2006.*

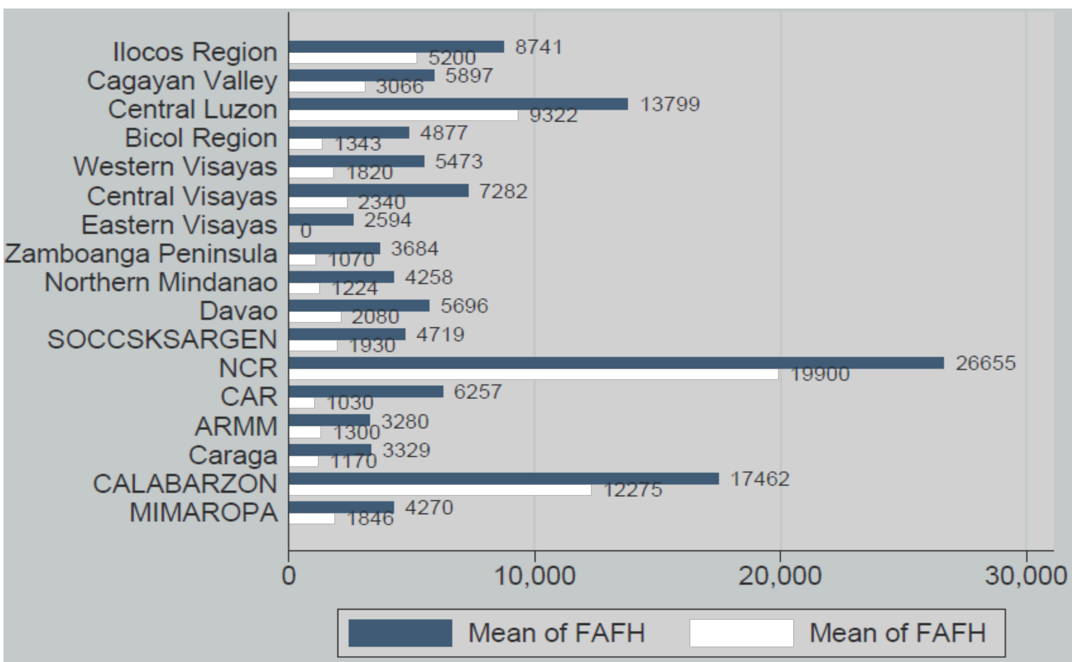

Figure 5. *Regional design consistent mean and median FAFH consumption, 2009.*

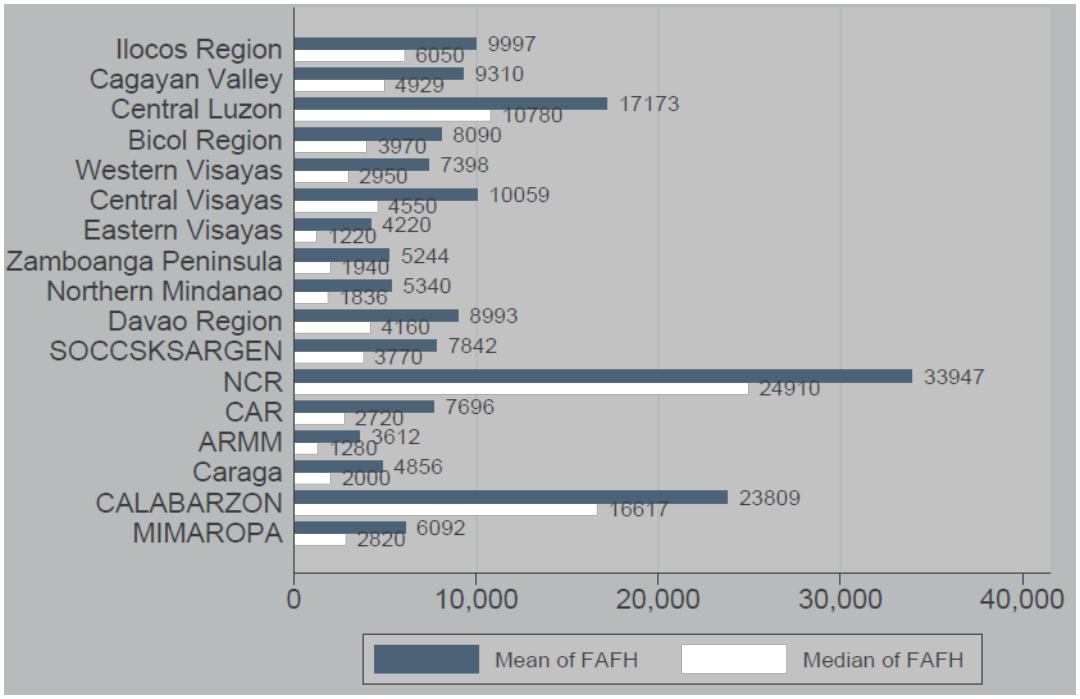

Figure 6. *Regional design consistent mean and median FAFH consumption, 2012.*

shares, design consistent statistics on the per capita total household expenditure, total food expenditure, FAH, and FAFH, as well as the per household average expenditures on food, FAH, and FAFH. These statistics for the different FIES rounds are pictorially presented in Figure 2. Based on the data presented in Table 2, FAFH per capita registered the highest continuously compounded[1*] annual growth at 9.19% over the period 2003-2012, followed by FAFH per household at 8.59% per year. FAH per household is growing at the slowest pace at 4.20% per year, followed by FAH per capita at 4.41% per annum. The remarkable growth in FAFH consumption and the slower rate of increase in FAH consumption by Filipino households suggest convergence in the consumption incidences of these food categories.

The regional weighted mean and median consumption of FAFH per household are presented graphically for the years 2003, 2006, 2009, and 2012 by Figure 3 to Figure 6 respectively. These graphs highlight the importance of the differences in regional location of the households in explaining the variations in FAFH consumption, the more progressive and urbanized the region, the higher the expenditure of food away from home (FAFH) by the households. This phenomenon is heavily supported in the literature (e.g. Ma et al., 2006; McCracken & Brandt, 1987; Nayga & Capps, 1992).

Design Consistent Stylized Facts of Variables Used in the Empirical Models

Presented in Table 3 are the tabulated summary statistics on the variables used in the different models used in the empirical analysis over the FIES rounds. The readers can glean from this table the average intensity of each variable across survey rounds. The figures are design consistent averages generated by the SVY mean command of Stata software. Particularly revealing are the monotonically increasing consumption incidence of FAFH, purchasing power (average household income and number of employed members), as well as the age (average age of household head) and education profiles (proportion of households headed by at least high school graduate) of households over the years. On the other hand, the proportions of male headed households and married household heads are on a monotone decline. Other stylized facts appear to be almost stationary over the time span 2003 – 2012, with subtle dynamic variations.

Table 3 . *Design Consistent Stylized Facts of Variables Used in Analysis*

Variables	2003	2006	2009	2012
Budget Share of FAFH	4.24%	4.57%	5.06%	6.61%
Consumption Incidence of FAFH	67.03%	71.66%	76.74%	89.61%
Family Size	4.82	4.82	4.84	4.69
Total HH Income	147,888	172,730	207,506	234,615
Sex of HHH (Male=1)	83.29%	81.33%	80.46%	77.29%
Age of HHH	46.20	48.44	49.36	50.82
HHH is Single	4.04%	3.94%	3.71%	4.63%
HHH is Married	81.30%	80.04%	79.43%	75.54%
HHH is at least HS Graduate	42.99%	44.07%	45.97%	47.70%
Number of Employed HH Members	1.71	1.77	1.89	1.98
Wife is Employed	36.45%	40.01%	41.97%	41.45%
Poor HH (regdcl<=2)	20.00%	20.00%	19.15%	20.00%
One Member HH	4.24%	4.66%	3.78%	5.69%
Ilocos Region	5.32%	5.44%	5.26%	5.16%
Cagayan Valley	3.56%	3.56%	3.54%	3.60%
Central Luzon	10.99%	10.97%	10.79%	11.14%
Bicol Region	5.74%	5.80%	5.83%	5.44%
Western Visayas	7.68%	7.87%	7.83%	7.49%
Central Visayas	7.38%	7.43%	7.48%	7.36%
Eastern Visayas	4.58%	4.68%	4.69%	4.21%
Zamboanga Peninsula	3.56%	3.58%	3.69%	3.60%
Northern Mindanao	4.49%	4.53%	4.62%	4.56%
Davao Region	4.92%	4.83%	4.84%	5.03%
Soccksargen	4.30%	4.30%	4.40%	4.61%
Metro Manila	13.91%	13.57%	13.27%	13.62%
CAR	1.70%	1.74%	1.71%	1.75%
ARMM	3.06%	3.07%	3.22%	2.60%
Caraga	2.52%	2.55%	2.56%	2.48%
CALABARZON	13.26%	12.93%	13.01%	14.39%
MIMAROPA	3.03%	3.13%	3.26%	2.98%

Results of the Tobit Estimation of Working-Leser Engel Curves

Survey design consistent estimates of the Tobit Working-Leser Engel curves for FAFH using the raw data files of the four rounds of FIES yielded four censored regression equations presented in Table 4. The same sets of regressors are applied in each model to assess the dynamic impact of the variables on households' budget share of FAFH. Gauging from the statistical significance, and the intuitive appeal of the algebraic signs of most estimated coefficients of the equations, one may prematurely claim the adequate fit of the Tobit censored regression model to the data of the different FIES rounds.

Examining the figures in Table 4, some interesting significant co-variations can be noted, other than those provided by the usual demand determinants like household's income level and size of the family. For one, locational attributes of the households appear to be the most significant predictors. The dummy variables for the highly urbanized regions of Metro Manila, Calabarzon, and Central Luzon deemed to provide the highest explanatory contribution to the budget share of FAFH for the average Filipino household. Although highly significant in all equations, the consistent positive algebraic sign of the coefficient of the log income variable signify the failure of the Tobit model to subscribe to the main prediction of Engel's Law (which is: "The higher the income of families, the

Table 4. *Working-Leser FAFH Engel Curves 2003-2012: Tobit Model*

FAFH Share Determinants	2003			2006			2009			2012		
	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value
Log of Income	0.01534	22.93	0.00000	0.01322	20.64	0.00000	0.01083	17.63	0.00000	0.00348	4.40	0.00000
Family Size	0.00252	12.24	0.00000	0.00298	14.73	0.00000	0.00337	17.65	0.00000	0.00259	12.25	0.00000
Age of HHH	0.00138	7.56	0.00000	0.00100	5.57	0.00000	0.00056	2.96	0.00300	-0.00082	-3.90	0.00000
Age of HHH squared	-0.00002	-11.77	0.00000	-0.00002	-10.09	0.00000	-0.00001	-7.40	0.00000	0.00000	1.19	0.23400
Sex of HHH (=1 Male)	0.00729	4.73	0.00000	0.00753	5.57	0.00000	0.00471	3.75	0.00000	0.00431	3.06	0.00200
HHH is Married	-0.02010	-11.86	0.00000	-0.01781	-11.43	0.00000	-0.01229	-8.54	0.00000	-0.01806	-11.68	0.00000
Wife is Employed	0.00136	1.56	0.11800	0.00079	0.92	0.35900	-0.00013	-0.16	0.87500	0.00562	6.27	0.00000
At Least HS Grad HHH	0.00357	3.92	0.00000	0.00320	3.64	0.00000	0.00434	5.19	0.00000	0.00373	3.87	0.00000
Number of Employed HH Members	0.00587	12.60	0.00000	0.00611	13.42	0.00000	0.00483	11.05	0.00000	0.00081	2.11	0.03500
One Member HH	0.01074	3.32	0.00100	-0.00232	-0.73	0.46600	-0.00087	-0.25	0.79900	0.03820	12.39	0.00000
Poor HH (regdc<=2)	-0.02060	-15.90	0.00000	-0.02066	-16.53	0.00000	-0.02066	-17.44	0.00000	-0.01435	-11.20	0.00000
Ilocos Region	0.03508	17.11	0.00000	0.01797	8.82	0.00000	0.02663	14.32	0.00000	0.02422	10.77	0.00000
Cagayan Valley	0.00549	2.63	0.00900	0.00509	2.61	0.00900	0.00686	3.76	0.00000	0.01729	7.19	0.00000
Central Luzon	0.04787	24.81	0.00000	0.03837	20.42	0.00000	0.04175	23.30	0.00000	0.04211	19.24	0.00000
Bicol Region	0.00864	4.12	0.00000	-0.00567	-2.86	0.00400	-0.00249	-1.33	0.18300	0.02174	9.72	0.00000
Western Visayas	0.01260	6.68	0.00000	0.00369	1.92	0.05500	-0.00093	-0.52	0.60100	0.00223	1.04	0.30000
Central Visayas	0.01248	6.26	0.00000	0.01179	5.90	0.00000	0.00713	3.94	0.00000	0.02263	9.78	0.00000
Eastern Visayas	-0.02338	-11.24	0.00000	-0.03057	-14.44	0.00000	-0.03156	-16.32	0.00000	-0.01098	-5.14	0.00000
Zamboanga Peninsula	0.00123	0.61	0.53900	-0.00416	-2.01	0.04400	-0.00621	-3.45	0.00100	-0.00311	-1.40	0.16200
Northern Mindanao	0.00231	1.16	0.24600	-0.00004	-0.02	0.98300	-0.01097	-5.98	0.00000	-0.00511	-2.32	0.02000
Davao Region	0.00793	3.93	0.00000	0.00235	1.17	0.24200	0.00172	0.93	0.35200	0.01478	6.48	0.00000
Soccksargen	0.00531	2.55	0.01100	0.00465	2.33	0.02000	0.00011	0.07	0.94700	0.01239	5.73	0.00000
Metro Manila	0.06701	34.60	0.00000	0.05845	30.01	0.00000	0.05752	34.39	0.00000	0.07447	34.95	0.00000
CAR	-0.00827	-3.53	0.00000	-0.01492	-6.51	0.00000	-0.02008	-9.72	0.00000	-0.01199	-5.74	0.00000
ARMM	-0.00260	-1.25	0.21300	-0.00352	-1.68	0.09200	-0.00489	-2.52	0.01200	-0.02238	-9.46	0.00000
Caraga	0.00345	1.77	0.07600	-0.01148	-5.99	0.00000	-0.01082	-5.94	0.00000	-0.01010	-4.53	0.00000
CALABARZON	0.06231	34.04	0.00000	0.05137	28.16	0.00000	0.05123	30.16	0.00000	0.06263	30.12	0.00000
Constant	-0.20340	-24.51	0.00000	-0.16026	-19.53	0.00000	-0.11662	-14.17	0.00000	0.01947	1.81	0.07000

Table 5. *Working-Leser FAFH Engel Curves 2003-2012: Craggit Model*

FAFH Share Determinants	2003			2006			2009			2012		
	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value
Log of Income	-0.00483	-1.92	0.05500	-0.00201	-0.90	0.36800	-0.00061	-0.38	0.70300	-0.01810	-3.46	0.00100
Family Size	-0.00328	-3.95	0.00000	-0.00120	-1.68	0.09300	0.00069	1.37	0.17100	0.00705	5.49	0.00000
Age of HHH	0.00223	3.20	0.00100	0.00340	4.97	0.00000	0.00080	1.53	0.12500	-0.00413	-3.39	0.00100
Age of HHH squared	-0.00003	-4.87	0.00000	-0.00004	-6.43	0.00000	-0.00002	-3.67	0.00000	0.00002	1.74	0.08200
Sex of HHH (=1 Male)	0.02328	4.54	0.00000	0.02189	5.05	0.00000	0.01405	4.51	0.00000	0.02203	3.00	0.00300
HHH is Married	-0.04505	-7.70	0.00000	-0.03752	-7.36	0.00000	-0.02282	-6.31	0.00000	-0.08577	-9.27	0.00000
Wife is Employed	-0.01038	-3.27	0.00100	-0.00900	-3.07	0.00200	-0.00655	-3.09	0.00200	0.02749	4.63	0.00000
At Least HS Grad HHH	-0.00158	-0.48	0.63300	-0.00022	-0.07	0.94100	0.00301	1.38	0.16800	0.01504	2.59	0.00900
Number of Employed HH Members	0.02646	14.07	0.00000	0.02568	15.27	0.00000	0.01770	14.93	0.00000	0.01413	5.91	0.00000
One Member HH	0.09978	9.39	0.00000	0.08785	8.10	0.00000	0.06599	6.86	0.00000	0.19824	12.39	0.00000
Poor HH (regdc<=2)	-0.04094	-7.66	0.00000	-0.04194	-8.44	0.00000	-0.03746	-10.28	0.00000	-0.04587	-5.67	0.00000
Ilocos Region	0.09963	7.28	0.00000	0.06197	5.65	0.00000	0.15603	14.59	0.00000	0.22557	8.85	0.00000
Cagayan Valley	0.03030	2.18	0.02900	0.00887	0.82	0.41400	0.10772	10.52	0.00000	0.25553	9.69	0.00000
Central Luzon	0.14055	10.29	0.00000	0.11272	10.70	0.00000	0.18452	16.69	0.00000	0.31619	11.52	0.00000
Bicol Region	0.03653	2.52	0.01200	-0.02415	-1.95	0.05100	0.08231	7.56	0.00000	0.13596	5.28	0.00000
Western Visayas	-0.00248	-0.18	0.85700	0.01022	0.92	0.35500	0.08811	8.27	0.00000	0.06988	2.72	0.00700
Central Visayas	0.05740	4.20	0.00000	0.04089	3.65	0.00000	0.10905	10.21	0.00000	0.18195	6.87	0.00000
Eastern Visayas	-0.14879	-6.49	0.00000	-0.12671	-6.86	0.00000	-0.00101	-0.08	0.94000	-0.24699	-6.11	0.00000
Zamboanga Peninsula	-0.12882	-6.51	0.00000	-0.08837	-5.65	0.00000	0.02785	2.45	0.01400	-0.04867	-1.60	0.10900
Northern Mindanao	-0.05534	-3.48	0.00100	-0.04754	-3.48	0.00000	0.02823	2.50	0.01200	-0.13700	-3.91	0.00000
Davao Region	-0.01279	-0.87	0.38500	-0.02846	-2.25	0.02400	0.07924	7.30	0.00000	0.14425	5.53	0.00000
Soccksargen	-0.01352	-0.88	0.38000	-0.02754	-2.28	0.02300	0.03810	3.68	0.00000	0.07817	3.09	0.00200
Metro Manila	0.17416	12.43	0.00000	0.17066	14.97	0.00000	0.20537	18.49	0.00000	0.41968	13.88	0.00000
CAR	-0.06781	-4.19	0.00000	-0.03982	-3.07	0.00200	0.07591	6.89	0.00000	-0.10669	-3.61	0.00000
ARMM	-0.13143	-6.92	0.00000	-0.16589	-9.52	0.00000	0.06926	6.37	0.00000	-0.01117	-0.41	0.68400
Caraga		Omitted			Omitted			Omitted		-0.13705	-3.88	0.00000
CALABARZON	0.16374	11.94	0.00000	0.13960	13.12	0.00000	0.19745	17.63	0.00000	0.38194	13.38	0.00000
MIMAROPA	-0.05004	-3.13	0.00200	-0.03740	-3.01	0.00300	0.05490	5.18	0.00000		Omitted	
Constant	-0.12668	-3.60	0.00000	-0.17693	-5.32	0.00000	-0.15288	-6.12	0.00000	-0.13474	-1.96	0.05000
LR stat (Ho: Tobit)		$\chi^2_9 = 2526.2$ (p<0.0000)			$\chi^2_9 = 2798.3$ (p<0.0000)			$\chi^2_9 = 2286.6$ (p<0.0000)			$\chi^2_9 = 4870.1$ (p<0.0000)	

lower proportion of their income devoted to food") in all survey rounds. The so-called "age cohort-effect" (Rentz, Reynolds, & Stout, 1983)—the concavity of the Engel curve with respect to age of household head, ceteris paribus, is not met consistently in all equations; as well as the significance of the coefficients of variables indicating time constraints of household managers (e.g. Wife is Married, One-member household). These subtle observations may put some doubts on the empirical validity of the estimated Tobit equations.

Results of the Craggit Estimation of Working-Leser Engel Curves

When the Cragg double hurdle model confronts the data of the four waves of FIES, the MLE estimated Craggit Working-Leser Engel curves exhibited in Table 5 took shape. In terms of statistical adequacy, the equations appear to be quite good, especially that of 2012, as most estimated coefficients are statistically significant with intuitive algebraic signs. All equations apparently adhere to main precept of Engel's Law, as all log income coefficient estimates are negative, although 2003 and 2009 estimates are insignificant. The age-cohort effect (Rentz, et al., 1983) is manifested by the concavity of the curves with respect to age in 2003, 2006, and 2009 but in 2012 the curve becomes marginally convex (age coefficient is negative with $p < 0.005$, but age squared is positive with $p < 0.10$). This reversal in the quadratic effect of age of household head is not undesirable, but rather revealing of a behavioral shift when analyzed closer. Prior to 2012, budget share for FAFH increases as household head becomes older until a certain age, after which the allotment declines. In 2012, the situation was reversed.

Empirically speaking, is the Craggit Engel curve model an improvement of the Tobit model? The answer is a resounding "yes", as gleaned from the results of the likelihood ratio tests also shown in Table 5 where all of the Chi-squared statistics for the test in all survey periods produced highly significant computed values based on the maximized log likelihood of both the Tobit and the Craggit models. These results overwhelmingly rejected the single hurdle data generating process assumption concerning the decisions to "eat out" and consume positive amount of FAFH which underlie the Tobit model, in favor of the Craggit's independent hurdles alternative.

Results of the Heckman Estimation of Working-Leser Engel Curves

Because of the inherent sample selection problem surrounding the implementation of the FAFH Engel curve, the Heckman model described in the methodology section is used in estimating four Working-Leser models for the four FIES survey rounds. These estimated equations are presented in Table 6. In examining the tabulated summary, one may be fascinated by the excellent empirical fit, particularly for the 2012 Engel curve. Only the coefficient estimates for regional dummy variables Zamboanga Peninsula and ARMM are not statistically significant, the rest are not only significant, but also with plausible algebraic signs with a lot of intuitive appeal. The most satisfactory results of the Heckit are the negative and highly significant estimates for the coefficients of log income in all survey rounds, implying the empirical validity of Engel's Law for FAFH during the modern period. The significant "age-cohort effect" was also noted, as evidenced by the highly significant quadratic coefficients on age squared on all time periods. The reversal from concavity to convexity in 2012 of this effect noted in the Craggit model was also noted in the Heckit model which one can put as: "budget allocation for FAFH decreases as the household head becomes older, up to a certain age, after which it increases*"*. The commercial, marketing management, nutritional and economic implications of this behavioral shift may be enormous value when put to finer focus.

Both the Craggit and the Heckit models involve two different hurdles, or two different equations, respectively associated with the participation in consumption, and determination of how much to consume. The only difference between the two hurdle processes underlying the two models is the hurdles independence in the Craggit and hurdles dependence in the Heckit. Hence, the way to check which model is better is to formally test the hypothesis of hurdles independence. The LR test for independent equations is the STATA default for this purpose. The computed LR statistics for all FIES rounds are also presented in Table 6. The extreme significance ($p<0.00001$) of these statistics indicate sound rejection of the hypothesis of hurdles independence to indicate the empirical ascendancy of the Heckman sample selection (Heckit) model for each of the Engel curves underlying the budget formation for FAFH in each

Table 6 . *Working-Leser FAFH Engel Curves 2003-2012: Heckit Sample Selection Model*

FAFH Share	2003			2006			2009			2012		
Determinants	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value	Coeff.	t-value	p-value
Log of Income	-0.00215	-3.41	0.00100	-0.00132	-2.23	0.02600	-0.00137	-2.40	0.01600	-0.00290	-3.83	0.00000
Family Size	-0.00107	-5.17	0.00000	-0.00048	-2.43	0.01500	0.00001	0.06	0.95400	0.00100	4.71	0.00000
Age of HHH	0.00045	2.50	0.01300	0.00076	4.39	0.00000	0.00019	1.06	0.28900	-0.00084	-4.03	0.00000
Age of HHH squared	-0.00001	-4.27	0.00000	-0.00001	-6.08	0.00000	-0.00001	-3.16	0.00200	0.00000	2.36	0.01800
Sex of HHH (=1 Male)	0.00715	4.82	0.00000	0.00692	5.39	0.00000	0.00557	4.65	0.00000	0.00463	3.33	0.00100
HHH is Married	-0.01322	-7.98	0.00000	-0.01113	-7.34	0.00000	-0.00867	-6.21	0.00000	-0.01520	-9.90	0.00000
Wife is Employed	-0.00367	-4.37	0.00000	-0.00375	-4.60	0.00000	-0.00334	-4.26	0.00000	0.00400	4.50	0.00000
At Least HS Grad HHH	-0.00083	-0.93	0.35200	-0.00021	-0.25	0.80000	0.00087	1.08	0.27900	0.00235	2.45	0.01400
Number of Employed HH Members	0.00780	16.83	0.00000	0.00793	18.11	0.00000	0.00727	16.80	0.00000	0.00250	6.45	0.00000
One Member HH	0.03888	9.25	0.00000	0.03392	7.81	0.00000	0.03096	6.69	0.00000	0.04540	13.79	0.00000
Poor HH (regdc<=2)	-0.01039	-7.86	0.00000	-0.01073	-8.91	0.00000	-0.01253	-10.75	0.00000	-0.00740	-5.78	0.00000
Ilocos Region	0.02691	14.64	0.00000	0.01885	10.39	0.00000	0.02879	17.11	0.00000	0.02441	11.35	0.00000
Cagayan Valley	0.01162	6.50	0.00000	0.00717	4.36	0.00000	0.01222	7.68	0.00000	0.02934	12.80	0.00000
Central Luzon	0.03779	22.53	0.00000	0.03354	20.41	0.00000	0.04141	25.32	0.00000	0.04020	19.11	0.00000
Bicol Region	0.01303	6.77	0.00000	0.00226	1.31	0.19000	0.00589	3.42	0.00100	0.01285	5.92	0.00000
Western Visayas	0.00612	3.75	0.00000	0.00742	4.41	0.00000	0.00694	4.29	0.00000	0.00578	2.79	0.00500
Central Visayas	0.01699	9.45	0.00000	0.01402	7.70	0.00000	0.01259	7.48	0.00000	0.01857	8.22	0.00000
Eastern Visayas	-0.00918	-5.10	0.00000	-0.01011	-5.54	0.00000	-0.00870	-4.96	0.00000	-0.01394	-6.83	0.00000
Zamboanga Peninsula	-0.00611	-3.67	0.00000	-0.00581	-3.27	0.00100	-0.00406	-2.57	0.01000	-0.00297	-1.40	0.16100
Northern Mindanao	-0.00098	-0.58	0.56300	-0.00132	-0.74	0.46100	-0.00486	-3.05	0.00200	-0.00892	-4.21	0.00000
Davao Region	0.00422	2.39	0.01700	0.00092	0.52	0.60400	0.00469	2.75	0.00600	0.01338	6.03	0.00000
Soccksargen	0.00424	2.27	0.02300	0.00134	0.79	0.42700	-0.00345	-2.35	0.01900	0.00637	3.07	0.00200
Metro Manila	0.05068	30.59	0.00000	0.05698	33.51	0.00000	0.05254	34.76	0.00000	0.06619	32.25	0.00000
CAR	0.00650	3.00	0.00300	0.00555	2.78	0.00500	0.00334	1.80	0.07300	-0.00779	-3.98	0.00000
ARMM	-0.00019	-0.12	0.90700	0.00074	0.43	0.66800	0.00412	2.46	0.01400	0.00017	0.08	0.93500
Caraga	-0.00705	-4.40	0.00000	-0.01237	-8.13	0.00000	-0.00844	-5.26	0.00000	-0.00772	-3.66	0.00000
CALABARZON	0.04642	29.53	0.00000	0.04346	27.39	0.00000	0.04810	31.02	0.00000	0.05597	27.96	0.00000
Constant	0.05963	7.51	0.00000	0.04039	5.23	0.00000	0.05488	7.07	0.00000	0.10585	10.19	0.00000
Wald test of indep. Hurdles Ho: $\rho = 0$ (Craggit Model)	$\chi^2 = 35.03$ (p<0.0000)			$\chi^2 = 47.93$ (p<0.0000)			$\chi^2 = 66.45$ (p<0.0000)			$\chi^2 = 19.48$ (p<0.0000)		

Table 7. *Commodity Classification of FAFH Using the Estimated Income Elasticities for the Different Models*

FIES Survey Round/ Model	Average FAFH Share	Engel Curve Coeff. of ln(Income)	t-value	p-value	Working-Leser Income Elasticity	Commodity Classification of FAFH
Tobit Model						
2003	0.036308	0.01534	22.93000	0.00000	1.42250	Luxury
2006	0.041559	0.01322	20.64000	0.00000	1.31810	Luxury
2009	0.044584	0.01083	17.63000	0.00000	1.24291	Luxury
2012	0.059527	0.00348	4.40000	0.00000	1.05846	Luxury
Craggit Model						
2003	0.036308	-0.00483	-1.92000	0.05500	n/a	Independent
2006	0.041559	-0.00201	-0.90000	0.36800	n/a	Independent
2009	0.044584	-0.00061	-0.38000	0.70300	n/a	Independent
2012	0.059527	-0.01810	-3.46000	0.00100	0.69594	Necessity
Heckit Model						
2003	0.036308	-0.00215	-3.41000	0.00100	0.94078	Necessity
2006	0.041559	-0.00132	-2.23000	0.02600	0.96824	Necessity
2009	0.044584	-0.00137	-2.40000	0.01600	0.96927	Necessity
2012	0.059527	-0.00290	-3.83000	0.00000	0.95128	Necessity

sample period of FIES. For all intents and purposes, the results of Heckit model should be used in policy formulation, prediction and analysis of the pattern of modern Filipino households' consumption decision and budget formation on food consumed away from home (FAFH). As a final summary table, Table 7 featuring the predictions of the three limited dependent variable models for FAFH consumption of households, highlighting on the estimated income elasticities which adequately establish FAFH or "eating-out" as a "necessity" item in the consumption basket of modern Filipino households.

Concluding Remarks

Consumption incidence of food away from home (FAFH) among Filipino households has been increasing monotonically over the years, reaching an all-time high of 89.61% of all households in 2012. Per capita consumption of FAFH is also on the uptrend at an annual clip of 9.91%, compared to the increase of just 4.41% per year on per capita expenditure of food consumed at home (FAH). These statistics are testament to the phenomenon of changing consumer preferences resulting in a remarkable shift in food consumption patterns, particularly in the cities and highly urbanized locales. Despite the economic and commercial importance of food consumption away from home, very limited attempt has been made to investigate the evolution and economics of this type of food consumption among Filipinos over time. This study attempts to bridge this gap in the literature by doing a comprehensive analysis of this emerging development using the four most recent public use files of the FIES, aiming to establish the stylized facts and the significant drivers of this phenomenon. A value added feature of the study is the use of survey design compliant procedures in all estimation and inferences conducted to avoid misleading results.

The outcomes of the study confirm the significant co-variation of FAFH consumption in the most recent period (2012) with the traditional food demand determinants like household income, family size, age composition; household head's demographics like education and marital status. Usual demand predictors, however, like age and gender are insignificant determinants. Interestingly, non-traditional factors like employment status of the homemaker (wife), single member status of the household head, and number of employed members contribute significant explanatory influence on FAFH consumption. This empirical result confirms the validity of the household production and consumption theory due to Becker (1965). Over-all, the most powerful drivers of the phenomenon proved to be the locational characteristics of the household captured by the regional dummy variables, with the indicator variables for Metro Manila, Calabarzon, and Central Luzon appear to be the strongest drivers.

The empirical verification by the study that FAFH is a necessity item in the food basket of modern Filipino household also confirms the validity of the principal prediction of the Engel's Law to FAFH. The results of the study may be used as the basis of predicting the increasing role of FAFH in shaping the consumption behavior and budget formation of modern Filipino families, thus offering important insights with valuable commercial, health and economic implications.

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