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The Pattern of Consumption for Food Away From Home (FAFH) of Modern Filipino Households

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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, etc., 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 may be a steady convergence of the proportion of food eaten at home (FAH) and the proportion of food eaten away from home (FAFH).

The issue of the increasing importance of FAFH has not been a priority area among local researchers and policy makers as there is an obvious dearth of research studies, executive and legislative concerns related to it.

This apparent oversight induced the researcher to propose a study that will empirically and analytically examine available nationwide household survey data (Family Income and Expenditure Survey [FIES]) undertaken 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 in spending on food 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 growing convergence between 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 household decision in allocating budget for FAFH;
4. To examine the continued relevance (or statistical regularity) of the theoretical predictions of Engel's law on FAFH during the modern era; and,
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*, etc.

Review of Literature

Empirical research on consumption of food away from home (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 and 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: e.g., Byrne et al., 1998; Binkley, 2008; McCraken & Brandt, 1987; Guthrie et al., 2002; in Malaysia: e.g., Tey et al., 2009; Radam et al., 2006; in China: e.g., Ma et al., 2005; Min et al., 2004; and Fang & Beghin, 2002; in Spain: e.g., Molina, 1994, and Manrique & Jensen, 1998).

Almost all of the published works on FAFH employ large-scale household survey data; however, the researcher did not find any study in the literature searched that employed survey-design-consistent estimation techniques, as well as the existence of any study that features the Philippines.

Much of the early literature on FAFH has been descriptive in nature, e.g., 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; Kinsey, 1980; Capps, Jr., et al., 1985; 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 selectivity bias or other techniques like count and duration models when frequency of FAFH incidence during the reference period is being modeled (e.g., Dong et al., 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; Shonkwiler & Yen, 1999). However, estimation biases may still linger when the complexity of the sampling design of the underlying survey is ignored (Deaton, 1997; Heeringa et al., 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 et al., 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 the 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 our 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 inference vis-à-vis 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 the proponent 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, pp. 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 softwares, this procedure is theoretically flawed when complex design was used in the survey (Deaton, 1997).

The main data source of the study, the FIES in particular employs a multistaged 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 different probabilities of inclusion in the sample. As such, there is a need to take into consideration the use of sampling weights (sometimes called raising factors), which represent the inverse of the selection probabilities for each sample element (Cochran, 1977).

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, and nontraditional 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., Kinsey, 1980; Capps, Jr., et al., 1985; Prochaska & Schrimper, 1973; Redman, 1980; McCracken & Brandt, 1987).

Empirical Strategy

In this study, two alternative empirical modeling frameworks are to be implemented to operationalize the household production theory in the context of household demand for FAFH. The first model (Tobit model) presumes the household as a utility maximizing entity subject to both budget and time limitations and makes a one-time decision of simultaneously deciding to consume FAFH and determining the amount to be consumed, with the Tobin (1958) maximum likelihood procedure as the basis of parameter estimation. The second is anchored on the framework originally proposed by Cragg (1971) that consumption of items with less than perfect consumption incidence like FAFH is a double-hurdle process of deciding to consume and how much to consume. The framework of Tobin attributed zero consumption to consumers' attributes alone, not on the infrequency

of purchases, which may be due to other reasons (e.g., abstention, budget restriction, under reporting). When considered as a double-hurdle process, the Tobit model presupposes the same set of explanatory factors in both the decisions to consume (the first hurdle) and how much to consume (the second hurdle). In the case of the double-hurdle process of Cragg, the sets of explanatory variables for the first and the second hurdles are not constrained to be the same (Cameron & Trivedi, 1998). In order to observe positive consumption, both hurdles must be surmounted. When one assumes that the two hurdle processes are dependent, the original model of Cragg (1971) may not be appropriate for use in the present study, but instead, the framework proposed by Heckman (1979), which also treats censoring as a sample selection issue addressed by the double-hurdle process, may be. Also, instead of estimating the FAFH demand equation in the second hurdle, the FAFH Engel curve under the Working–Leser specification is estimated.

Under the Heckman procedure (Heckman, 1979), the first hurdle (participation stage) uses the Probit model to determine the probability of the household to decide consuming FAFH, while the second hurdle (consumption stage) models the actual budget formation process through the Working–Leser specification of the FAFH Engel curve, augmented by a sample selection adjustment term generated in the participation stage. The Tobit and Heckman models differently address the sample selectivity issues surrounding the consumption of FAFH that may bias inferences to be made.

The Tobit Model (Tobin, 1958)

Prior to McCraken and Brandt (1987), studies involving empirical analyses of FAFH almost exclusively used single equation *ordinary least squares (OLS)* regression, which has been proven to be both *biased and inconsistent* because of the large number of households not consuming FAFH. The use of the Tobit model (also known as censored regression model) in FAFH analysis was pioneered by McCracken and Brandt (1987) to preclude this concern on OLS. The empirical form of the model is the usual regression specification (whose population regression function is supposedly a solution to the first order condition of the household's utility maximization problem subject to budget and time constraints, anchored on the theory of household production, outlined by Becker [1965]).

$$FAFH_h = \kappa_1 + \kappa_2 ' D_{1h} + \kappa_3 ' L_{1h} + \kappa_4 ' E_{1h} + u_h \quad (1)$$

where the household h^{th} *FAFH* consumption is left censored at zero for households who do not "eat out" as determined by vectors D_1 (*household's*

sociodemographic characteristics vector), L_1 (*household's geographical location vector*), and E_1 (*household's economic attributes vector*). The subscript of the attribute vectors pertain to the single-hurdle nature of the Tobit model. To account for this censoring, the Tobin (1958) maximum likelihood procedure (whose likelihood function is based on the censored normal distribution) is used in the parameter estimation.

The Heckman Model (Heckman, 1979)

In this model, it is presumed that consumption of FAFH is characterized by a two-stage decision process. The first stage is deciding whether or not to consume FAFH, called the participation stage. The next decision stage is in determining the budget share (or the proportion of income allocated) for the consumption of FAFH—the consumption stage. The Heckman model is employed in this study to implement the estimation of the FAFH Engel curve.

Stage 1. This is the so-called *participation stage*: Let $Y_h = 1$ if household *h* decides to consume FAFH, 0 if otherwise. The conditional probability

$$P(Y_h = 1 \mid \mathrm{D}_{ph}, \mathrm{L}_{ph}, \mathrm{E}_{ph}) = \Phi(\alpha + \lambda' \mathrm{D}_{ph} + \gamma' \mathrm{L}_{ph} + \delta' \mathrm{E}_{ph}) \qquad (2)$$

is the participation probability of the household *h* given its demographic, locational, and economic attributes. The Probit model is used to estimate the intercept α and the parameter vectors λ, γ, and δ via MLE with $\phi(.)$ and $\Phi(.)$ are the *pdf* (probability density function) and *CDF* (cumulative distribution function), respectively, of the standard normal curve. The inverse Mills ratio

$$MR_h = \phi(\hat{z}_h)\, \hat{\Phi}_h^{-1}(\hat{z}_h) \qquad (3)$$

with $\hat{z}_h = \hat{\alpha} + \hat{\lambda}' D_{ph} + \hat{\gamma}' L_{ph} + \hat{\delta}' E_{ph}$ (the estimated Probit index function value) is generated for each household to correct for the sample selectivity bias in the expenditure stage. The additional subscript *p* of the attribute vectors pertains to the "participation" stage.

Stage 2. This is the so-called *consumption stage*. Estimate the model

$$FAFHShare_h = \kappa_1 + \kappa_2' D_{ch} + \kappa_3' L_{ch} + \kappa_4' E_{ch} + \beta MR_h + u_h \qquad (4)$$

using GLS for all uncensored observations to come up with the estimated FAFH Engel curve equation using the Working–Leser functional specification. This stage features the augmentation of the Engel curve equation by the inverse Mill's ratio MR_h as an additional regressor to correct for the sample selectivity bias. The additional subscript c of the attribute vectors pertains to the "consumption" stage.

The Working–Leser Engel Curve Model

The traditional approach in estimating Engel curves using cross-section data is based on full-system parametric models that simultaneously consider the income expansion paths of all items in the consumption basket. 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 of these models 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 nonlinear 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 of j^{th} consumption item as a semi logarithmic function of household's income:

$$S_{hj} = \alpha_j + \zeta \log(Y_h) + u_{hj} \tag{5}$$

where S_{hj} is the budget share of the j^{th} item for the h^{th} household and Y_h is the income of the h^{th} household.

The relationship being represented by an Engel curve is that of consumption (budget allocation) and income. However, households' consumption patterns also respond to sociodemographic and geographic location (both regional and urbanization) of the households, hence specification (5) can be augmented as

$$S_{hj} = \alpha_j + \zeta \log(Y_{hj}) + \gamma_j^{'} X_{hj} + u_{hj} \tag{6}$$

with X_{hj} as the composite vector of sociodemographic, economic, and locational characteristics of the h^{th} household influencing the budget share for the j^{th} consumption item, with corresponding parameter column vector γ_j. The Working–Leser curve (6) is the specification implemented in Stage 2 of the Heckman procedure.

Working–Leser Elasticity Estimation

The income elasticity of FAFH consumption is the economic relationship coefficient of interest in this study. Using specification (6), this elasticity can be shown to be represented by the formula (see Rufino, 2013)

$$\hat{\varepsilon}_{S_{j|Y}} = \frac{\partial S_{hj}}{\partial Y_h}\frac{Y_h}{S_{hj}} = 1 + \frac{\hat{\zeta}}{\overline{S}_j} \tag{7}$$

The algebraic sign, as well as the magnitude of the income 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.

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 primary database of the study as it deems to represent the modern period. The raw data files of earlier rounds of FIES (2009, 2006, 2003) are also used to account for the dynamic nature of FAH and FAFH consumption. Sampling-design-consistent stylized facts on 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.

Empirical Results

Descriptive Statistics

Based on the 2012 FIES survey round, 89.61% of Filipino households consumed FAFH (from a figure of just 75.43% during the previous round of

2009). This pattern of consumption is noted to be monotonically increasing (67.03% in 2003 and 71.66% in 2006), which unmistakably represents 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 consumption at home (FAH), and food consumption away from home (FAFH).

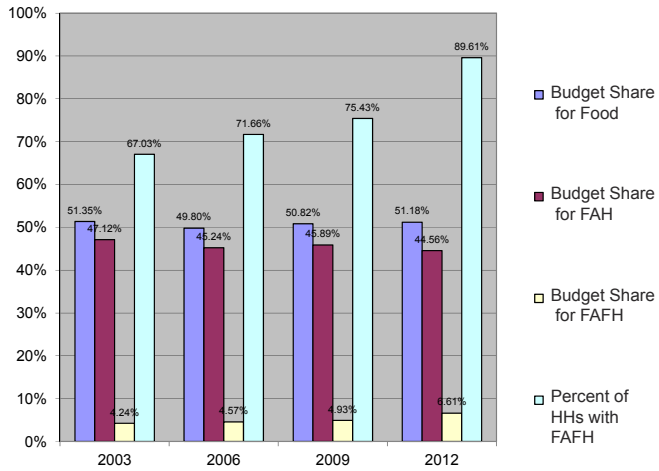

Figure 1. Evolution of budget shares of FOOD, FAH, FAFH, and proportion of households with FAFH, Philippines: 2003, 2006, 2009, and 2012.

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 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 incidence of these food categories.

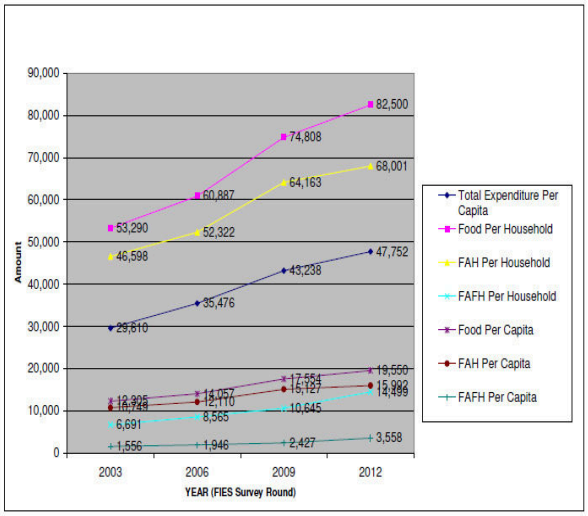

Figure 2. Weighted mean estimates of the food, FAH, and FAFH expenditures per household and per capita figures on total, food, FAH, and FAFH Expenditures, Philippines: 2003, 2006, 2009, and 2012.

The regional weighted mean and median consumption of FAFH per household are presented graphically for the years 2003, 2006, 2009, and 2012 by Figures 3 to 6. 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 FAFH by the households. This phenomenon is heavily supported in the literature (e.g., Ma et al., 2006; McCracker & Brandt, 1987; Nayga & Capps, Jr., 1992).

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

2003	Mean	Linearized Standard Error	95% Confidence Interval		2006	Mean	Linearized Standard Error	95% Confidence 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%
2009	Mean	Linearized Standard Error	95% Confidence Interval		2012	Mean	Linearized Standard Error	95% Confidence 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 household	53,289.58	60,887.04	74,808.35	82,499.84
FAH consumption per household	46,598.46	52,321.92	64,163.01	68,000.98
FAFH consumption per household	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 households with FAFH	67.03%	71.66%	75.43%	89.61%

Table 3. Annual Growth Rates (per Capita and per Household) of Total Expenditure and Food (Total and Consumed at Home and Away From Home)

Period	Totex per Capita	Food per Capita	FAH per Capita	FAFH per Capita	Food per Household	FAH per Household	FAFH per Household
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%

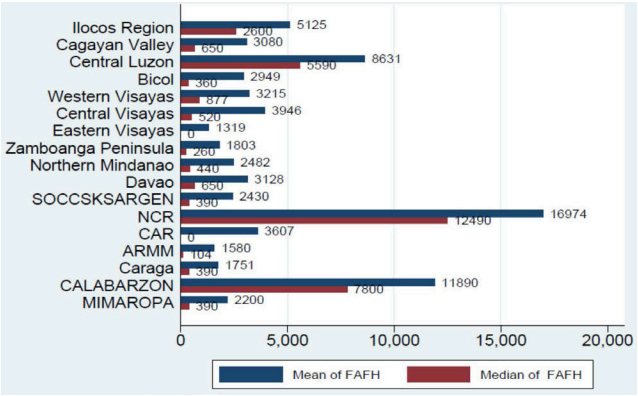

Figure 3. Regional Design-consistent Mean and Median FAFH Consumption, 2003.

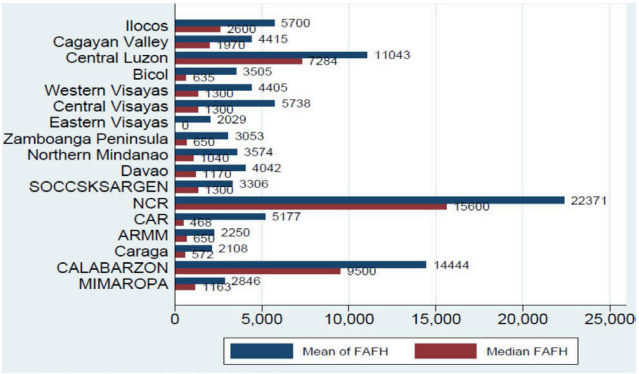

Figure 4. Regional Design-consistent Mean and Median FAFH Consumption, 2006.

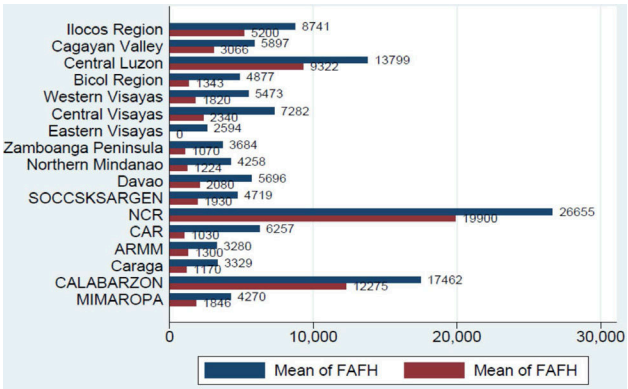

Figure 5. Regional Design-consistent Mean and Median FAFH Consumption, 2009.

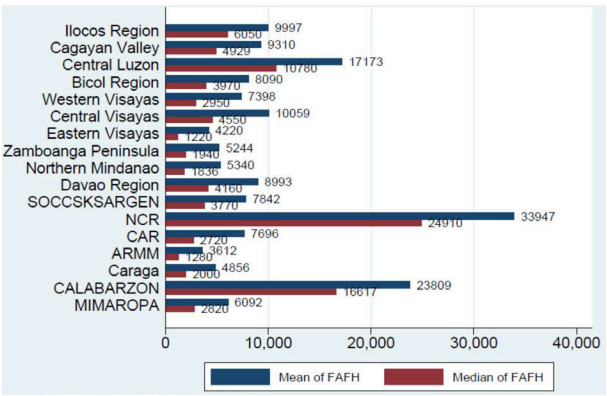

Figure 6. Regional Design-consistent Mean and Median FAFH Consumption, 2012.

Results of Tobit Modeling

Survey design-consistent estimates of the Tobit models for FAFH using the raw data files of the four rounds of FIES yielded four censored regression equations presented in Tables 4 to 7. The same sets of regressors are applied in each model to assess the dynamic impact of the variables on households' consumption of FAFH. The stylized facts on these variables are presented in Tables 8 and 9. These descriptive statistics are design-consistent and hence can be considered as unbiased and consistent estimates of their counterparts in the population. Interesting insights can be gleaned from these figures; for example, household purchasing power (income per household) is ever increasing over time by **5.13%** per year across survey rounds, reaching its peak at P234,615 per household in 2012 from P147,888 in 2003. Also worthwhile to note is the aging profile of household heads—from 46.2 years average in 2003 to 50.82 years in 2012, for an aging rate of about **1.06%** per year. Other stylized facts appear to be almost stationary over the time span of 2003–2012, with subtle dynamic variations.

Looking at Table 4, which presents the estimated Tobit model of FAFH consumption using the most recently available FIES raw data, the estimated demand equation for FAFH for the modern Filipino households takes shape. Some interesting significant covariations can be noted, other than those provided by the usual demand determinants like the 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 were deemed to provide the highest explanatory contribution to the level of FAFH consumption of the average Filipino household with respective marginal contributions of P21,029, P15,169, and P9,087 (all at $p < 0.0001$). When interpreted, FAFH consumption by the typical Metro Manila household is on the average P21,029 higher than that of Eastern Visayas (the benchmark region). Remarkably, some household demographics failed to produce significant explanatory impact, for instance, gender ($p > 0.90$) and age ($p > 0.35$) of the household head.

Table 4. Design-Consistent Tobit Censored Regression of FAFH Consumption, 2012

FAFH	Coefficient	Linearized Standard Error	*t*-Value	*p*-Value	95% Confidence Interval	
					Lower Limit	Upper Limit
Total income	0.0370	0.0033	11.2400	0.0000	0.0305	0.0434
Family size	1,265.2300	153.7054	8.2300	0.0000	963.8571	1,566.6020
Sex (male = 1)	32.3844	417.1206	0.0800	0.9380	-785.4701	850.2389

Table 4 continued...

Age of household head	-42.5935	45.6556	-0.9300	0.3510	-132.1111	46.9241
Age squared	-0.4479	0.4486	-1.0000	0.3180	-1.3275	0.4316
Single household head	1,094.5960	570.0172	1.9200	0.0550	-23.0454	2,212.2370
Married household head	-1,910.1060	479.5258	-3.9800	0.0000	-2,850.3190	-969.8925
College grad household head	2,228.2270	363.2000	6.1300	0.0000	1,516.0960	2,940.3590
Employed members	992.1206	146.1351	6.7900	0.0000	705.5915	1,278.6500
Wife is employed	866.0623	299.2714	2.8900	0.0040	279.2764	1,452.8480
Middle-income household	4,472.1590	652.3210	6.8600	0.0000	3,193.1440	5,751.1740
One-member household	1,366.7040	502.9226	2.7200	0.0070	380.6166	2,352.7920
Number of children	384.0957	121.2075	3.1700	0.0020	146.4424	621.7489
Ilocos Region	4,047.2410	689.3270	5.8700	0.0000	2,695.6680	5,398.8150
Cagayan Valley	2,561.7050	764.7166	3.3500	0.0010	1,062.3130	4,061.0960
Central Luzon	9,087.1060	756.2521	12.0200	0.0000	7,604.3110	10,569.9000
Bicol Region	5,253.5790	659.5368	7.9700	0.0000	3,960.4160	6,546.7430
Western Visayas	900.1818	786.0743	1.1500	0.2520	-641.0856	2,441.4490
Central Visayas	4,522.1290	718.9115	6.2900	0.0000	3,112.5480	5,931.7090
Zamboanga Peninsula	905.0703	668.1206	1.3500	0.1760	-404.9236	2,215.0640
Northern Mindanao	-117.6918	665.2091	-0.1800	0.8600	-1,421.9770	1,186.5940
Davao Region	3,517.7100	759.5009	4.6300	0.0000	2,028.5450	5,006.8740
Soccsksargen	4,247.9510	662.4926	6.4100	0.0000	2,948.9920	5,546.9100
Metro Manila	21,028.5600	847.9085	24.8000	0.0000	19,366.0500	22,691.0600
CAR	-2,300.3100	901.9050	-2.5500	0.0110	-4,068.6880	-531.9316
ARMM	-2,957.9820	1,229.5960	-2.4100	0.0160	-5,368.8680	-547.0950
Caraga	-1,003.1770	694.4416	-1.4400	0.1490	-2,364.7790	358.4248
CALABARZON	15,169.2400	762.1959	19.9000	0.0000	13,674.8000	16,663.6900
MIMAROPA	684.0354	625.6325	1.0900	0.2740	-542.6515	1,910.7220
_Intercept	-10,843.0100	1,407.3950	-7.7000	0.0000	-13,602.5100	-8,083.5140
/sigma	18,100.4100	535.3381	33.8100	0.0000	17,050.7700	19,150.0600

Table 5. Design-Consistent Tobit Censored Regression of FAFH Consumption, 2009

FAFH	Coefficient	Linearized Standard Error	*t*-Value	*p*-Value	95% Confidence Interval	
					Lower Limit	Upper Limit
Total income	0.0147	0.0007	20.7900	0.0000	0.0133	0.0161
Family size	2,170.7560	66.7960	32.5000	0.0000	2,039.7820	2,301.7300
Sex (male = 1)	490.3256	348.7996	1.4100	0.1600	-193.6028	1,174.2540
Age of household head	216.8734	46.2744	4.6900	0.0000	126.1382	307.6085
Age squared	-3.3308	0.4539	-7.3400	0.0000	-4.2207	-2.4409
Middle income	8,854.0470	239.8894	36.9100	0.0000	8,383.6700	9,324.4240
Single household head	-709.6474	621.1895	-1.1400	0.2530	-1,927.6800	508.3849
Married household head	-952.3312	370.9527	-2.5700	0.0100	-1,679.6980	-224.9648
College grad household head	9,256.1340	626.2624	14.7800	0.0000	8,028.1550	10,484.1100
Employed members	1,971.3450	177.0048	11.1400	0.0000	1,624.2730	2,318.4170
Wife is employed	-359.1273	251.8386	-1.4300	0.1540	-852.9339	134.6794
Ilocos Region	12,583.0300	1,157.5200	10.8700	0.0000	10,313.3500	14,852.7000
Cagayan Valley	8,384.3710	794.8501	10.5500	0.0000	6,825.8240	9,942.9180
Central Luzon	17,985.5000	802.9460	22.4000	0.0000	16,411.0700	19,559.9200
Bicol Region	6,127.4400	823.8880	7.4400	0.0000	4,511.9550	7,742.9250
Western Visayas	7,403.4990	806.1959	9.1800	0.0000	5,822.7050	8,984.2930
Central Visayas	9,093.5490	937.3606	9.7000	0.0000	7,255.5670	10,931.5300
Zamboanga Peninsula	5,680.1310	850.3557	6.6800	0.0000	4,012.7490	7,347.5140
Northern Mindanao	5,096.7270	862.4139	5.9100	0.0000	3,405.7010	6,787.7540
Davao Region	8,180.7130	844.4261	9.6900	0.0000	6,524.9570	9,836.4690
Soccsksargen	7,875.7430	784.6761	10.0400	0.0000	6,337.1450	9,414.3410
Metro Manila	29,585.1000	886.6207	33.3700	0.0000	27,846.6100	31,323.5900
CAR	4,468.2750	1,144.0230	3.9100	0.0000	2,225.0670	6,711.4840
ARMM	4,974.4040	961.1409	5.1800	0.0000	3,089.7930	6,859.0150
Caraga	4,700.3190	830.9683	5.6600	0.0000	3,070.9510	6,329.6870
CALABARZON	21,600.6100	818.4214	26.3900	0.0000	19,995.8500	23,205.3800
MIMAROPA	7,193.7350	812.5204	8.8500	0.0000	5,600.5400	8,786.9300
One-member household	-4,656.8960	637.5808	-7.3000	0.0000	-5,907.0680	-3,406.7240
Constant	-30,086.6300	1,447.4520	-20.7900	0.0000	-32,924.8100	-27,248.4600
/sigma	15,095.7500	458.3317	32.9400	0.0000	14,197.0500	15,994.4500

Table 6. Design-Consistent Tobit Censored Regression of FAFH Consumption, 2006

FAFH	Coefficient	Linearized Standard Error	*t*-Value	*p*-Value	95% Confidence Interval	
					Lower Limit	Upper Limit
Total income	0.0377	0.0036	10.4400	0.0000	0.0306	0.0448
Family size	1,256.7120	94.4159	13.3100	0.0000	1,071.5200	1,441.9040
Sex (male = 1)	716.7801	339.3820	2.1100	0.0350	51.1001	1,382.4600
Age of household head	272.0120	39.8864	6.8200	0.0000	193.7769	350.2471
Age squared	-4.0501	0.4051	-10.0000	0.0000	-4.8446	-3.2555
Middle income	4,078.8160	544.7310	7.4900	0.0000	3,010.3550	5,147.2780
Single household head	1,656.2360	595.2642	2.7800	0.0050	488.6563	2,823.8160
Married household head	-1,963.6020	385.2618	-5.1000	0.0000	-2,719.2730	-1,207.9310
College grad household head	2,684.7780	708.8483	3.7900	0.0000	1,294.4090	4,075.1470
Employed members	1,594.0190	126.3876	12.6100	0.0000	1,346.1160	1,841.9210
Wife is employed	-115.7145	204.3318	-0.5700	0.5710	-516.5006	285.0717
Ilocos Region	8,854.6530	689.1431	12.8500	0.0000	7,502.9350	10,206.3700
Cagayan Valley	6,468.1080	674.5849	9.5900	0.0000	5,144.9450	7,791.2710
Central Luzon	13,311.0900	655.3280	20.3100	0.0000	12,025.7000	14,596.4800
Bicol Region	4,787.2480	626.0253	7.6500	0.0000	3,559.3320	6,015.1640
Western Visayas	6,664.0280	645.1342	10.3300	0.0000	5,398.6310	7,929.4250
Central Visayas	7,922.9290	655.4177	12.0900	0.0000	6,637.3620	9,208.4970
Zamboanga Peninsula	4,980.4350	660.8816	7.5400	0.0000	3,684.1510	6,276.7200
Northern Mindanao	5,259.7980	633.1314	8.3100	0.0000	4,017.9440	6,501.6520
Davao Region	6,485.0660	618.5762	10.4800	0.0000	5,271.7610	7,698.3710
Soccsksargen	6,463.6590	667.1696	9.6900	0.0000	5,155.0410	7,772.2770
Metro Manila	20,970.9500	897.0803	23.3800	0.0000	19,211.3800	22,730.5300
CAR	2,970.0090	891.3031	3.3300	0.0010	1,221.7650	4,718.2540
ARMM	4,885.7640	788.3954	6.2000	0.0000	3,339.3680	6,432.1600
Caraga	3,943.2980	699.5532	5.6400	0.0000	2,571.1610	5,315.4350
CALABARZON	16,816.5300	668.5940	25.1500	0.0000	15,505.1200	18,127.9400
MIMAROPA	5,568.7020	638.3848	8.7200	0.0000	4,316.5430	6,820.8600
One-member household	-4,373.5720	577.0646	-7.5800	0.0000	-5,505.4540	-3,241.6900
Constant	-24,872.7600	1,277.3400	-19.4700	0.0000	-27,378.2000	-22,367.3300
/sigma	13,274.4800	354.0208	37.5000	0.0000	12,580.0800	13,968.8700

Table 7. Design-Consistent Tobit Censored Regression of FAFH Consumption, 2003

FAFH	Coefficient	Linearized Standard Error	*t*-Value	*p*-Value	95% Confidence Interval	
					Lower Limit	Upper Limit
Total income	0.0097	0.0041	2.3300	0.0200	0.0015	0.0178
Family size	1,543.8690	99.0877	15.5800	0.0000	1,349.6550	1,738.0830
Sex (male = 1)	86.9262	310.4721	0.2800	0.7790	-521.6054	695.4579
Age of household head	331.9857	34.1507	9.7200	0.0000	265.0496	398.9219
Age squared	-4.1184	0.3432	-12.0000	0.0000	-4.7911	-3.4457
Middle income	7,356.2580	572.7653	12.8400	0.0000	6,233.6270	8,478.8900
Single household head	1,885.7930	480.4296	3.9300	0.0000	944.1416	2,827.4450
Married household head	-1,414.5950	356.2326	-3.9700	0.0000	-2,112.8180	-716.3718
College grad household head	6,133.3570	868.8031	7.0600	0.0000	4,430.4850	7,836.2290
Employed members	1,347.2270	117.4668	11.4700	0.0000	1,116.9890	1,577.4640
Wife is employed	529.0588	190.6077	2.7800	0.0060	155.4639	902.6538
Ilocos Region	9,561.3910	411.0761	23.2600	0.0000	8,755.6740	10,367.1100
Cagayan Valley	5,050.8740	400.3563	12.6200	0.0000	4,266.1680	5,835.5810
Central Luzon	13,294.8500	484.7701	27.4300	0.0000	12,344.6900	14,245.0000
Bicol Region	4,552.3660	356.5618	12.7700	0.0000	3,853.4980	5,251.2350
Western Visayas	6,086.7290	360.9182	16.8600	0.0000	5,379.3220	6,794.1360
Central Visayas	6,023.5710	366.3830	16.4400	0.0000	5,305.4530	6,741.6890
Zamboanga Peninsula	3,590.2810	378.5854	9.4800	0.0000	2,848.2460	4,332.3160
Northern Mindanao	4,226.1280	355.9308	11.8700	0.0000	3,528.4970	4,923.7600
Davao Region	5,534.5600	379.4328	14.5900	0.0000	4,790.8640	6,278.2560
Soccsksargen	4,242.8490	363.4062	11.6800	0.0000	3,530.5650	4,955.1330
Metro Manila	21,629.5500	855.4234	25.2900	0.0000	19,952.9000	23,306.2000
CAR	4,081.9860	481.4697	8.4800	0.0000	3,138.2960	5,025.6770
ARMM	3,272.1200	384.6084	8.5100	0.0000	2,518.2800	4,025.9600

Caraga	4,245.0100	349.7451	12.1400	0.0000	3,559.5030	4,930.5180
CALABARZON	17,101.8200	578.3005	29.5700	0.0000	15,968.3400	18,235.3000
MIMAROPA	4,133.5290	371.0969	11.1400	0.0000	3,406.1710	4,860.8860
One-member household	-2,407.8310	495.3801	-4.8600	0.0000	-3,378.7860	-1,436.8760
Constant	-27,726.5900	1,325.0580	-20.9200	0.0000	-30,323.7300	-25,129.4500
/sigma	11,488.1600	425.9931	26.9700	0.0000	10653.21	12323.12

Table 8. Design-Consistent Means of the Variables Used in Tobit Censored Regressions, 2003–2012

2003	Mean	Linearized Standard Error	95% Confidence Interval		2006	Mean	Linearized Standard Error	95% Confidence Interval	
FAFH	6,691.12	65.87	6,562.02	6,820.23	FAFH	8,565.12	113.14	8,343.20	8,787.04
Total income	147,887.80	1,360.92	145,220.40	150,555.30	Total income	172,730.00	1,716.99	169,362.30	176,097.80
Family size	4.82	0.01	4.79	4.84	Family size	4.82	0.01	4.79	4.85
Age of household head	46.20	0.07	46.06	46.35	Age of household head	48.44	0.09	48.26	48.61
Age squared	2,337.56	7.42	2,323.01	2,352.10	Age squared	2,543.00	9.28	2,524.79	2,561.21
Sex (male = 1)	0.8329	0.0020	0.8290	0.8367	Sex (male = 1)	0.8133	0.0022	0.8090	0.8175
Single household head	0.0404	0.0010	0.0383	0.0424	Single household head	0.0394	0.0012	0.0372	0.0417
Married household head	0.8130	0.0020	0.8090	0.8170	Married household head	0.8004	0.0023	0.7958	0.8049
Wife is employed	0.3645	0.0025	0.3596	0.3694	Wife is employed	0.4001	0.0031	0.3939	0.4063
Middle income	0.6000	0.0025	0.5950	0.6050	Middle income	0.6000	0.0039	0.5924	0.6076
College-educated household head	0.0995	0.0016	0.0964	0.1025	College-educated household head	0.1049	0.0024	0.1002	0.1095
Employed members	1.7148	0.0053	1.7045	1.7252	Employed members	1.7732	0.0069	1.7596	1.7867
Ilocos Region	0.0532	0.0011	0.0511	0.0552	Ilocos Region	0.0544	0.0010	0.0525	0.0563
Cagayan Valley	0.0356	0.0008	0.0341	0.0371	Cagayan Valley	0.0356	0.0007	0.0343	0.0369
Central Luzon	0.1099	0.0018	0.1064	0.1133	Central Luzon	0.1097	0.0017	0.1063	0.1131
Bicol Region	0.0574	0.0011	0.0552	0.0596	Bicol Region	0.0580	0.0012	0.0557	0.0603
Western Visayas	0.0768	0.0014	0.0742	0.0795	Western Visayas	0.0787	0.0013	0.0763	0.0812

Table 8 continued...

Central Visayas	0.0738	0.0013	0.0712	0.0764	Central Visayas	0.0743	0.0016	0.0711	0.0776
Eastern Visayas	0.0458	0.0009	0.0439	0.0476	Eastern Visayas	0.0468	0.0011	0.0447	0.0489
Zamboanga Peninsula	0.0356	0.0008	0.0340	0.0373	Zamboanga Peninsula	0.0358	0.0008	0.0343	0.0373
Northern Mindanao	0.0449	0.0010	0.0429	0.0468	Northern Mindanao	0.0453	0.0013	0.0427	0.0479
Davao Region	0.0492	0.0010	0.0472	0.0513	Davao Region	0.0483	0.0013	0.0458	0.0509
Soccsksargen	0.0430	0.0009	0.0412	0.0448	Soccsksargen	0.0430	0.0013	0.0405	0.0455
Metro Manila	0.1391	0.0021	0.1349	0.1434	Metro Manila	0.1357	0.0038	0.1283	0.1432
CAR	0.0170	0.0004	0.0161	0.0178	CAR	0.0174	0.0005	0.0163	0.0184
ARMM	0.0306	0.0007	0.0292	0.0321	ARMM	0.0307	0.0010	0.0287	0.0326
Caraga	0.0252	0.0006	0.0241	0.0264	Caraga	0.0255	0.0007	0.0241	0.0269
CALABARZON	0.1326	0.0019	0.1289	0.1363	CALABARZON	0.1293	0.0019	0.1256	0.1330
MIMAROPA	0.0303	0.0007	0.0290	0.0317	MIMAROPA	0.0313	0.0009	0.0296	0.0331
One-member household	0.0424	0.0010	0.0403	0.0444	One-member household	0.0466	0.0012	0.0443	0.0489

Table 9. Design-Consistent Means of the Variables Used in Tobit Censored Regressions, 2003–2012 (cont.)

2009	Mean	Linearized Standard Error	95% Confidence Interval		2012	Mean	Linearized Standard Error.	95% Confidence Interval	
FAFH	10,932.19	236.97	10,467.53	11,396.84	FAFH	14,498.86	297.31	13,915.92	15,081.81
Total Income	207,506.20	3,128.70	201,371.40	213,641.00	Total Income	234,614.90	3,525.22	227,703.00	241,526.90
Family Size	4.84	0.01	4.82	4.87	Family Size	4.69	0.01	4.66	4.71
Age of HHH	49.36	0.09	49.17	49.54	Age of HHH	50.82	0.10	50.62	51.01
Age Squared	2,614.67	9.68	2,595.69	2,633.66	Age Squared	2,781.19	10.49	2,760.62	2,801.75
Sex (Male=1)	0.8046	0.0026	0.7995	0.8097	Sex (Male=1)	0.7729	0.0027	0.7676	0.7782
Single HHH	0.0371	0.0011	0.0349	0.0393	Single HHH	0.0463	0.0013	0.0438	0.0488
Married HHH	0.7943	0.0024	0.7896	0.7989	Married HHH	0.7554	0.0026	0.7503	0.7605
Wife Employed	0.4197	0.0034	0.4130	0.4264	Wife Employed	0.4145	0.0032	0.4082	0.4207
Middle Income	0.5902	0.0050	0.5803	0.6000	Middle Income	0.6000	0.0058	0.5887	0.6113
College Educ HHH	0.1109	0.0028	0.1055	0.1164	College Educ HHH	0.1262	0.0012	0.1239	0.1286
Employed Members	1.8899	0.0067	1.8768	1.9031	Employed Members	1.9802	0.0087	1.9631	1.9973
Ilocos Region	0.0526	0.0043	0.0441	0.0611	Ilocos Region	0.0516	0.0043	0.0432	0.0599

Table 9 continued...

Cagayan Valley	0.0354	0.0031	0.0293	0.0415	Cagayan Valley	0.0360	0.0032	0.0296	0.0423
Central Luzon	0.1079	0.0069	0.0944	0.1215	Central Luzon	0.1114	0.0071	0.0973	0.1254
Bicol Region	0.0583	0.0047	0.0491	0.0674	Bicol Region	0.0544	0.0044	0.0457	0.0631
Western Visayas	0.0783	0.0058	0.0671	0.0896	Western Visayas	0.0749	0.0055	0.0640	0.0857
Central Visayas	0.0748	0.0056	0.0638	0.0858	Central Visayas	0.0736	0.0056	0.0626	0.0847
Eastern Visayas	0.0469	0.0040	0.0389	0.0548	Eastern Visayas	0.0421	0.0036	0.0350	0.0492
Zamboanga Peninsula	0.0369	0.0033	0.0304	0.0433	Zamboanga Peninsula	0.0360	0.0031	0.0298	0.0422
Northern Mindanao	0.0462	0.0040	0.0383	0.0541	Northern Mindanao	0.0456	0.0039	0.0379	0.0533
Davao Region	0.0484	0.0042	0.0401	0.0566	Davao Region	0.0503	0.0041	0.0422	0.0584
Soccsksargen	0.0440	0.0040	0.0361	0.0518	Soccsksargen	0.0461	0.0041	0.0381	0.0541
Metro Manila	0.1327	0.0085	0.1161	0.1493	Metro Manila	0.1362	0.0070	0.1224	0.1499
CAR	0.0171	0.0017	0.0138	0.0204	CAR	0.0175	0.0017	0.0141	0.0209
ARMM	0.0322	0.0031	0.0261	0.0384	ARMM	0.0260	0.0026	0.0208	0.0312
Caraga	0.0256	0.0024	0.0209	0.0303	Caraga	0.0248	0.0023	0.0202	0.0294
CALABARZON	0.1301	0.0077	0.1150	0.1453	CALABARZON	0.1439	0.0083	0.1276	0.1602
MIMAROPA	0.0326	0.0030	0.0268	0.0385	MIMAROPA	0.0298	0.0028	0.0243	0.0353
One Member HH	0.0378	0.0011	0.0356	0.0399	One Member HH	0.0569	0.0014	0.0543	0.0596
					Number of Children	1.3736	0.0096	1.3548	1.3924

The two categories of marital status registered contrasting effects on FAFH consumption. Coefficient for the married dummy variable ($p < 0.0001$) is negative while that of being single ($p < 0.10$) is positive. This result is echoed in other FIES rounds except in 2009 (Table 4), when the single status dummy is insignificant ($p > 0.25$). All other postulated demand determinants are highly significant with correct a priori algebraic signs. Most of these results are replicated in the estimated equations in other FIES rounds (see Tables 5–7). The most important feature of the main FAFH demand equation (Table 4) is the apparent empirical validity of the household production and consumption theory (Becker, 1965; Prochaska & Schrimper, 1973) adopted in the study. The variables that proxy for the value of household members time posted highly significant coefficient estimates: wife is employed ($p < 0.005$), number of employed members ($p < 0.0001$), and one-member household dummy ($p < 0.01$).

Results of the Heckman Estimation of Working–Leser Engel Curves

Because of the inherent sample selection problem surrounding the specification of the FAFH Engel curve, which may not be present in FAH, the systems approach in simultaneously estimating both the FAH and the FAFH Engel curves using the Heckman procedure is precluded in the analysis. Instead, the single-equation approach is used and only for FAFH. As a result, four Working–Leser Engel curves are estimated independently for each FIES survey round. These estimated equations are presented in Tables 10 to 13. The focus of attention is on the FAFH Engel curve presented in Table 10, representing the most contemporary FAFH budget formation process of Filipino households.

The upper panel of Table 10 presents the outcome of the second (consumption) stage of the Heckman procedure, while the lower panel shows the result of the first (participation) stage. The participation stage is implemented through probit estimation of the conditional probability that the household will consume FAFH given its attributes, while the consumption stage features the estimated Engel curve for FAFH corrected for selectivity bias through the inclusion of the inverse Mills ratio derived from the results of the participation stage as additional regressor (Heckman, 1979). The fit of the models in both stages appear to be excellent with nearly all coefficients estimated with extreme statistical significance and conforming to theoretical a priori expectations, except for a few variables which are insignificant.

Table 10. Weighted Heckman Estimation of Working–Leser FAFH Engel Curve, 2012.

Engel Curve	Coefficient	Standard Error	*t*-Value	*p*-Value	95% Lower Limit	95% Upper Limit
Log(total income)	-0.00246	0.00085	-2.90000	0.00400	-0.00413	-0.00080
Family size	0.00012	0.00024	0.51000	0.61000	-0.00034	0.00059
Age of household head	-0.00070	0.00022	-3.13000	0.00200	-0.00114	-0.00026
Age squared	0.00000	0.00000	1.85000	0.06400	0.00000	0.00001
Sex (male = 1)	0.00626	0.00147	4.27000	0.00000	0.00339	0.00913
Single household head	0.01474	0.00302	4.89000	0.00000	0.00883	0.02065
Married household head	-0.01880	0.00165	-11.40000	0.00000	-0.02203	-0.01557
Wife is employed	0.00434	0.00094	4.60000	0.00000	0.00249	0.00619
College undergrad household head	0.00276	0.00104	2.65000	0.00800	0.00071	0.00480
College grad household head	0.00132	0.00318	0.41000	0.67800	-0.00492	0.00755
Number of employed members	0.00207	0.00045	4.59000	0.00000	0.00118	0.00295
Ilocos Region	0.03792	0.00293	12.95000	0.00000	0.03218	0.04366

Table 10 continued...

Cagayan Valley	0.04238	0.00299	14.15000	0.00000	0.03651	0.04826
Central Luzon	0.05319	0.00269	19.77000	0.00000	0.04791	0.05846
Bicol Region	0.02674	0.00324	8.25000	0.00000	0.02038	0.03310
Western Visayas	0.01947	0.00284	6.87000	0.00000	0.01391	0.02503
Central Visayas	0.03185	0.00314	10.14000	0.00000	0.02570	0.03801
Zamboanga Peninsula	0.01044	0.00269	3.87000	0.00000	0.00516	0.01573
Northern Mindanao	0.00479	0.00242	1.98000	0.04800	0.00005	0.00953
Davao Region	0.02723	0.00326	8.36000	0.00000	0.02084	0.03361
SOCCSKSARGEN	0.01992	0.00269	7.40000	0.00000	0.01464	0.02520
Metro Manila	0.07899	0.00272	29.09000	0.00000	0.07367	0.08432
CAR	0.00667	0.00265	2.52000	0.01200	0.00148	0.01186
ARMM	0.01333	0.00331	4.02000	0.00000	0.00683	0.01982
Caraga	0.00590	0.00246	2.40000	0.01600	0.00108	0.01073
CALABARZON	0.06917	0.00259	26.72000	0.00000	0.06409	0.07425
MIMAROPA	0.01377	0.00262	5.25000	0.00000	0.00863	0.01891
_cons	0.08730	0.01180	7.40000	0.00000	0.06418	0.11043
Probit Stage	Coefficient	Standard Error	*t*-Value	*p*-Value	95% Lower Limit	95% Upper Limit
Log(total income)	0.48277	0.02261	21.35000	0.00000	0.43844	0.52710
Family size	0.08500	0.00983	8.65000	0.00000	0.06573	0.10427
Age of household head	-0.00834	0.00444	-1.88000	0.06000	-0.01704	0.00035
Age squared	-0.00001	0.00004	-0.30000	0.76300	-0.00009	0.00007
Sex (male = 1)	-0.04021	0.03528	-1.14000	0.25400	-0.10937	0.02896
Single household head	-0.07750	0.05326	-1.46000	0.14600	-0.18192	0.02692
Married household head	-0.26221	0.03765	-6.96000	0.00000	-0.33603	-0.18838
Wife is employed	0.17178	0.02690	6.39000	0.00000	0.11903	0.22453
College undergrad household head	0.10246	0.02830	3.62000	0.00000	0.04697	0.15794
College grad household head	0.21200	0.06892	3.08000	0.00200	0.07687	0.34713
Number of employed members	-0.06910	0.01288	-5.36000	0.00000	-0.09436	-0.04384
Metro Manila	0.56027	0.04786	11.71000	0.00000	0.46643	0.65411
_cons	-4.43544	0.26299	-16.87000	0.00000	-4.95108	-3.91979
/athrho	-0.05071	0.01812	-2.80000	0.00500	-0.08623	-0.01518
/lnsigma	-2.71105	0.01260	-215.20000	0.00000	-2.73575	-2.68634
rho	-0.05066	0.01807			-0.08602	-0.01518
sigma	0.06647	0.00084			0.06485	0.06813
lambda	-0.00337	0.00120			-0.00571	-0.00102

Table 11. Weighted Heckman Estimation of Working–Leser FAFH Engle Curve, 2009

Engel Curve	Coefficient	Standard Error	*t-Value*	*p-Value*	95% Lower Limit	95% Upper Limit
Log(total income)	0.00270	0.00067	4.02000	0.00000	0.00138	0.00402
Family size	-0.00038	0.00021	-1.81000	0.07000	-0.00079	0.00003
Age of household head	0.00023	0.00019	1.23000	0.21900	-0.00014	0.00060
Age squared	-0.00001	0.00000	-3.29000	0.00100	-0.00001	0.00000
Sex (male = 1)	0.00626	0.00127	4.92000	0.00000	0.00376	0.00875
Single household head	0.00798	0.00310	2.57000	0.01000	0.00189	0.01406
Married household head	-0.00994	0.00156	-6.36000	0.00000	-0.01300	-0.00688
Wife is employed	-0.00323	0.00080	-4.02000	0.00000	-0.00481	-0.00165
College undergrad household head	0.00162	0.00082	1.96000	0.05000	0.00000	0.00323
College grad household head	-0.00635	0.00106	-6.00000	0.00000	-0.00842	-0.00427
Number of employed members	0.00701	0.00047	14.85000	0.00000	0.00608	0.00793
Ilocos Region	0.03615	0.00303	11.92000	0.00000	0.03020	0.04210
Cagayan Valley	0.02013	0.00272	7.39000	0.00000	0.01479	0.02547
Central Luzon	0.04776	0.00274	17.45000	0.00000	0.04239	0.05313
Bicol Region	0.01460	0.00293	4.99000	0.00000	0.00886	0.02034
Western Visayas	0.01523	0.00269	5.66000	0.00000	0.00996	0.02050
Central Visayas	0.02062	0.00298	6.92000	0.00000	0.01477	0.02646
Zamboanga Peninsula	0.00486	0.00288	1.69000	0.09200	-0.00079	0.01050
Northern Mindanao	0.00386	0.00275	1.40000	0.16000	-0.00153	0.00925
Davao Region	0.01311	0.00293	4.47000	0.00000	0.00737	0.01886
Soccsksargen	0.00537	0.00264	2.03000	0.04200	0.00019	0.01054
Metro Manila	0.05775	0.00253	22.83000	0.00000	0.05279	0.06272
CAR	0.01129	0.00342	3.30000	0.00100	0.00458	0.01800
ARMM	0.01288	0.00307	4.20000	0.00000	0.00686	0.01890
Caraga	0.00037	0.00263	0.14000	0.88700	-0.00479	0.00554
CALABARZON	0.05435	0.00263	20.68000	0.00000	0.04920	0.05950
MIMAROPA	0.00858	0.00279	3.07000	0.00200	0.00311	0.01405
_cons	-0.00006	0.00861	-0.01000	0.99400	-0.01694	0.01681
Probit Stage	Coefficient	Standard Error	*t*-Value	*p*-Value	95% Lower Limit	95% Upper Limit
Log(total income)	0.65364	0.02145	30.48000	0.00000	0.61159	0.69569
Family size	0.12569	0.00671	18.75000	0.00000	0.11255	0.13884
Age of household head	0.01432	0.00418	3.43000	0.00100	0.00613	0.02252
Age squared	-0.00029	0.00004	-7.46000	0.00000	-0.00037	-0.00022

Table 11 continued...

Sex (male = 1)	-0.03168	0.03140	-1.01000	0.31300	-0.09325	0.02988
Single household head	-0.26855	0.04928	-5.45000	0.00000	-0.36519	-0.17192
Married household head	-0.19624	0.03425	-5.73000	0.00000	-0.26340	-0.12907
Wife is employed	0.12307	0.02296	5.36000	0.00000	0.07804	0.16809
College undergrad household head	0.15058	0.02249	6.70000	0.00000	0.10649	0.19467
College grad household head	-0.09385	0.03814	-2.46000	0.01400	-0.16864	-0.01907
Number of employed members	-0.04739	0.01248	-3.80000	0.00000	-0.07186	-0.02293
Metro Manila	0.33371	0.03341	9.99000	0.00000	0.26821	0.39921
_cons	-7.39795	0.25057	-29.52000	0.00000	-7.88927	-6.90664
/athrho	-0.12641	0.01626	-7.77000	0.00000	-0.15830	-0.09452
/lnsigma	-3.00323	0.01312	-228.91000	0.00000	-3.02896	-2.97751
rho	-0.12574	0.01601			-0.15699	-0.09424
sigma	0.04963	0.00065			0.04837	0.05092
lambda	-0.00624	0.00077			-0.00775	-0.00473

Table 12. Weighted Heckman Estimation of Working–Leser FAFH Engle Curve, 2006.

Engel Curve	Coefficient	Standard Error	*t-Value*	*p-Value*	95% Lower Limit	95% Upper Limit
Log(total income)	0.00153	0.00065	2.37000	0.01800	0.00026	0.00280
Family size	-0.00080	0.00021	-3.73000	0.00000	-0.00122	-0.00038
Age of household head	0.00088	0.00018	4.95000	0.00000	0.00053	0.00123
Age squared	-0.00001	0.00000	-6.34000	0.00000	-0.00001	-0.00001
Sex (male = 1)	0.00680	0.00130	5.21000	0.00000	0.00424	0.00935
Single household head	0.02024	0.00327	6.19000	0.00000	0.01383	0.02665
Married household head	-0.01004	0.00154	-6.50000	0.00000	-0.01307	-0.00701
Wife is employed	-0.00354	0.00086	-4.11000	0.00000	-0.00524	-0.00185
College undergrad household head	0.00032	0.00092	0.34000	0.73000	-0.00148	0.00212
College grad household head	-0.00468	0.00120	-3.92000	0.00000	-0.00703	-0.00234
Number of employed members	0.00751	0.00048	15.81000	0.00000	0.00658	0.00844
Ilocos Region	0.02740	0.00298	9.18000	0.00000	0.02155	0.03325
Cagayan Valley	0.01590	0.00259	6.13000	0.00000	0.01082	0.02099
Central Luzon	0.04114	0.00248	16.60000	0.00000	0.03628	0.04600

Table 12 continued...

Bicol Region	0.01197	0.00250	4.78000	0.00000	0.00706	0.01687
Western Visayas	0.01689	0.00239	7.07000	0.00000	0.01221	0.02158
Central Visayas	0.02307	0.00291	7.92000	0.00000	0.01736	0.02878
Zamboanga Peninsula	0.00419	0.00268	1.57000	0.11800	-0.00106	0.00944
Northern Mindanao	0.00794	0.00238	3.34000	0.00100	0.00328	0.01260
Davao Region	0.01019	0.00233	4.37000	0.00000	0.00562	0.01476
Soccsksargen	0.01082	0.00246	4.40000	0.00000	0.00600	0.01565
Metro Manila	0.06337	0.00245	25.86000	0.00000	0.05856	0.06817
CAR	0.01399	0.00263	5.31000	0.00000	0.00882	0.01915
ARMM	0.01082	0.00299	3.62000	0.00000	0.00496	0.01668
Caraga	-0.00261	0.00223	-1.17000	0.24200	-0.00699	0.00177
CALABARZON	0.05077	0.00235	21.60000	0.00000	0.04616	0.05538
MIMAROPA	0.00953	0.00232	4.11000	0.00000	0.00498	0.01408
_cons	-0.00500	0.00820	-0.61000	0.54200	-0.02110	0.01109
Probit Stage	Coefficient	Standard Error	*t*-Value	*p*-Value	95% Lower Limit	95% Upper Limit
Log(total income)	0.63823	0.01743	36.62000	0.00000	0.60405	0.67242
Family size	0.10963	0.00571	19.21000	0.00000	0.09844	0.12083
Age of household head	0.01381	0.00359	3.85000	0.00000	0.00677	0.02086
Age squared	-0.00028	0.00003	-8.26000	0.00000	-0.00035	-0.00022
Sex (male = 1)	-0.00617	0.02961	-0.21000	0.83500	-0.06424	0.05191
Single household head	-0.13867	0.04630	-2.99000	0.00300	-0.22949	-0.04785
Married household head	-0.21913	0.03207	-6.83000	0.00000	-0.28204	-0.15623
Wife is employed	0.14169	0.02171	6.53000	0.00000	0.09911	0.18428
College undergrad household head	0.11279	0.02045	5.52000	0.00000	0.07268	0.15291
College grad household head	-0.12158	0.03656	-3.33000	0.00100	-0.19329	-0.04987
Number of employed members	-0.00321	0.01168	-0.27000	0.78400	-0.02612	0.01970
Metro Manila	-0.23836	0.02930	-8.13000	0.00000	-0.29583	-0.18089
_cons	-6.76617	0.22427	-30.17000	0.00000	-7.20607	-6.32628
/athrho	-0.10260	0.01626	-6.31000	0.00000	-0.13448	-0.07071
/lnsigma	-2.95918	0.01247	-237.33000	0.00000	-2.98363	-2.93472
rho	-0.10224	0.01609			-0.13367	0.07059
sigma	0.05186	0.00065			0.05061	0.05315
lambda	-0.00530	0.00082			-0.00691	-0.00369

Table 13. Weighted Heckman Estimation of Working–Leser FAFH Engle Curve, 2003.

Engel Curve	Coefficient	Standard Error	*t*-Value	*p*-Value	95% Lower Limit	95% Upper Limit
Log(total income)	0.00079	0.00063	1.25000	0.21100	-0.00045	0.00202
Family size	-0.00152	0.00021	-7.36000	0.00000	-0.00193	-0.00112
Age of household head	0.00056	0.00018	3.11000	0.00200	0.00021	0.00091
Age squared	-0.00001	0.00000	-4.69000	0.00000	-0.00001	0.00000
Sex (male = 1)	0.00797	0.00151	5.28000	0.00000	0.00501	0.01093
Single household head	0.01851	0.00325	5.69000	0.00000	0.01213	0.02488
Married household head	-0.01354	0.00175	-7.74000	0.00000	-0.01698	-0.01011
Wife is employed	-0.00327	0.00084	-3.88000	0.00000	-0.00492	-0.00162
College undergrad household head	0.00012	0.00091	0.14000	0.89200	-0.00165	0.00190
College grad household head	-0.00686	0.00116	-5.93000	0.00000	-0.00912	-0.00459
Number of employed Members	0.00734	0.00046	15.84000	0.00000	0.00643	0.00825
Ilocos Region	0.03434	0.00195	17.57000	0.00000	0.03051	0.03817
Cagayan Valley	0.01928	0.00191	10.12000	0.00000	0.01555	0.02302
Central Luzon	0.04545	0.00180	25.26000	0.00000	0.04192	0.04897
Bicol Region	0.02187	0.00204	10.74000	0.00000	0.01788	0.02586
Western Visayas	0.01446	0.00175	8.24000	0.00000	0.01102	0.01790
Central Visayas	0.02514	0.00191	13.16000	0.00000	0.02140	0.02888
Zamboanga Peninsula	0.00322	0.00179	1.80000	0.07200	-0.00029	0.00674
Northern Mindanao	0.00818	0.00182	4.50000	0.00000	0.00462	0.01174
Davao Region	0.01277	0.00188	6.80000	0.00000	0.00909	0.01645
Soccsksargen	0.01293	0.00198	6.53000	0.00000	0.00905	0.01681
Metro Manila	0.05613	0.00177	31.75000	0.00000	0.05267	0.05960
CAR	0.01390	0.00224	6.20000	0.00000	0.00951	0.01829
ARMM	0.00835	0.00177	4.73000	0.00000	0.00489	0.01182
Caraga	0.00224	0.00173	1.30000	0.19500	-0.00115	0.00563
CALABARZON	0.05374	0.00170	31.66000	0.00000	0.05041	0.05707
MIMAROPA	0.00829	0.00184	4.50000	0.00000	0.00468	0.01190
_cons	0.01618	0.00770	2.10000	0.03500	0.00110	0.03127
Probit Stage	Coefficient	Standard Error	*t*-Value	*p*-Value	95% Lower Limit	95% Upper Limit
Log(total income)	0.71693	0.01346	53.25000	0.00000	0.69055	0.74332
Family size	0.08446	0.00435	19.41000	0.00000	0.07593	0.09299
Age of household head	0.02725	0.00324	8.42000	0.00000	0.02091	0.03359
Age squared	-0.00039	0.00003	-12.06000	0.00000	-0.00046	-0.00033
Sex (male = 1)	-0.01028	0.03062	-0.34000	0.73700	-0.07029	0.04974

Table 12 continued...

Single household head	-0.04067	0.04447	-0.91000	0.36000	-0.12783	0.04650
Married household head	-0.22096	0.03329	-6.64000	0.00000	-0.28622	-0.15571
Wife employed	0.10936	0.01785	6.13000	0.00000	0.07438	0.14434
College undergrad household head	0.14757	0.01764	8.37000	0.00000	0.11301	0.18214
College grad household head	-0.13138	0.03237	-4.06000	0.00000	-0.19483	-0.06793
Number of employed members	0.00172	0.00973	0.18000	0.86000	-0.01735	0.02078
Metro Manila	0.49082	0.03222	15.23000	0.00000	0.42767	0.55397
_cons	-8.41598	0.15940	-52.80000	0.00000	-8.72842	-8.10355
/athrho	-0.11121	0.01351	-8.23000	0.00000	-0.13769	-0.08473
/lnsigma	-2.95669	0.01142	-258.980	0.00000	-2.97907	-2.93431
rho	-0.11075	0.01334			-0.13682	-0.08453
sigma	0.05199	0.00059			0.05084	0.05317
lambda	-0.00576	0.00068			-0.00710	-0.00442

One of the most interesting results noted in Table 10 is the apparent validity of the Engel's law on the budget setting process for FAFH using the 2012 FIES survey data. This assertion is demonstrated by the highly significant and negative coefficient estimate of the income variable, which when interpreted would mean that poorer households devote higher share of income to FAFH than richer families. Furthermore, income elasticities are computed (using equation [7]) for the various FIES rounds results and exhibited in Table 14.

Table 14. Estimated Working–Leser Elasticities of FAFH

FIES Survey Round	Average FAFH Share	Engel Curve Coefficient of ln(Income)	Working–Leser Income Elasticity	Commodity Classification of FAFH
2003	0.036308	0.00079	1.02176	Luxury
2006	0.041559	0.00153	1.03682	Luxury
2009	0.044584	0.00270	1.06056	Luxury
2012	0.059527	-0.00246	0.95867	Necessity

By classifying FAFH as a necessity consumption item, even households situated in the lower rung of income distribution are compelled to consume FAFH during the modern era. This phenomenon is not seen in the earlier survey rounds as FAFH had been consistently categorized as luxury item.

The highly significant and positive coefficient estimates for the variables related to the value of time of household members justify these variables as the nontraditional budget shares predictors, echoing the results noted in the Tobit estimated FAFH demand equation. This result implies the validity of the household production theory (Becker, 1965; Prochaska & Schrimper, 1973) in specifying Engel curves of FAFH.

Concluding Remarks

Consumption incidence of 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 effort 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 consumption trend 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 inferences.

The outcomes of the study confirm the significant covariation of FAFH consumption in the most recent period (2012) with the traditional food demand determinants like household income, family size, age composition, and the household head's demographics like education and marital status. Usual demand predictors, however, like age and gender are insignificant determinants. Interestingly, nontraditional factors like the employment status of the homemaker (wife), single-member status of the household, 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). Overall, 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 Engel's law to FAFH, with an income elasticity of **0.9587**. The results of the study may be used as the basis of predicting the increasing role of FAFH in shaping the consumption behavior of the modern Filipino families, thus offering important insights with valuable commercial and economic implications shift in food consumption.

Note

*Annual growth is determined by the formula.

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