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AN ANALYSIS OF FOOD CONSUMER CHARACTERISTICS IN KOREA

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I. Introduction

Food consumption in Korea has undergone dramatic changes since the 1980's. The changes are mainly characterized by an increased demand for meat and food away from home. Food expenditures of urban-households have been increasing over time while the share for total expenditure decreased 13 percent between 1980 and 1996. In 1996, food expenditure accounted for 29 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 34 percent between 1980 to 1996.

Under these situations, identifying the factors affecting consumers' behavior on food is important for efficient adjustment of the food industry and farmers in changing consumer demand for food. Numerous factors are responsible for these changing consumption patterns, including demographic and life style changes, limited time for food preparation, increase in real disposable income, and diet, health, and food safety concerns.

The objective of this paper is to identify and compare the impacts of economic and socio-demographic variables on food consumption.

Two cross sectional data sets were used to examine the selected socio-economic impacts on food consumption across two different time periods: The data used in the empirical analysis are from the household

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component of 1984 and 1993 Family Income and Expenditure Survey.

For the estimation of food demand equation, Engel equations were estimated using OLS and Type 2 tobit model. Choi & Lee(1995, 1996) were referred to for details on the estimation procedures and methods.

II. Overview of Change in Food Consumption

During 1990-1996, rice consumption per capita has decreased 2.2 percent on average(Table 1). The decline of rice consumption was due to the change in nutrient intake sources from grain to meat. Improvement in per capita income increased purchasing power of consumer on meats which are relatively paid higher. Per capita consumption of meats and fruits has been on the rise, reaching 28.7 kg and 52.3 kg, respectively, in 1996. This is a 99 percent and 150 percent increase from the 1985 level, respectively. Per capita consumption of beef annually increased 9.6 percent between 1990 and 1996.

TABLE 1 Annual Per Capita Consumption for Major Food Items

Unit: kg/person

	1980	1985	1990	1996	Growth rate (%)	
					85~96	90~96
Rice	132.4	128.1	119.6	104.9	-1.4	-2.2
Meat	11.3	14.4	19.9	28.7	6.0	6.3
Beef	2.6	2.9	4.1	7.1	6.5	9.6
Pork	6.3	8.4	11.8	15.3	5.7	4.4
Vegetables	120.3	98.6	132.6	145.7	1.2	1.6
Fruits	21.8	35.8	41.0	52.3	5.6	4.1

Source: Ministry of Agriculture & Forestry, *Major Statistical Indicator for Agriculture*, 1997.

TABLE 2 Monthly Food Expenditure Per Household

Unit : thouand won, (%)

	Total Expenditure	Total Food Expenditure	Grains	Meat	Eggs & Milk	Seafood	Fruits	Bread& Cookies	FAFH	Other Food
1980	179.3	77.5	26.3	13.4	3.7	-	4.2	4.7	2.9	22.3
		(100)	(33.9)	(17.3)	(4.8)		(5.4)	(6.1)	(3.7)	(28.8)
1990	685.7	219.5	42.0	26.2	10.4	21.1	15.6	12.6	44.8	46.8
		(100)	(19.1)	(11.9)	(4.7)	(9.6)	(7.1)	(5.7)	(20.4)	(21.3)
1996	1426.9	406.1	47.6	44.3	14.5	36.2	30.5	23.7	136.6	72.7
		(100)	(11.7)	(10.9)	(3.6)	(8.9)	(7.5)	(5.8)	(33.6)	(17.9)

Source: National Statistical Office, *Annual Report on the Family Income and Expenditure Survey*, 1997.

In 1996, monthly household food and beverage expenditure (including alcohol) in Korea totaled 406 thousand won, up 80 percent from the total of 220 thousand won in 1990 (Table 2). These numbers, however, do not account for the general inflation that has occurred over the last few decades. In real terms, overall food expenditures increased by 30 percent between 1990 and 1996.

The share of grains in food consumption remarkably dropped over the last several decades. The grain share was 33.9 percent in 1980 and 11.7 percent in 1996. Expenditures on fruits and food away from home (FAFH) have been increasing over time, which increased the percentage of total food expenditure. In 1996, expenditures on fruits and FAFH accounted for 7.5 percent and 33.6 percent of the total expenditure, respectively. Expenditures on meat increased from 26.2 thousand won to 44.3 thousand won between 1990 and 1996, while the share of meat decreased from 11.9 percent to 10.9 percent.

III. Consumption Analysis of Major Food

For the analysis, food groups are aggregated into 9 groups: grains, processed grains, meat, eggs & milk, sea food, vegetables, fruits, bread & cookies, and food away from home. Additional analysis is carried out for major food items: rice, barley, soybean, flour, noodles,

beef, pork, chicken and milk.

It is important to examine the impact of socio-demographic variables as well as prices and expenditures on food consumption. It is expected that households with different socio-demographic characteristics have different attitude towards food consumption.

The household characteristic variables included in the Engel equation are: household expenditure in logarithm (LEXP), household size(HHSIZE), the presence of a female head (FHEAD) and two heads in a household (BHEAD), education level of household head (EDBH, EDGC), season dummies (SUMMER, FALL, WINTER), occupation of the household head (WCOLLAR), number of household member employed (EMPLOY), region dummy (SEOUL), age of household head(HEADAGE), and tenancy dummy (TENANCY).

Series of household composition variables were constructed, to measure the number of individuals in various age-sex categories in the household. The categories were: (1) children under 6 years (C05); children 6 to 13 years (C613); male children 14 to 19 years (M1419); female children 14 to 19 years (F1419); male adults 20 to 49 years (M2049); female adults 20 to 49 years (F2049); male adults over 50 years (MO50); female adults over 50 years(FO50). In the Engel equation, the expenditures of each food group or item were used as the dependent variables. The Engel equations were estimated by OLS or Type 2 Tobit model.[1] The estimation result of Engel equation using OLS and Tobit model for major food group and items are summarized as follows.

1. Socio-Demographic Impacts on Food Consumption

The results for the OLS estimation of Engel equation are presented in (Table 3) and (Table 4). Based on the sign and magnitude of the estimated coefficients, socio-demographic impacts on food at home are summarized as follows.

Generally, there is no significant difference across socio-

[1] Engel equations for major food items except rice, milk, beef 1993, and pork of which expenditure are zero for a significant portion of the sample were estimated by Type 2 Tobit model.

TABLE 3 OLS Estimation Results for Major Food Groups, 1993

	Grains	Processed Grains	Meat	Eggs& Milk	Seafood	Vegetables	Fruits	Oils & Seed	Bread & Cookies	FAFH
INTERCEPT	-69848	-12853	-236225	-43288	-179141	-83842	-152392	-13999	-109462	-689608
	(-11.51)	(-14.34)	(-42.41)	(-17.26)	(-38.75)	(-28.34)	(-42.95)	(-13.1)	(-34.81)	(-42.911)
LEXP	5231.46	1137.77	18174	3669.54	13687	6952.76	11781	1170.03	8790.53	53453
	(11.30)	(16.73)	(43.82)	(20.03)	(38.67)	(31.56)	(45.26)	(14.73)	(37.51)	(45.13)
SUMMER	716.57	1304.88	3092.74	-727.52		-1177.53	4961.80	-460.83		3832.23
	(1.35)	(20.65)	(6.90)	(-3.53)		(-4.91)	(16.86)	(-5.23)		(3.44)
FALL	7680.17		3153.79	-702.25	4476.39	-3698.03	6422.07	-151.60	-513.63	
	(14.31)		(6.99)	(-3.39)	(13.22)	(-15.32)	(21.64)	(-1.71)	(-2.37)	
WINTER	-954.76		3296.75	-2102.34	2615.94	-11501	2955.52	466.86	1509.17	-5443.15
	(-1.71)		(7.01)	(-9.77)	(7.31)	(-45.90)	(9.60)	(4.95)	(6.60)	(-4.59)
WCOLLAR		-115.05	1461.59		2152.93	889.79	1377.20	153.18	397.51	-4595.76
		(-1.76)	(3.94)		(6.26)	(4.30)	(5.86)	(2.12)	(1.80)	(-4.27)
FHEAD		-513.09	-2600.45	-623.72		-1567.00			1028.36	
		(-5.34)	(-4.65)	(-2.56)		(-5.25)			(3.24)	
BHEAD	-930.85	-452.04	-2345.46		-1271.63	-1966.91	-1252.11	-220.18	-1014.55	
	(-1.79)	(-4.96)	(-5.17)		(-2.74)	(-7.02)	(-4.27)	(-2.52)	(-3.40)	
HEAD AGE	94.58	-9.33	159.88		172.02	110.76	51.19	26.03	-28.50	-257.18
	(3.74)	(-2.68)	(7.44)		(9.09)	(9.64)	(3.70)	(6.07)	(-2.33)	(-4.19)
SEOUL	-4165.27	222.29	1331.87	814.91	-5136.24	927.53	-454.27		1887.74	7181.42
	(-8.87)	(3.21)	(3.33)	(4.46)	(-14.64)	(4.36)	(-1.73)		(8.35)	(6.13)
EDBH	2473.26	229.96	-478.89	-446.04	-1148.63	-687.75	-635.60	-122.87	-417.67	-4759.15
	(5.03)	(3.13)	(-1.13)	(-2.43)	(-3.07)	(-3.03)	(-2.38)	(-1.53)	(-1.73)	(-3.85)
EDGC	-2561.62		-1413.46	1518.41	-1175.98	-1948.41		-174.42	1536.86	6081.66
	(-5.33)		(-3.37)	(8.18)	(-3.12)	(-8.61)		(-2.15)	(6.38)	(4.93)
EMPLOY		-228.96		-680.91	-308.81	-558.48			-253.21	15831
		(-4.55)		(-5.96)	(-1.17)	(-3.50)			(-1.50)	(22.25)
C05	3853.18	815.88	2280.86	5979.16	630.70	469.11	583.97	-104.32	4005.39	-8794.70
	(11.68)	(16.43)	(8.08)	(47.49)	(2.55)	(3.11)	(3.34)	(-1.97)	(24.93)	(-10.82)
C613	8124.94	709.67	3488.27	1031.43	2440.63	2274.90	1400.28	155.35	3370.41	-7683.75
	(30.81)	(18.85)	(15.54)	(10.58)	(12.39)	(19.01)	(10.02)	(3.63)	(26.48)	(-11.90)
M1419	10112	809.60	2686.79	1500.79	1744.01	2569.23		128.71	827.25	-7404.38
	(22.33)	(12.25)	(7.02)	(8.74)	(5.14)	(12.62)		(1.75)	(3.82)	(-6.69)
F1419	8388.82	454.85	805.13	925.61	1276.88	1932.48	374.09		498.71	-4386.08
	(20.75)	(7.62)	(2.36)	(5.98)	(4.21)	(10.57)	(1.68)		(2.57)	(-4.39)
M2049	7376.82	346.44	1095.82	692.69	2036.83	3086.76		202.95	-784.93	9898.29
	(18.10)	(5.28)	(2.94)	(4.23)	(6.22)	(14.71)		(2.99)	(-3.53)	(9.35)
F2049	5197.44	465.77	1260.19	1077.24	1621.71	2693.83	1027.35	150.65	381.56	
	(12.31)	(6.91)	(3.52)	(6.26)	(4.75)	(13.07)	(4.41)	(2.17)	(1.75)	
M050	11040		2055.35		3472.31	3357.64	573.89	228.79	-1536.39	3134.12
	(17.15)		(3.67)		(7.02)	(11.00)	(1.65)	(2.19)	(-4.74)	(2.00)
F050	8612.63	228.79	2077.36	-352.31	2349.72	3088.45	1293.27	421.58	-562.02	
	(16.70)	(3.03)	(4.61)	(-1.85)	(6.01)	(12.67)	(4.50)	(4.98)	(-2.18)	
TENANCY			439.02	299.19		777.70	470.28	72.01	468.20	10269
			(1.20)	(1.80)		(3.98)	(1.96)	(1.03)	(2.25)	(9.67)
R^2	0.22	0.11	0.25	0.23	0.22	0.33	0.24	0.08	0.24	0.26

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

TABLE 4 OLS Estimation Results for Major Food Groups, 1984

	Grains	Processed Grains	Meat	Eggs & Milk	Seafood	Vegetables	Fruits	Oils & Seed	Bread & Cookies	FAFH
INTERCEPT	-38806	-4953.61	-118021	-3726.9	-62015	-45664	-58801	-10451	-43245	-84907
	(-9.39)	(-10.69)	(-56.44)	(-35.71)	(-39.52)	(-34.07)	(-51.03)	(21.81)	(-37.85)	(-36.37)
LEXP	3238.42	504.32	10176	3421.90	5336.01	4171.61	5086.33	938.54	3885.92	7646.28
	(9.44)	(13.49)	(60.77)	(41.33)	(42.08)	(38.60)	(53.65)	(24.60)	(42.14)	(39.67)
SUMMER	-570.94	369.23	1107.09	-243.58		537.21	2875.22	49.04	139.61	
	(1.35)	(8.27)	(5.51)	(-2.38)		(4.17)	(24.74)	(1.36)	(1.27)	
FALL	3390.21	-71.29	926.02	-330.49	1784.29	402.16	1936.39		-383.82	-714.54
	(7.89)	(-1.58)	(4.56)	(-3.20)	(13.56)	(3.08)	(16.48)		(-3.44)	(-3.48)
WINTER	-451.16	222.71	2396.62	-987.05	-469.64	-5548.10	1551.74		316.15	-396.33
	(-1.02)	(4.80)	(11.46)	(-9.30)	(-3.44)	(-41.44)	(12.86)		(2.76)	(-1.86)
WCOLLAR	-1290.76	-117.72	1180.52	785.04	949.24	679.47	548.00	123.08	461.88	289.16
	(-3.95)	(-3.42)	(7.62)	(10.01)	(8.16)	(6.84)	(6.13)	(3.57)	(5.44)	(1.59)
FHEAD		-85.21	-1625.52	-326.67	-1015.00	-1013.21	-603.66	-70.23	144.47	-514.41
		(-1.68)	(-7.82)	(-2.84)	(-5.88)	(-6.86)	(-4.57)	(-1.49)	(1.15)	(-1.90)
HEADAGE	49.75	-2.23	23.42	-15.67	27.68	12.74		7.29	-21.24	-50.87
	(2.72)	(-1.23)	(3.03)	(-3.62)	(4.21)	(2.26)		(4.01)	(-4.46)	(-4.97)
EMPLOY	1083.54	-37.48	-820.35	-453.81	-363.58	-596.46	-158.65	-51.75		773.32
	(3.93)	(-1.30)	(-6.49)	(-7.14)	(-3.67)	(-7.05)	(-2.10)	(-1.83)		(5.01)
C05	3087.26	228.91		990.65	441.43	140.37	-86.73	50.75	1531.25	-887.92
	(13.80)	(9.64)		(19.13)	(5.46)	(2.04)	(-1.41)	(2.96)	(26.47)	(-7.03)
C613	5811.29	206.39		131.12	612.23	649.43	67.57		596.60	-999.00
	(33.55)	(11.56)		(3.17)	(9.83)	(12.22)	(1.45)		(13.14)	(-10.35)
M1419	8122.33	428.88	-1081.10		258.69	692.08	-565.29	59.22	-359.06	-1064.92
	(25.97)	(13.00)	(-7.61)		(2.31)	(7.26)	(-6.71)	(1.84)	(-4.44)	(-6.13)
F1419	6448.48	148.65	-976.77		252.16	742.57	-183.33	-38.80		-1116.10
	(21.02)	(4.58)	(-6.81)		(2.28)	(7.92)	(-2.18)	(-1.22)		(-6.52)
M2049	6695.20	88.30		-288.42	333.55	1283.56	-669.11		-571.65	-289.54
	(22.12)	(2.58)		(-3.64)	(2.83)	(12.77)	(-7.46)		(-6.93)	(-1.57)
F2049	5030.98	189.89	470.27		866.60	1628.71	482.44	193.03	-169.22	-1293.78
	(14.35)	(5.15)	(2.83)		(6.87)	(15.10)	(5.03)	(5.22)	(-1.90)	(-6.59)
M050	7155.07			-573.25	556.95	1241.39	-602.47		-1007.95	-1052.42
	(14.62)			(-4.82)	(3.14)	(8.19)	(-4.79)		(-7.91)	(-3.84)
F050	7906.60	-63.05	743.56	-340.64	952.53	1203.77	180.95	297.03	-394.15	-1456.68
	(20.08)	(-1.55)	(4.17)	(3.63)	(6.56)	(9.70)	(1.64)	(7.30)	(-3.74)	(-6.47)
TENANCY		-48.02	-213.98	-291.58	-496.47	172.30		-72.09	292.46	
		(-1.35)	(-1.35)	(-3.59)	(-4.12)	(1.67)		(-2.03)	(3.34)	
R^2	0.32	0.08	0.38	0.25	0.31	0.42	0.33	0.14	0.27	0.17

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

demographic impacts on grain products between 1984 and 1993. The SUMMER variable has an overall positive impact on processed grain consumption between 1984 and 1993. This suggests that households consumed more flour products, and noodles in summer than in spring. Households headed by female only (FHEAD) consumed less processed grains compared to male headed households. Households residing in Seoul (SEOUL) were found to consume more processed grains but less grains relative to households residing in other cities.

There were a number of significant estimation coefficients for the household' s age-sex category variables in the Engel equation. In 1984, as the number of teenagers between the age of fourteen and nineteen (C1419) increased, the households consumed less meat. In 1993, however, meat consumption increased in all age-sex groups. Especially, households which have children between the age of six to thirteen (C613) consumed much more meat compared to other households. It is found that households consisting of adults over 50 years old (MO50) had significantly higher preferences for seafood than the other households.

In 1984, households consisting of women between 20 to 49 years old (F2045) had significantly higher preferences for vegetables while households consisting of men over 50 years old (MO50) had significantly higher preferences for vegetables. Fruits were largely preferred for households consisting of women over 20 years (F2049, FO50).

White collar households (WCOLLAR) consumed more meat, seafood, fruits, and oil seeds compare to blue collar households and the trends are consistent throughout 1984 and 1993. Female headed households (FHEAD) consumed less meat, eggs, and vegetables compared to male headed households.

The results for rice of Engel equation indicate that households whose household heads had a college education or more (EDGC) consumed less rice compared to household heads who had a high school education or less. Households residing in Seoul (SEOUL) consumed less rice compared to households residing in other cities. And the presence of two heads in a household (BHEAD) negatively impacted rice consumption, as a result of male and female headed households having more occasions to eat way from home.

Preferences of flour and noodles were not significantly different across two time periods in a sense that signs of coefficients are

consistent between 1984 and 1993. Noodles were preferred for the households who had males over 50 years of age (MO50).

The Engel Equation was estimated for major food items such as beef, pork, and chicken. The results indicate that households residing in Seoul (SEOUL) or white collar (WCOLLAR) households or households whose heads have a college education (EDGC) consumed more beef compared to reference households (Table 5 and 6). Pork was consumed more in the winter of 1984 and in summer of 1993. It implies that pork consumption increased due to increase in demand for barbecue in summer as the level of income is getting higher. Consumption pattern of chicken is very similar to that of pork.

Milk consumption is closely related to household age-sex composition. Households who have kids below 13 years old (C05, C613) consumed more milk than other households. In contrast, households who have adults over 50 years old (MO50, FO50) consumed less milk.

2. Income Impact on Food

Expenditure elasticities of major food groups and food items are calculated from the estimated coefficients and are evaluated at sample mean (Table 7). Generally, the expenditure elasticities of foods in 1993 are positive and more inelastic than those in 1984, indicating that food are becoming necessities as income increases. There are some significant differences in elasticities throughout food items, and also between 1984 and 1993. Expenditure elasticities of grain products including processed grains, rice, and soybean were generally inelastic, ranging from 0.1 to 0.25, and the magnitude of the elasticities for each grain product between 1984 and 1993 were almost the same.

Elasticities for rice in 1993 was 0.12 and the same as in 1984. Generally, income elasticities of rice is found to be negative based on time series data analysis. The elasticities from cross-section analysis is likely to be positive because there exist quality differences in the rices paid by households. Elasticities of barley in 1984, known as an inferior good, was -0.042 as expected, however in 1993, the estimated coefficient was not significant. This implies that barley is no longer an inferior good but has become a health food in 1990's.

TABLE 5 WLS(Weighted Least Square) Estimation Results for Major Food Items, 1993

	Rice[1]	Barley	Soybean	Flour	Noodles	Beef[1]	Pork[1]	Chicken	Milk[1]
INTERCEPT	-53960	1469.59	-251.23	-1066.6	-1982.58	-116963	-12553	-5484.13	-35464
	(-8.95)	(10.40)	(-0.25)	(-3.81)	(-3.79)	(-41.74)	(-8.17)	(-5.33)	(-17.13)
LEXP	4409.51		228.17	80.68	215.44	8618.65	1135.99	532.09	2924.60
	(9.57)		(3.64)	(4.09)	(6.42)	(40.79)	(9.93)	(8.36)	(18.77)
SUMMER	-3325.06	-214.95	-487.51		-75.74	1152.43	767.39	765.40	-374.95
	(-6.36)	(-5.26)	(8.92)		(-1.40)	(4.61)	(6.84)	(6.67)	(-2.09)
FALL	2840.10	-223.53		-88.29	-441.83	2676.48		-341.10	-353.35
	(5.44)	(-5.66)		(-5.01)	(-9.86)	(10.63)		(-4.49)	(-1.96)
WINTER	-707.73	-62.77	82.68	32.12	-310.48	4050.05	-875.33	160.01	-1755.50
	(-1.26)	(-1.46)	(1.39)	(1.46)	(-4.57)	(15.49)	(-7.32)	(1.90)	(-9.36)
WCOLLAR	-490.08	94.35		-49.85	67.09	1556.67	-421.91	-163.74	291.46
	(-1.09)	(2.82)		(-2.29)	(2.37)	(7.21)	(-3.67)	(-2.72)	(2.00)
FHEAD							-748.81	-366.38	-399.44
							(4.64)	(-3.25)	(-1.92)
BHEAD	-1071.52	62.26	-97.59	-66.41		-1016.65	-272.39	-127.21	
	(-1.784)	(1.43)	(-1.41)	(-2.94)		(-3.51)	(-1.76)	(1.62)	
HEADAGE	59.16			2.98	3.73	139.56			9.03
	(2.42)			(3.00)	(2.03)	(11.88)			(1.07)
SEOUL	-2691.41			-42.98	207.69		120.55		534.80
	(-5.79)			(-2.29)	(6.20)		(1.03)		(3.38)
EDBH	2150.16	85.34	121.90	24.63		-1316.06	261.63	71.96	-382.57
	(4.45)	(2.52)	(2.29)	(1.31)		(-5.62)	(2.15)	(1.16)	(-2.26)
EDGC	-2715.98	-54.99		-20.76		688.72	-1080.82	-356.31	765.78
	(-5.51)	(-1.62)		(-1.03)		(2.91)	(-8.64)	(-5.03)	(4.55)
EMPLOY	443.46	-84.20	-107.11		-57.76	-516.34	247.63	98.17	-391.50
	(1.295)	(-3.63)	(-3.03)		(-2.48)	(-3.31)	(2.84)	(2.27)	(-4.01)
C05	4323.33	-67.59	-100		33.77	252.05	716.95	209.48	3771.86
	(13.36)	(-2.73)	(-2.73)		(1.35)	(1.69)	(8.69)	(4.66)	(33.16)
C613	8328.52	30.88		39.90	56.68	288.38	1467.64	215.66	859.07
	(32.53)	(1.63)		(4.17)	(2.88)	(2.42)	(22.23)	(5.81)	(9.67)
M1419	10474	70.10	85.14	75.37	84.12		1923.05	278.03	975.45
	(23.93)	(2.37)	(1.79)	(4.48)	(2.59)		(17.22)	(4.66)	(6.46)
F1419	9024.61	70.10	88.81	37.27		-405.48	950.80	72.38	295.55
	(23.01)	(66.36)	(1.96)	(2.52)		(-2.14)	(9.47)	(1.38)	(2.19)
M2049	7907.44	66.36		54.70	73.19		1529.41	275.38	
	(18.75)	(2.38)		(3.28)	(2.13)		(13.25)	(4.43)	
F2049	5347.69	76.16	-68.04	32.18	62.05	374.29	724.91		502.31
	(12.13)	(2.52)	(-1.38)	(1.97)	(1.98)	(1.78)	(6.84)		(3.35)
M050	11299	196.03	219.85	94.79	120.31	1209.26	1376.93	498.04	-359.33
	(17.74)	(4.57)	(3.40)	(3.77)	(2.70)	(4.04)	(9.53)	(6.65)	(-1.67)
F050	8122.73	87.38	238.33	117.17		1829.89			-707.99
	(16.18)	(2.66)	(4.03)	(5.89)		(7.51)			(-3.97)
LAMBDA		-248.11	-1065.72	228.43	-199.23			880.34	
		(-2.86)	(-5.73)	(3.67)	(-1.17)			(2.25)	
R^2	0.24	0.06	0.09	0.06	0.06	0.22	0.12	0.06	0.15

Note :[1] Engel equations were estimated by OLS model.
Blank spaces indicate that variables were not included in the equation. The numbers in parentheses below coefficients are the t-values.

TABLE 6 WLS(Weighted Least Square) Estimation Results for Major Food Items, 1984

	Rice[1]	Barley	Soybean	Flour	Noodles	Beef	Pork[1]	Chicken	Milk[1]
INTERCEPT	-41966	760.37	-1508.01	208.72	-226.76	-77742.04	-20271	-6584.01	-20908
	(-10.19)	(1.55)	(-2.93)	(0.57)	(-1.09)	(-11.94)	(-24.62)	(-5.22)	(-27.78)
LEXP	3718.50	-4266	137.01	-37.08	38.28	6401.64	1809.54	600.33	905.56
	(11.10)	(-1.37)	(3.93)	(-1.73)	(2.23)	(13.53)	(27.28)	(7.90)	(31.45)
SUMMER	-1290.98	-59.44		63.50	185.68	230.01	186.25	693.55	
	(-3.75)	(-1.76)		(1.77)	(6.41)	(1.46)	(2.35)	(5.06)	
FALL	1867.03		196.58	-126.22		819.22	180.82	92.36	
	(5.34)		(7.41)	(-4.70)		(4.40)	(2.26)	(1.39)	
WINTER			185.28	49.76		2308.25	574.04	140.12	-507.88
			(4.20)	(1.30)		(10.26)	(6.96)	(2.02)	(-8.18)
WCOLLAR	-1410.89			-70.71	25.96	1406.14	-93.83		503.51
	(-4.61)			(-3.57)	(1.61)	(8.18)	(-1.54)		(9.04)
FHEAD		58.06				-908.60	-579.47	-154.89	-197.15
		(1.36)				(-3.89)	(-6.55)	(-1.75)	(-2.39)
HEADAGE	27.64	8.12	5.05		1.76	18.55	5.29		-11.04
	(1.62)	(4.02)	(3.96)		(1.86)	(2.62)	(1.54)		(-3.59)
EMPLOY	571.13			22.14	-41.25	-771.48	-101.91		-285.72
	(2.21)			(1.41)	(-3.00)	(-6.41)	(-1.96)		(-6.03)
O15	3000.80	49.40	-23.43	48.22		-191.37	231.26	68.77	460.49
	(14.31)	(2.37)	(-1.50)	(3.47)		(-2.32)	(5.47)	(2.43)	(12.32)
O613	5600.67	124.73		115.82	59.45	-254.85	264.09	45.36	
	(34.42)	(8.09)		(11.45)	(7.36)	(-3.97)	(8.16)	(2.00)	
M1419	7819.19	156.05	42.56	121.98	70.38	-772.70	117.33		-188.13
	(26.82)	(6.06)	(1.97)	(7.08)	(4.65)	(-6.55)	(2.02)		(-3.57)
F1419	6248.85	100.90	51.59	125.23	45.63	-546.72	-61.11		-153.79
	(21.87)	(3.97)	(2.43)	(7.30)	(3.02)	(-4.71)	(-1.06)		(-2.92)
M2049	6795.36	113.68		42.88	80.34	-134.52	362.54	124.90	-366.48
	(23.98)	(4.27)		(2.37)	(5.21)	(-1.10)	(55.90)	(2.82)	(-6.50)
F2049	5390.77	99.57	23.95	60.87	69.85	226.36	274.47	133.85	-67.99
	(16.30)	(3.24)	(1.01)	(3.07)	(4.05)	(1.77)	(4.30)	(2.79)	(-1.13)
MO50	7112.43	73.97		83.13	103.19	189.77	308.89	123.18	-423.42
	(15.55)	(1.79)		(3.19)	(4.42)	(1.05)	(3.51)	(1.96)	(-5.14)
FO50	7336.90	229.15	134.56	112.86		655.79		68.99	-386.32
	(19.82)	(6.91)	(5.30)	(4.98)		(4.52)		(1.24)	(-5.59)
TENANCY	-438.31		-78.66	-42.31		-214.32	83.37		-192.11
	(-1.390)		(-3.29)	(-2.17)		(-1.73)	(1.33)		(-3.34)
LAMBDA		-13.44	93.33	590.97	-132.83	3009.10		971.51	
		(-0.12)	(1.02)	(2.81)	(-2.13)	(2.74)		(2.21)	
R^2	0.35	0.07	0.08	0.09	0.07	0.23	0.14	0.04	0.18

Note : [1] Engel equations were estimated by OLS modal.
Blank spaces indicate that variables were not included in the equation. The numbers in parentheses below coefficients are the t-values.

TABLE 7 Expenditure Elasticities for Food Group and Food Items, 1984~1993

	1984	1993
Grains	0.11	0.15
Rice	0.12	0.12
Barley	-0.042	-
Soybean	0.21	0.15
Processed Grains	0.25	0.25
Noodles	0.07	0.20
Meat	0.83	0.54
Beef	1.15	0.72
Pork	0.47	0.16
Chicken	0.47	0.16
Seafood	0.59	0.52
Fruits	0.75	0.56
Vegetables	0.40	0.31
Bread & Cookies	0.66	0.53
FAFH	1.15	0.75

Elasticities of food away from home is 0.75 and higher than any other food. And elasticities of beef (0.72), pork (0.16), chicken (0.16), bread & cookies (0.53), and fruits (0.56) were found to be elastic compared to the grain products.

IV. Analysis of Food Away From Home

The use of household data for food away from home (FAFH) analysis creates a major estimation problem. The problem stems from the fact that households are observed not to consume FAFH. According to the 1993 Family Income and Expenditure Survey data, 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 one season (three months). In this study, the Type 2 Tobit model was used for modelling zero consumption behavior on FAFH, and Heckman's two step estimation

method was applied to the estimation of the model[3].

The results of the second stage WLS estimation for the FAFH expenditure models are summarized in (Table 8). The parameter estimates for the logarithm of household expenditure (LEXP) 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 FAFH compared to households at lower household expenditure level. Households whose heads 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) were observed 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.

The location of households had a significant impact on FAFH expenditure pattern. The result showed households residing in Seoul spent 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(BHEAD) on average spent more on snacks and fast-food away from home than other households. They are assumed to eat FAFH more frequently than single headed households due to higher rate of time shortage.

In general, as the number of children between the age of six and thirteen (C613) increased, the households spent more at Chinese restaurants in 1993, but less at snack bars in 1984 and 1993. Households with over fifty year old females (FO50) 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^2s in the second stage estimation are around 0.2. The low R^2s in the cross sectional data analysis are due to the inherent heterogeneity of demand at household level.

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[3] Refer to Amemiya(1984) and Choi & Lee(1996) for the detailed discussion of Type 2 tobit and Heckman's two step estimation procedure.

TABLE 8 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 Korea Restaurants	Expenditure at Chinese Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities
CONST	174487.4	-12688.8	-16547.3	-148148.3	-25804.7	-2259.47	-2982.77	-12283
	(-6.64)	(-8.26)	(-3.29)	(-9.99)	(-7.03)	(-3.24)	(-0.79)	(-3.52)
LTEXP	15236.27	1173.65	1711.78	11734.14	2443.41	316.8730	414.7778	1303.46
	(8.68)	(12.35)	(5.69)	(11.53)	(9.24)	(6.38)	(1.63)	(5.31)
SUMMER	-5657.804	-545.869	-1101.71					-317.5332
	(-4.83)	(-5.12)	(-3.52)					(-2.02)
FALL	-5414.03	-738.042	-1282.61					-218.3221
	(-5.73)	(-7.24)	(-4.23)					(-1.39)
WINTER	1833.78		-438.6296	-3086.01	623.0175	2581.438	514.8153	320.1397
	(1.83)		(-1.41)	(-3.28)	(3.30)	(7.44)	(2.47)	(1.72)
WCOLLAR	-1902.79	203.7057	414.882	-5316.24	255.478		530.7381	-185.1315
	(-2.08)	(2.23)	(1.85)	(-8.88)	(1.69)		(2.80)	(-1.51)
HEA AGE	223.305			-234.844		3.4816	-12.7711	-26.4955
	(4.82)			(-5.63)		(1.90)	(-1.18)	(-2.99)
FHEAD		-283.135		2536.28				-656.9728
		(-2.26)		(2.63)				(-3.62)
SEOUL	7704.02	-129.505	-373.1996	5487.08				
	(9.61)	(-1.25)	(-1.57)	(7.59)				
EDBH	-951.812		-482.4786	-2579.16				
	(-1.02)		(-1.57)	(-3.79)				
EDGC	1079.42			2013.16				
	(1.27)			(3.20)				
BHEAD	-3697.55			2483.12				
	(-3.45)			(2.73)				
EMPLOY	4269.59		325.056	4420.07	132.367	-92.8611		409.8411
	(6.69)		(2.08)	(9.67)	(1.17)	(-3.86)		(3.34)
C05			-403.84	-2322.71	-304.346	-42.5082	-132.302	
			(-2.46)	(-5.41)	(-2.98)	(-2.23)	(-1.12)	
C613	-1749.26	127.237	-355.692	-2301.95	-282.740			-236.8423
	(-4.04)	(2.86)	(-2.61)	(-6.79)	(-3.39)			(-3.61)
M1419	-2876.31		-465.389	1598.11	-601.857	-370.6718	-370.6718	-168.3453
	(-3.91)		(-1.93)	(2.82)	(-4.33)	(-2.33)	(-2.33)	(-1.49)
F1419	-3212.11			1462.22	-369.424	-82.4414	258.9157	-203.6974
	(-4.65)			(2.93)	(-2.74)	(-2.89)	(1.68)	(-1.93)
M2049	1809.65		-385.810	3166.88				
	(2.57)		(-1.66)	(5.32)				
F2049	-1917.81		-362.379	2790.77				-252.9629
	(-2.47)		(-1.60)	(4.81)				(-1.86)
M050				3621.74	-420.872			459.7684
				(4.18)	(-2.08)			(2.39)
F050	985.9129	-293.449	-616.723	2349.55			312.8579	-182.6808
	(1.13)	(-2.63)	(-1.79)	(3.41)			(1.66)	(-1.13)
TENANCY	1161.33			2826.37		53.2048		
	(1.34)			(4.79)		(1.72)		
LAMBDA	-38873.5	285.627	-321.495	13550.52	-1540.02	-808.0114	-31.2700	-441.0516
	(-6.48)	(0.62)	(-0.39)	(2.72)	(-2.95)	(-5.64)	(-0.07)	(-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 coefficients are the t-values.

The marginal effects are used to examine the impacts of socio-demographic variables on eating FAFH. In the censored regression models, the estimated coefficients themselves do not directly provide meaningful interpretation. The marginal effect of socio-demographic variables were calculated based on Maddala (1983)[4].

The calculated marginal effects are listed in Table 9. The result shows that, ceteris paribus, households residing in Seoul (SEOUL) were inclined to dine out at Korean restaurants (96 won per month and 89 won per month at cafeteria) in 1993. Households with both male and female heads (BHEAD) were expected to spend more

TABLE 9 Calulated Marginal Effects of Socio-Demograpic Variables

Unit: won

Variables	1993				1984			
	Expenditure at Korean Restaurants	Expenditure at Chuinses Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities	Expenditure at Korea Restaurants	Expenditure at Chuinses Restaurants	Expenditure at Western Restaurants	Expenditure at Snack and Fast-food Facilities
SUMMER	-2428.463	-199.4709	-352.4203					-97.43549
FALL	-2323.289	-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
SEOUL	95.847612			-89.47911				
HEADAGE	3306.7451	-47.3237	-119.3812	2090.66		1.2511578	-3.814348	-8.130165
EDBH	-408.5401		-154.338	-982.6996				
EDGC	463.31301			767.04458				
BHEAD	-1587.078			946.10548				
EMPLOY	1832.6086		103.98068	1684.1134	45.037455	-33.37062		125.76031
C05			-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
M050			-197.2807	1379.9372	-143.1997			141.08056
F050	423.17699	-107.232		895.21394			93.441578	-56.05585
TENANCY	498.47148			1076.8906		19.119711		

[4] A detailed discussion of deriving marginal effect on FAFH is presented in Choi & Lee(1996).

money on snacks(946 won per month) but spent less on Korean food (1,587 won per month) in 1993. Female headed households (FHEAD) were also expected to spend more money on snacks (966 won) but spent less on Chinese food (103 won) in 1993.

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 old (M2049) or females over 50 (FO50) years old in 1993. Households with children 6 to 13 years of age (C613) were expected to spend more money on Chinese food (46 won per month). In contrast, households with females over 50 years old were likely to spend less money on Chinese food (107 won). Snacks became preferred food throughout most age-sex groups except children 6 to 13 years old 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 food expenditure.

This study found that the expenditure elasticities vary across food groups and, in general, were inelastic. The estimation results showed that many of socio-demographic variables significantly affected food consumption. On the basis of the analysis of the Family Income and Expenditure Survey, change in age-sex composition of household may affect food consumption patterns in the future. For example, consumption of grains and flour products will decrease while that of meat and milk will increase. And the presence of more women in the paid labor force will increase the importance of convenience in foods. It implies that opportunity cost of time is getting higher as the household income increases. Recent increase in the number of fast food restaurants is accelerating this trend.

One difficulty in analyzing the food expenditure was that detailed expenditures data for the specific food items such as fried roast beef, hamburger, pizza, etc., were not available. With this problem, it was hard to precisely interpret the estimation results for aggregate food groups. It is recommended that Nationwide Food Consumption Survey be conducted in Korea in the near future. The survey should contain detailed information associated with diet,

health, and food safety as well as prices of food and details of foods. The survey data will provide more valuable insights to researchers, food industry, farmers, and policy-makers.

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