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INCOME AND SOCIO-DEMOGRAPHIC IMPACTS ON HOUSEHOLD FOOD EXPENDITURES AWAY FROM HOME IN KOREA

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I. Introduction

Food consumption in Korea has undergone dramatic changes since 1980's. The changes are mainly characterized by an increased demand for meat and food away from home. These demand changes have resulted from improvements in household income and diversification of eating patterns.

Food expenditures of urban-households have been increasing over time while the share for total expenditure decreased 13 percent between 1980 and 1994. In 1994, food expenditure accounts for 30 percent of the total expenditure. The proportion of expenditure on food away from home (FAFH) is increasing. The FAFH share for food expenditure increased from 4 percent to 29 percent between 1980 to 1994. The value of the FAFH sales in 1994 is estimated to be 17,000 billion won.

Under these situations, identifying the factors affecting consumers' behavior on FAFH is important for efficient adjustment of the food industry and farmers in changing consumer demand for FAFH. In order to obtain insights into understanding the changes in the consumption patterns away from home, the effects of income and socio- demographics on the FAFH consumption should be explicitly examined.

Despite the importance of FAFH, in Korea, few research on the demand for FAFH have been performed, while numerous studies related to food at home have been done. In the U.S, much of the

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previous literature recognizing the importance of FAFH have been done (Manchester,1978; Van Dress,1980: Smallwood & Blaylock, 1981; McCracken & Brandt, 1990). These studies have contributed to understanding consumption patterns away from home. Especially, McCracken & Brandt(1990) analyzed consumption behavior on FAFH within a theoretical framework, which is based on the opportunity cost approach.

The use of household data for food consumption analysis creates a major estimation problem. The problem stems from the fact that households are observed to consume zero amount of the various commodities under consideration (Heien and Wessells, 1990). According to the 1993 Family Income and Expenditure Survey data,[1] 76 percent of the households surveyed consumed Korean food away from home(KFAFH), and only 48 percent and 13 percent of the households consumed Chinese food away from home (CFAFH) and Western food away from home (WFAFH), during the one season(three months).

For the estimation of food demand equation with such a sample, the estimation method should allow zero expenditures to occur with positive probability. In this study, the Type 2 Tobit model (Amemiya, 1984) is used for modelling zero consumption behavior on FAFH, and Heckman's two step estimation method is applied to the estimation of the model.

The objective of this study is to evaluate the impacts of economic and socio-demographic variables on FAFH consumption by types such as Korean food, Chinese food, Western food, and snacks and fast-food. The data used in the empirical analysis are from the household component of 1984 and 1993 Family Income and Expenditure Survey. Two cross sectional data set were used to examine the selected socio-economic impacts on specific FAFH consumption across two different time periods; 1984 and 1993.

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[1] The survey is conducted monthly by the National Statistical Office of Korea. The data were collected by an account-book method, and the total sample for the 1993 survey consists of over 15,000 urban households.

II. Model and Estimation Procedure

Consider a random sample of n observations, and two behavioral equations for individual i. The first behavioral equation pertains to the reservation value (expenditure) on food away from home faced by individual i; and the second equation pertains to the market value (expenditure) on food away from home faced by individual i. These equations can be written as follows:

$$(1.1) \quad EXP_{ri} = X_{3i}\theta + u_{3i},$$
$$(1.2) \quad EXP_{mi} = X_{2i}\gamma + u_{2i}$$
$$(1.3) \quad EXP_i = EXP_{mi} \text{ if } EXP_{ri} - EXP_{mi} \geq 0,$$
$$EXP_i = 0 \quad \text{if } EXP_{ri} - EXP_{mi} < 0, \quad i = 1, \cdots, n$$

where EXP_{mi} is the market value (expenditure) on FAFH faced by individual i, EXP_{ri} is the reservation value (expenditure) for individual i, EXP_i is the observed expenditure on FAFH for individual i, and X_{3i}, X_{2i} are vectors of explanatory variables for individual i hypothesized to affect the reservation and market value on FAFH. The random variables, u_{3i} and u_{2i} are i.i.d. drawing from a bivariate normal distribution with mean zero, variances σ_3^2 and σ_2^2 and covariance σ_{32}.

Consider a consumer's economic behavior. If a consumer's reservation value for FAFH is greater than the market value which the consumer faces for that FAFH, it is assumed that the FAFH item is consumed; otherwise, it is assumed that the FAFH item is not consumed[2]. Based on the decision rules (1.3), the eating away from home decision behavior of individual i can be modelled as follows:

$$(1.4) \quad v_i = EXP_{ri} - EXP_{mi} = (X_{3i}\theta - X_{2i}\gamma) + (u_{3i} - u_{2i})$$
$$= X_{1i}\beta + u_{1i}$$

where $X_{1i} = [X_{2i}\ X_{3i}]$, $\beta' = [\theta - \gamma]$, $u_{1i} = u_{3i} - u_{2i}$, and u_{1i} are normally distributed with mean zero and variance σ_1^2. Equation (1.4) is a FAFH market participation equation. The actual values of v_i are not observed, but based on the observed behavior of the consumer it is known

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[2] The reservation value FAFH could be defined as the opportunity cost of household time.

whether $v_i \geq 0$ or $v_i < 0$. That is, $v_i \geq 0$ if and only if $EXP_{ri} \geq EXP_{mi}$ (consumption occurs) and $vi < 0$ if and only if $EXP_{ri} < EXP_{mi}$ (no consumption occurs). The reservation expenditure (EXP_{ri}), in contrast, is not explicitly observed for any portion of the sample. In this study, the Type 2 Tobit model is used to estimate these two behavioral equations; the FAFH market participation equation, (1.4) and the food expenditure (away from home) equation, (1.2). In general, the explanatory variables vector, $X_{1i} = (X_{2i}\ X_{3i})$, in equation (1.4) may contain variables not included in vector X_{2i} in equation (1.2).

The likelihood function related to (1.4) for the Type 2 Tobit model is defined as follows:

$$(1.5) \qquad L = \Pi_0 \text{Prob}(v_i<0)\ \Pi_1 f(EXP_i|v_i \geq 0)\text{Prob}(v_i \geq 0)$$

where Π_0 and Π_1 stand for the product over those i for which $EXP_i=0$ ($v_i<0$) and $EXP_i = EXP_{mi}(v_i \geq 0)$, respectively, and $f(EXP_i|\ v_i \geq 0)$ is the conditional density of EXP_i given $v_i \geq 0$. Thus, the likelihood function (1.5) can be rewritten as (Amemiya, 1984):

$$\begin{aligned}(1.6) \qquad L = {} & \Pi_0 [1 - \Phi(X_{1i}\beta\sigma_1^{-1})] \\ & \times \Pi_1 \phi \{[X_{1i}\beta\sigma_1^{-1} + \sigma_{12}\sigma_1^{-1}\sigma_2^{-2}(EXP_i - X_{2i}\gamma)] \\ & \times [1 - \sigma_{12}^2\sigma_1^{-2}\sigma_2^{-2}]^{\frac{1}{2}}\} \times \sigma_2^{-1} \phi [\sigma_2^{-1}(EXP_i - X_{2i}\gamma)]\end{aligned}$$

where ϕ and Φ are the probability density and the cumulative density of the standard normal distribution, respectively. The MLE's for the parameters of the model (i.e., β, γ, σ_1, σ_2, and σ_{12}) can be obtained by maximizing the logarithm of the likelihood function, log L. The likelihood function is nonlinear in the parameters and, hence, must be solved using an iterative procedure. Since the likelihood function (1.6) is complicated and usually is not well behaved, there are some difficulties with the optimization of the likelihood function.

In this study Heckman's two step procedure was used because the two step estimator is consistent and much more easily computed than the MLE. Heckman's two step procedure takes account of the fact that in equation (1.2), $E(u_{2i}|v_i \geq 0) = \sigma_{12}\ \lambda_i$, where λ_i is the inverse Mill's ratio. This technique first models the probability that an observation has complete data (i.e., is not censored). This estimated probability is then used to estimate the conditional means for each observation. And

finally the estimated conditional mean is used as an additional regressor in a least squares regression analysis for the observed sample. The error term, u_{2i} in equation (1.2) can be defined as follows (Heckman,1976):

$$(1.7)\quad E(u_{2i}|vi>0) = E(u_{2i}|u_{1i}> -X_{1i}\beta) = \sigma_{12}\lambda_1$$
$$\text{where } \lambda_i = \lambda(\frac{X_{1i}\beta}{\sigma_1}) = \frac{\phi(X_{1i}\alpha_1)}{\Phi(X_{1i}\alpha_1)} = \frac{\phi(-X_{1i}\alpha_1)}{1-\Phi(-X_{1i}\alpha_1)}$$
$$\text{and}\quad \alpha_1 = \beta\sigma_1^{-1}$$

Using equation (1.7), the conditional expected value of equation (1.2) is $E(EXP_i|v_i>0) = X_{2i}\gamma + \sigma_{12}\sigma_1^{-1}\lambda(X_{1i}\beta)$. Equation (1.2), therefore, can be rewritten for the subsample of consumers of the goods as:

$$(1.8)\quad EXP_{mi} = X_{2i}\gamma + \sigma_{12}\lambda(X_{1i}\alpha_1) + \varepsilon_{2i} \text{ for } v_i = EXP_{ri} - EXP_{mi}>0,$$
$$\varepsilon_{2i} = EXP_i - E(EXP_i|v_i>0),\ E(\varepsilon_{2i}) = 0$$
$$Var(\varepsilon_{2i}) = \sigma_2^2 - \sigma_{12}^2\sigma_1^{-2}[X_{1i}\alpha_1\lambda(X_{1i}\alpha_1) + (\lambda(X_{1i}\alpha_1))^2]$$
$$= \sigma_2^2 - \sigma_{12}^2[X_{1i}\beta\lambda(X_{1i}\beta) + (\lambda(X_{1i}\beta))^2]$$

Therefore, Heckman's two step estimator for a Type 2 Tobit model is as follows. First, estimate $\beta\sigma_1^{-1} = \alpha$ in equation (1.4) using the probit ML method. Use these α to get estimates of ϕ and Φ, namely, $\hat{\phi} = \phi(\alpha X_{1i})$ and $\hat{\Phi} = \phi(\alpha X_{1i})$, and use $\hat{\phi}$ and $\hat{\Phi}$ to calculate λ, namely $\hat{\lambda}(\hat{\lambda} = \hat{\phi}/\hat{\Phi}$ for $v_i \geq 0$ and $\hat{\lambda} = -\hat{\phi}/\hat{\Phi}$ for $v_i<0$), for each observation. Second, use least squares with only the positive observations on EXP_{mi} to get consistent estimate of γ and σ in equation (1.8). In equation (1.8), $Var(\varepsilon_{2i})$ is obviously heteroskedastic.

Therefore, in order to get asymptotically more efficient estimates, weighted least square (WLS) is suggested instead of OLS in the second step of the procedure.

III. Development of Empirical Model

It is hypothesized that differences between the socio-demographic factors across households may affect the household's eating away from home decisions. These hypothesized factors affecting the decision are thus incorporated in the empirical model.

The first step estimation procedure is the estimation of the

FAFH market participation equation (1.4). Equation (1.4) was initially specified as follows:

$$(1.10)\quad I_i = \beta_0 + \beta_2 TEXP + \beta_2 SUMMER + \beta_3 FALL + \beta_4 WINTER + \beta_5 WCOLLAR + \beta_6 FHEAD + \beta_7 HEADAGE + \beta_8 HHSIZE + \beta_9 SEOUL + \beta_{10} EDBH + \beta_{11} EDGC + \beta_{12} DBLJOB + \beta_{13} MF1 + \beta_{14} MF2 + \beta_{15} MF2C1 + \beta_{16} MF2CM1 + \beta_{17} MF3 + \beta_{18} TENACY$$

where the dependent variable I_i is the binary choice variable which indicates whether a household eats specific food item away from home during the survey period.[3] That is, I_i is 1 if the household eat the food group i away from home ; otherwise I_i is zero.

The household characteristic variables included in the FAFH market participation equation are: per capita household expenditure (TEXP), household size(HHSIZE), the presence of a female head (FHEAD), education level of household head (EDBH, EDGC), season dummies (SUMMER, FALL, WINTER), occupation of the household head (WCOLLAR), the employment status of man and wife (DBLJOB), region dummy (SEOUL), age of household head(HEADAGE), a set of dummy variables as household age-sex category variables(MF1, MF2, MF2C1, MF2CM1, ..., MF3) and tenancy (TENACY).

The second step of two step estimation procedure involved the estimation of the food expenditure (away from home) equation (1.2). The equation (1.2) was initially specified as:

$$(1.11)\quad EXP_{mi} = f(LTEXP, SUMMER, FALL, WINTER, WCOLLAR, HEADAGE, FHEAD, SEOUL, EDBH, EDGC, DBLJOB, HHSIZE, CO5, C613, M1419, F1419, M2049, F2049, MO50, FO50, TENANCY, LAMBDA) + \varepsilon_{2i},$$

where EXP_{mi} is the monthly household expenditure paid at different types of eating place i (i.e., i=1, at Korean restaurants; i=2, at Chinese

[3] The survey period for samples included in the estimation is at least two months in each season.

TABLE 1 Description of Variables for Type 2 Tobit Model

Variables	Content
Expenditure	
TEXP	monthly per capita households expenditure (won per month)
LTEXP	logarithm of TEXP
Season	
SUMMER	1 if household survey period was in summer, o otherwise
FALL	1 if household survey period was in fall, o otherwise
WINTER	1 if household survey period was in winter, o otherwise
Occupation	
WCOLLAR	1 if household head was employed in a white collar job, o otherwise
Household Type	
FHEAD	1 if household is headed by a female only, o otherwise
DBLJOB	1 if household is headed by both a male and female, o otherwise
Household Size	
HHSIZE	number of person in household
Age of Household Head	
HEADAGE	the age of household head
Region	
SEOUL	1 if household head resided in seoul, o otherwise
Education	
EDBH	1 if household head's education was below high school, o otherwise
EDGC	1 if household head's education was beyond college, o otherwise
Tenancy	
TENANCY	1 if household does not own the house in which household members live, o otherwise
Household Life Cycle Variables	
MF1	1 if household consists of a single adult and more than one child under 19 years, o otherwise
MF2	1 if household consists of male and female adults without children, 0 otherwise
MF2C1	1 if household consists of a male, a female and one child under 18 years, o otherwise
MF2CM1	1 if household consists of a male, a female and more than two children under 18 years, o otherwise
MF3	1 if household consists of more than three male and female adults, o otherwise
Age-Sex Category Variables	
CO5	number of children in household under 6 years
C613	number in household 6 to 13 years
M1419	number of male children in household 14 to 19 years
F1419	number of female children in household 14 to 19 years
M2049	number of male adults in household 20 to 49 years
F2049	number of female adults in household 20 to 49 years
MO50	number of male adults in household over 50 years
FO50	number of female adults in household over 50 years

restaurants; i=3, at Western restaurants; i=4, at snacks and fast-food facilities). The set of the explanatory variables differs somewhat between equation (1.10) and (1.11) since the Type 2 Tobit model allows for two separate decisions (i.e., the FAFH consumption decision and the decision of how much to pay for the FAFH). The main differences in the specification are related to the food expenditure, and household composition variables. First, in equation (1.11), per capita household expenditure is measured in logarithm (LTEXP). In equation (1.10), in the other hand, total expenditure (TEXP) is included. Second, different household composition variables are used: household life cycle variables (measured as the number of household members) are used in equation (1.11), while household age-sex category variables are used in equation (1.10). Region (SEOUL) and employment status of man and wife (DBLJOB) are only included in 1993 because these information were not available in the 1984 survey data. The detailed explanation for variables included in both models is in Table 1.

IV. Esstimation Results

Equations (1.10) and (1.11) were estimated for four different FAFH groups. The probit MLE's for the FAFH market participation equation and the WLS estimates for the food expenditure(away from home) equation were obtained using SAS/IML software package. Results for the two stage estimation are presented in Table 2.

One econometric problem in estimation of equations based on cross sectional data is multicollinearity among some explanatory variables. In order to avoid perfect and near-perfect multicollinearity, variable screening was performed based on the results of the linear probability model and the Variable Inflation Factor (VIF).[4]

The probit result showed that per capita household expenditure(TEXP) was positively related to the probability of eating Korean food, Chinese food, Western food, and snacks away from home. However, the magnitude of coefficients are very small.

Generally, seasonality in FAFH consumption was found in the

[4] Based on these tests. some varianles were deleted as shown in Table 2-3.

TABLE 2 Probit Estimation Results for FAFH by Source of Expenditure. 1984/1993

Variables	1993				1984			
	Expenditure at Korean Restaurants	Expenditure at Chinese Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities	Expenditure at Korean Restaurants	Expenditure at Chinese Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities
CONST	0.0138	-0.1045	-1.0228	0.7008	-0.5770	-0.1598	-1.9320	-0.4755
	(0.21)	(-1.74)	(-11.29)	(11.24)	(-8.15)	(-2.80)	(-15.02)	(-6.44)
TEXP	0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000	0.0000	0.0000
	(20.04)	(9.02)	(12.32)	(12.51)	(25.29)	(15.70)	(12.58)	(18.88)
SUMMER	0.2911	0.1917	0.2079	0.2081	0.2167			0.0326
	(8.65)	(7.54)	(5.29)	(6.31)	(6.06)			(1.04)
FALL	0.0998	0.1541	0.1427	0.1911	-0.0500	-0.0918	0.0894	
	(3.01)	(6.01)	(3.59)	(5.75)	(-1.38)	(-3.00)	(1.62)	
WINTER	-0.1228		0.0651	-0.1763	-0.1697	-0.0963	-0.1225	-0.1734
	(-3.70)		(1.54)	(-5.37)	(-4.52)	(-3.02)	(-1.86)	(-5.18)
WCOLLAR	0.1766	0.1588	0.1170	0.0646	0.1318	0.1342	0.1946	
	(6.27)	(6.58)	(3.64)	(2.47)	(4.82)	(4.99)	(3.69)	
FHEAD	-0.0747	-0.1003	0.0977	0.1557				0.0651
	(-1.87)	(-2.63)	(1.76)	(3.75)				(1.60)
HEADAGE	-0.0097	-0.0111	-0.0144	-0.0116	-0.0078	-0.0071	-0.0101	-0.0112
	(-7.60)	(-9.92)	(-8.94)	(-9.46)	(-5.92)	(-5.60)	(-3.79)	(-8.23)
HHSIZE	0.1044		0.0365		0.0701	0.0341	0.1076	0.2142
	(4.99)		(1.53)		(3.09)	(1.56)	(2.57)	(9.42)
SEOUL		-0.1655	-0.0653	-0.1871				
		(-6.31)	(-1.94)	(-6.51)				
EDBH	-0.1232		-0.1419	-0.0902				
	(-4.09)		(-3.75)	(-3.09)				
EDGC	0.0361	-0.0711						
	(1.11)	(-2.67)						
DBLJOB	0.0969	0.0322	0.1166	0.2437				
	(2.45)	(1.09)	(2.72)	(7.15)				
MF1	0.1073	0.1850		0.1397	-0.2311	0.0555		
	(1.75)	(3.25)		(219)	(-3.85)	(1.08)		
MF2	0.3126		-0.1865	-0.1361	0.2238		-0.1719	
	(6.94)		(-2.33)	(-3.42)	(3.79)		(-1.59)	
MF3	0.2202	0.1582	-0.1038				-0.3006	-0.0644
	(6.14)	(4.79)	(-1.41)				(-3.19)	(-1.23)
MF2C1		0.2097	-0.2213		-0.2309		-0.4870	-0.2584
		(8.45)	(-3.12)		(-5.92)		(-6.04)	(-5.86)
MF2CM1	0.0673		-0.2201		-0.3106	-0.3067	-0.5703	-0.3819
	(2.10)		(-3.05)		(-6.98)	(-10.01)	(-6.22)	(-8.03)
TENANCY	0.1694	0.0357		0.0954	0.1184		0.1451	0.0409
	(6.42)	(1.51)		(3.66)	(4.16)		(2.67)	(1.42)
No. of Observation	14639	14639	14639	14639	10156	10156	10156	10156
R^{2} 1)	0.0814	0.0337	0.0273	0.0478	0.1000	0.0411	0.0272	0.0546

NOTE : The numbers in parentheses below coefficients are the t-values.

1) Squared correlation between observed and predicated values of y

sense that the sign of parameter estimates for the season dummies were consistent. The WINTER variable overall had a negative impact on the probability of eating food away from home except Western food. This suggests that households were less likely to eat food away from home in the winter. In contrast, the SUMMER variables overall had a positive impact on the probability of eating FAFH. The employment status of household members has significant impacts on FAFH expenditure pattern. The WCOLLAR variable as well as DBLJOB were consistently positive across FAFH expenditure equations in 1984 and 1993. This implies that the households whose heads is employed in white collar jobs or headed by both male and female have high probability to eat away from home than other households. MF2C1, MF3, and MF2CM1 among household life cycle variables were significant across two different time periods.

The results of the second stage WLS estimation for the FAFH expenditure models are summarized in Table 3. The parameter estimates for the logarithm of per capita household expenditure (LTEXP) were positive and significant between 1984 and 1993 for each FAFH. This implies that the households at higher expenditure level tend to spend more money on FHAH relative to households at lower household expenditure level. Households whose head are employed in white collar jobs spend more on FAFH compared to households whose heads are employed in blue collar jobs. Households with only a female head (FHEAD) are expected to spend more on snacks away from home in 1993 , but not in 1984. They spent less on Chinese food away from home in 1993.

Region of residence of the household head had a significant impact on FAFH expenditure pattern. The result showed households residing in Seoul spend more on FAFH than households residing in other cities. Households with less educated heads (EDBH) spent less on FAFH compared to households with higher educated heads (EDGC), but these coefficients were statistically significant only for snacks expenditure equations in 1993. Households with both male and female heads(DBLJOB) on average spent more on snacks and fast-food away from home than other households. Male and female headed households might be expected to eat more frequently than female headed or male headed households because of higher opportunity cost of time.

The age-sex category variables were included in the FAFH

TABLE 3 WLS Estimation Results for FAFH by Source of Expenditure, 1984/1993

Variables	1993				1984			
	Expenditure at Korean Restaurants	Expenditure at Chinese Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities	Expenditure at Korean Restaurants	Expenditure at Chinese Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities
CONST	-174487.4 (-6.64)	-12688.8 (-8.26)	-16547.3 (-3.29)	-148148.3 (-9.99)	-25804.7 (-7.03)	-2259.47 (-3.24)	-2982.77 (-0.79)	-12283 (-3.52)
LTEXP	15236.27 (8.68)	1173.65 (12.35)	1711.78 (5.69)	11734.14 (11.53)	2443.41 (9.24)	316.8730 (6.38)	414.7778 (1.63)	1303.46 (5.31)
SUMMER	-5657.804 (-4.83)	-545.869 (-5.12)	-1101.71 (-3.52)					-317.5332 (-2.02)
FALL	-5414.03 (-5.73)	-738.042 (-7.24)	-1282.61 (-4.23)					-218.3221 (-1.39)
WINTER	1833.78 (1.83)		-438.6296 (-1.41)	-3086.01 (-3.28)	623.0175 (3.30)	258.1438 (7.44)	514.8153 (2.47)	320.1397 (1.72)
WCOLLAR	-1902.79 (-2.08)	203.7057 (2.23)	414.882 (1.85)	-5316.24 (-8.88)	255.478 (1.69)		530.7381 (2.80)	-185.1315 (-1.51)
HEADAGE	223.305 (4.82)			-234.844 (-5.63)		3.4816 (1.90)	-12.7711 (-1.18)	-26.4955 (-2.99)
FHEAD		-283.135 (-2.26)		2536.28 (2.63)				-656.9728 (-3.62)
SEOUL	7704.02 (9.61)	-129.505 (-1.25)	-373.1996 (-1.57)	5487.08 (7.59)				
EDBH	-951.812 (-1.02)		-482.4786 (-1.57)	-2579.16 (-3.79)				
EDGC	1079.42 (1.27)			2013.16 (3.20)				
DBLJOB	-3697.55 (-3.45)			2483.12 (2.73)				
HHSIZE	4269.59 (6.69)		325.056 (2.08)	4420.07 (9.67)	132.367 (1.17)	-92.8611 (-3.86)		409.8411 (3.34)
CO5			-403.84 (-2.46)	-2322.71 (-5.41)	-304.346 (-2.98)	-42.5082 (-2.23)	-132.302 (-1.12)	
C613	-1749.26 (-4.04)	127.237 (2.86)	-355.692 (-2.61)	-2301.95 (-6.79)	-282.740 (-3.39)			-236.8423 (-3.61)
M1419	-2876.31 (-3.91)		-465.389 (-1.93)	1598.11 (2.82)	-601.857 (-4.33)	-370.6718 (-2.33)	-370.6718 (-2.33)	-168.3453 (-1.49)
F1419	-3212.11 (-4.65)			1462.22 (2.93)	-369.424 (-2.74)	-82.4414 (-2.89)	258.9157 (1.68)	-203.6974 (-1.93)
M2049	1809.65 (2.57)		-385.810 (-1.66)	3166.88 (5.32)				
F2049	-1917.81 (-2.47)		-362.379 (-1.60)	2790.77 (4.81)				-252.9629 (-1.86)
MO50				3621.74 (4.18)	-420.872 (-2.08)			459.7684 (2.39)
FO50	985.9129 (1.13)	-293.449 (-2.63)	-616.723 (-1.79)	2349.55 (3.41)			312.8579 (1.66)	-182.6808 (-1.13)
TENANCY	1161.33 (1.34)			2826.37 (4.79)		53.2048 (1.72)		
LAMBDA	-38873.5 (-6.48)	285.627 (0.62)	-312.495 (-0.39)	13550.52 (2.72)	-1540.02 (-2.95)	-808.0114 (-5.64)	-312.700 (-0.07)	-441.0516 (-0.72)
No. of Observation	11033	6929	1767	11118	4709	4927	387	3621
R^2	0.1232	0.0487	0.0667	0.1004	0.0977	0.0660	0.1024	0.0609

NOTE : Blank spaces indicate that variables were not included in the equation. The numbers in parentheses below coefficents are the t-values.

expenditure equations as the number of individuals in various age-sex categories. In general, as the number of children between the age of six and thirteen increased, the households spent more at Chinese restaurants in 1993, but less at snack bars in 1984 and 1993. Households with over fifty years females spent more at Korean restaurants but less at Chinese restaurants in 1993.

The results show that the variables included to correct the selectivity bias (LAMBDA) were statistically significant in 4 equations of 8 equations, indicating the significance of omitted variables. The R^2's in the second stage estimation are around 0.2. The low R^2's in the cross sectional data analysis are due to the inheritant heterogeneity of demand at household level. Expenditure elasticities and marginal effects were calculated from the coefficient estimates. The expenditure elasticities, as expected, were positive for all FAFH groups (Table 4). The expenditure elasticity for snacks was 0.5, elastic relative to other FAFH groups in 1993. The expenditure elasticity for FAFH except Korean food tends to be elastic since 1980's. It might be associated with an increase in price of FAFH due to the presence of high-graded and luxurious restaurants including fast-food and family restaurants in 1990's.

The marginal effects are used to examine the impacts of socio-demographic variables on eating food away from home. In the censored regression models, the estimated coefficients themselves do not directly provide meaningful interpretations. The marginal effect of socio-demographic variables, X_k, can be derived as follows (Maddala, 1983):

$$(1.12) \quad \frac{\partial E(EXP_i|EXP_i^*>0)}{\partial X_k} = \beta_k[1 - (\frac{\beta X_i}{\sigma})\lambda_i(\cdot) - (\lambda_i(\cdot))^2]$$

where X_k is socio-demographic variable k (k=1, ..., s). The calculated marginal effects are listed in Table 5.

The result shows that, ceteris paribus, households residing in Seoul are likely to spend at Korean restaurants (3,306 won per month and 92,090 won per month at cafeteria) in 1993. Households with both male and female heads (DBLJOB) were expected to spend more on snacks(946 won per month) but spent less on Korean food (1,587 won per month) in 1993. Female-headed households were also expected to spend more money on snacks (966 won) but spent less on Chinese food (103 won) in 1993.

TABLE 4 Expenditure Elasticities for FAFH and Major Food at Home

	FAFH [1]				At Home Food [2]			
	KFAFH	CFAFH	WFAFH	SFAFH	Rice	Beef	Pork	Milk
1984	0.61	0.26	0.18	0.50	0.12	1.15	0.47	0.43
1993	0.44	0.32	0.31	0.51	0.12	0.72	0.16	0.39

1) KFAFH : Korean food away from home
CFAFH : Chinese food away from home
WFAFH : Western food away from home
SFAFH : Snack and fast-food away from home
2) Elasticities for 'at home food' are cited from Choi and Lee(1995)

TABLE 5 Calculated Marginal Effects of Socio-Demograpic Variables

Variables	1993				1984			
	Expenditure at Korean Restaurants	Expenditure at Chinese Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities	Expenditure at Korean Restaurants	Expenditure at Chinese Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities
SUMMER	-2428.463	-199.4709	-352.4203					-97.43549
FALL	-2323.829	-269.6946	-410.287					-66.99243
WINTER	787.10241		-140.3113	-1175.818	211.9707	92.766722	153.76039	98.235315
WCOLLAR	-816.7239	74.437981	132.71474	-2025.568	86.925173		158.51608	-56.80786
FHEAD		-103.4629		966.36211				-201.593
HEADAGE	95.847612			-89.47911		1.2511578	-3.814348	-8.130.165
SEOUL	3306.7451	-47.3237	-119.3812	2090.66				
EDBH	-408.5401		-154.338	-982.6996				
EDGC	463.31301			767.04458				
DBLJOB	-1587.078			946.10548				
HASIZE	1832.6086		103.98068	1684.1134	45.037455	-33.37062		125.76031
CO5			-129.1824	-884.986	-103.5523	-15.2578	-39.51477	
C613	-750.8253	46.494825	-113.7806	-877.078	-96.20092			-72.67538
M1419	-1234.579		-148.8712	608.90408	-204.7792		-110.7089	-51.65698
F1419	-1378.713			557.12654	-125.6949	-29.62618	77.330608	-62.50481
M2049	776.74486		-123.4252	1206.6298				
F2049	-823.1679		-115.92	1063.3236				-77.62201
MO50			-197.2807	1379.9372	-143.1997			141.08056
FO50	423.17699	-107.232		895.21394			93.441578	-56.05585
TENANCY	498.47148			1076.8906		19.119711		

The calculated marginal effects of age-sex category variables suggest that Korean food was a preferred meal in the households with males 20 to 49 years or females over 50 years in 1993. Households with children 6 to 13 years were expected to spend more on Chinese food (46 won per month). In contrast, households with females over 50 years are likely to spend less money on Chinese food (107 won). Snacks became preferred food through most age-sex groups except children 6 to 13 years in 1993 compared to those in 1984.

V. Conclusions

This study utilized the 1984 and 1993 Family Income and Expenditure Survey data to evaluate the impact of economic and socio-demographics on FAFH expenditure (by source of expenditure) using Type 2 Tobit analysis. It appears to be the first attempt to analyze the demand for FAFH using household data in Korea.

This study found that the expenditure elasticities vary across the FAFH groups and, in general, were relatively elastic compared to elasticities for foods at home. It implies that opportunity cost of time is getting higher as the household income increases. The estimation results showed that many of socio-demographic variables significantly impacted FAFH consumption, and their marginal effect varied across the FAFH groups. These differential impacts of the independent variables on FAFH expenditures are important in light of changing life styles, income levels, employment status of households, and age distribution of the population. As more married women enter labor force and their time value increases, more food will be eaten away from home. If present trends continue, expenditures at fast-food and snacks facilities are likely to increase. Recent increase in number of fast food restaurants is accelerating this trend.

In summary, income and many socio-demographic variables significantly influenced FAFH expenditures. The results also indicate the importance of distinguishing between FAFH expenditures at different types of eating places.

One difficulty in analyzing the FAFH expenditures was that detailed expenditures data for the specific FAFH items such as fried chicken, hamburger, pizza, etc., are not available. With this problem, it was hard to

precisely interpret the estimation results for aggregate FAFH groups. If more detailed data are available in the future, the future research will provide more valuable insights to FAFH industry and policy-makers.

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