Time-Saving Food Preparation Pattern and its Relationship to Income and Age Cohort in Korea

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lifestyle, age cohort, cluster analysis, food consumption

Abstract
This study investigates the relationship between consumers' perception of time scarcity and its determinants, focusing on their food preparation behavior. Through cluster analysis, consumers are classified according to their time allocation for food preparation. Two clusters of consumer groups—those with relatively time-spending and time-saving lifestyles—are identified depending on the survey questions associated with food preparation time. A binomial logit model in which the derived clusters are included as a dependent variable in the form of binary variables is estimated to analyze the effects of the determinants of the time-saving lifestyle. The effects that impact the probability of consumers being classified into the time-saving lifestyle are estimated to be significantly different from one generation to another and across the income cohorts. The demographic factors influencing consumers to be in the time-saving lifestyle are found to be marriage, education level, number of family members, wife's labor force participation, and residence in an urban area.

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1. Introduction

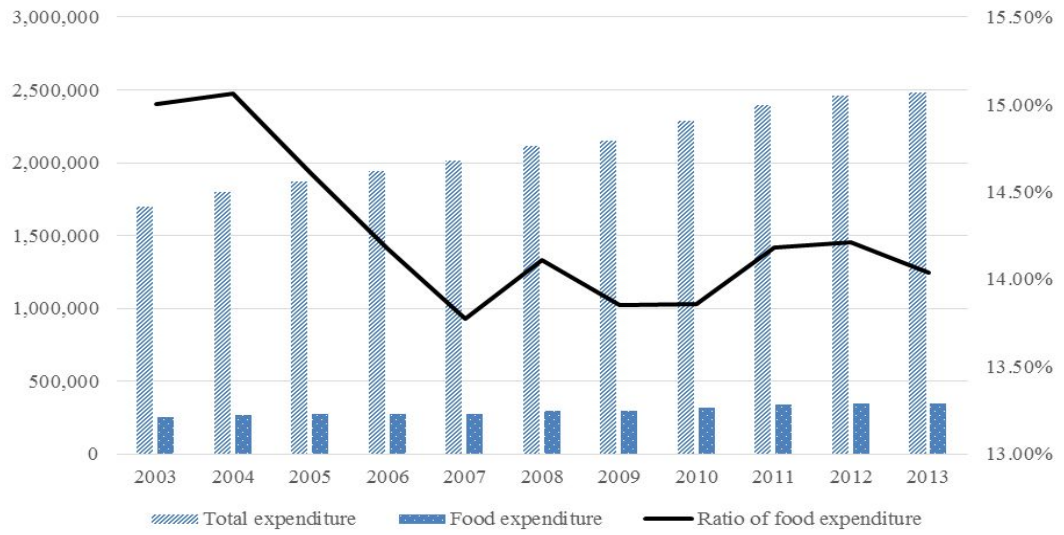
Although there was rapid economic growth in Korea from the early 1960s to the late 1990s, it is still one of the fastest growing developed countries. Such drastic changes have increased pressure and time scarcity, leading to busy lifestyles and a resulting demand for convenience. Among the OECD countries, Korea has the second-highest level of working or studying hours, while it is at bottom for hours of routine housework. This suggests that Koreans are less likely to spend their time on meal preparation at home. Figure 1 shows a decreasing trend in the ratio of expenditure on food to total household expenditure, excluding the expenditure for eating out. From this, we see that people in Korea are currently less likely to cook at home than they were 10 years ago. We can relate this trend of time scarcity to people's food choices, such as an increase in the purchase of food away from home or convenience foods and a decrease in the consumption of food at home or cooking food at home.

If the perception of time pressure affects consumers' food choices, we can state the hypothesis that consumers' utility from food consumption will differ by their opportunity cost for time. According to household production theory (Becker, 1965), households produce outputs such as meals, for the own consumption but not for selling, in accordance with a production function where the major inputs are the food materials and related services purchased from the market, the capital in the household, and the time use.

In the household production model, time allocation plays a very import role since not only it acts as an input for producing goods or services that will be consumed within household but also becomes a source of income (i.e., labor income) when it is utilized for working. In this context, while Becker's household production theory can explain the increasing importance of convenience due to time shortage caused by factors such as rising incomes and the increased participation of women in the labor force, the idea does not fully reflect the differences in consumers' preferences (see, e.g., Ferber and Birnbaum, 1977). In order to fill this gap, the

present study extends Becker's idea by considering individual consumers' perceptions of time scarcity.

Figure 1. Ratio of food expenditure to total expenditure (2003-2013)



Source: kosis.kr

Note: Ratio of food expenditure = (Food expenditure/Total expenditure) * 100

Most studies that investigate consumers' food choices and their relation to time from the perspective of household production theory have used records of time use data or survey questions asking participants how much time they spend on meal preparation or consumption. In these studies, various demographic factors, such as income, marriage, number of children, occupational status, or education level, are found out to be effective. Notable examples in this line of research are Hill and Stafford (1974), Zick and McCullough (1991), Brines (1994), Presser (1994), Sanchez and Thomson (1997), Yu et al. (2002), and Guryan et al. (2008). According to a U.S. Department of Agriculture study, which conducted tobit analysis using the 2003-04 American Time Use Survey (ATUS), household time resources are found to be more important than monetary resources in food preparation decisions (Mancino and Newman, 2007). In psychological studies, it has been proven that perceived time pressure is a stronger determinant of convenience behavior related to time-saving aspects in household meal

production than the actual number of working hours (Darian and Cohen, 1995). Households' convenience-related behaviors include the purchase of convenience products, use of convenient shopping outlets, or use of eating out and home meal replacements (Scholderer and Grunert, 2005). These prior studies suggest that time resources and demographic characteristics should be the core of analyzing consumers' food consumption behavior.

The present study analyzes consumers' attitudes toward food preparation time to capture their preferences regarding time scarcity. Instead of using time use data, survey questions associated with consumers' time-related lifestyle are utilized to elicit preferences for the time spent on food preparation. By performing cluster analysis, we categorize consumers according to their perceptions of time for preparing food. Consumers are classified into two groups: relatively time-spending and relatively time-saving in preparing food. We then address the hypothesis that a difference in the preferences for food preparation time (in Becker's perspective, food production time) exists between consumer groups. The test for this hypothesis is conducted using a logit model in which the categorized consumer groups are converted into binary variables and used as a dependent variable, with the socioeconomic and demographic characteristics as explanatory variables. In particular, we consider income and age cohorts as major factors that influence the probability of consumers being categorized into the time-saving group, reflecting the drastic economic change in Korea and the resulting transition of food consumption patterns from one generation to another (Lee, 2010; Kim et al., 2011).

Specifically, we focus on age and income as major factors influencing the time-saving lifestyle owing to a historical property of Korea. The drastic change in Korea may have induced a change of food consumption from one generation to the next. Therefore, we include the age cohort variable to capture the generational difference in time-related food consumption style. In the case of income, the opportunity cost of time for food production highly depends on the household's earnings. In this sense, we set two research hypotheses: (i) "There is a generational difference in opportunity cost of time for meal preparation," and (ii) "The opportunity cost of time will differ according to income level."

The remainder of the paper is organized as follows. In section 2, the estimation methods used in the study are explained. The questions utilized in clustering are discussed in section 3, and data are described in section 4. Estimation results are presented in section 5, and a conclusion with a summary of the empirical findings of this study is presented in section 6.

2. Methodology

2.1. Cluster Analysis

Cluster analysis is useful in grouping individuals into several categories by similarity and closeness, calculated by the distance of the values that indicate individual characteristics. It has been used to sort respondents from survey data, especially to group people who share similar behaviors or consumption patterns (Punj and Stewart, 1983).

Since this study utilizes survey data for more than 2,000 individuals, we choose the K-means cluster analysis, which is widely used for non-hierarchical methods. In the first step of the analysis, the centers of the cluster are randomly chosen, where the number of clusters (K) is predetermined by the researcher. Individuals are then grouped into each cluster with the closest center. Here, the distance between the individual and the cluster center is equal to the Euclidean distance, which can be described as:

$$\sum_{m=1}^{g}\sum_{l=1}^{m_n}(X_{ml}-\overline{X_m})'(X_{ml}-\overline{X_m})=\sum_{m=1}^{g}\sum_{l=1}^{m_n}d_{ml,m}^2 \quad (1)$$

where $\mathrm{X_{ml}}$ represents the p-dimension vector of the observational value of the *l*th individual in group *m*, $\mathrm{X_m}$ is the mean vector within group *m*, and $\mathrm{m_n}$ is the number of individuals in the m cluster. As $d_{ml,m}$ is the Euclidean distance between the *l*th individual in the *m*th group and the mean of the *m*th group, individuals are relocated into the nearest group. Group means are

updated after every single relocation. The final solution is determined when there is no more change in the cluster centers.

2.2. Probabilistic Choice Model

According to the probabilistic choice model, every individual chooses an optimal choice that maximizes his or her utility under the assumption that each individual chooses the most attractive choice among all the alternatives. It is based on the principle of random utility theory, where the utility is assumed to follow the random function, and individuals choose the choice that brings the highest utility. Utility in this case can be described as:

$$U_{in} = V_{in} + \varepsilon_{in}, \quad (2)$$

where U_{in} equals the total utility when individual *n* chooses choice *i*, V_{in} denotes the deterministic factor (deterministic utility or systematic utility) when individual *n* chooses choice *i*, and ε_{in} refers to the random factor (random utility or stochastic utility) when individual *n* chooses choice *i*. The total utility can be explained by the observable deterministic part (V_{in}) and the unobservable stochastic part (ε_{in}).

The specific form of the probabilistic choice model depends on the distribution assumption of the random utility ε_{in}. In the present study, we choose the binary logit model since the logit model is preferred over other procedures in analyzing categorical variables (Maddala, 1983). The probability of the binary logit model is expressed as in equation (3).

$$Prob(Y_i = 1|X_i) = f(X_i'\beta_j) = \frac{exp(X_i'\beta_j)}{1 + exp(X_i'\beta_j)} \quad (3)$$

where Y_i indicates the time-saving consumer group, X_i is the vector of independent variables including socioeconomic characteristics, and $Prob(Y_i = 1|X_i)$ is the probability of individuals to be grouped into the time-saving lifestyle. The marginal effects in the logit model are computed as

$$\frac{\partial \text{Prob}(Y_i=1|\text{X}_\text{i})}{\partial x_{ij}} = f'(X_i'\beta)\beta_j, \quad (4)$$

where β_j shows the proportionate effect on the probability that $y_i = 1$ as x_{ij} changes (Cameron and Trivedi, 2005).

3. Questions for Classifying Lifestyle and Data Description

As discussed, the basic idea of this study is that consumers' food preparation time (and thus food consumption pattern) may vary across types of lifestyle based on perception of time shortage regarding food. Assume that an individual allocates his or her time between food preparation and hours of work. Then, the relatively time-saving consumers have high opportunity cost of time, and thus they prefer to allow working hours to consume the time that would otherwise be used for meal preparation. Conversely, relatively time-spending consumers would rather enjoy their time for food preparation, as they place a higher value on food preparation time than working hours.

The dataset used for this study is made up of cross-sectional survey data from 2,012 respondents as collected by Korea Agro-Fisheries & Food Trade Corporation in 2011. Regarding the food consumption lifestyle, the survey contains 23 questions to capture several aspects of food consumption patterns, including time allocation for food preparation. The questions were answered using a five-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). As reported in Table 1, four questions highly related to food preparation time are chosen for the cluster analysis.[1]

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1 Details of the 23 questions are presented in the Appendix.

Table 1. MANOVA Results of questions about food consumption lifestyle

Question		k = 2			k = 3	
		F-stat.	P-value		F-stat.	P-value
Q2	I eat processed foods owing to lack of time for cooking	2341.29	.000	>	1567.06	.000
Q5	I tend to feel like having a square meal with rice	247.78	.000	>	155.12	.000
Q8	I purchase a large amount of food products at a time	548.10	.000	>	254.38	.000
Q9	I prefer major supermarkets to conventional markets	378.18	.000	<	910.65	.000

Note: MANOVA = Multivariate analysis of variance, where the drawn clusters are independent variables and each question is a dependent variable.

In Table 1, if respondents respond positively to Q2, "I purchase processed foods owing to lack of time for cooking," we can directly capture the respondents' attitude toward time scarcity in meal preparation. Respondents who mostly agree that they purchase processed foods owing to their lack of time to make food can be identified as having the time-saving lifestyle. In Q5, consumers with a time-spending lifestyle would be more likely to enjoy eating rice with their meal, since it takes more time to cook rice compared to other kinds of food, such as convenience foods or ready-to-eat meals. In Q8, individuals who purchase a large amount of food at one time tend to save their time for food production, as they do not go grocery shopping frequently. With regard to Q9, consumers who prefer shopping in supermarkets rather than in traditional markets may have a higher opportunity cost of time, since supermarkets are generally placed near homes, and one-stop shopping is possible.

Unlike the hierarchical method, in which the number of clusters is determined by the analysis, using "K-means cluster analysis," the investigator determines the number of clusters (k). The criteria for the proper determination of the number of clusters are F-statistics: $(between - cluster\ variance)/(within - cluster\ variance)$. The groups are well classified with high F-statistics, since a high value of F-statistics indicates that the differences between groups are statistically significant. In this study, three out of four questions are found to have higher F-statistics in a two-group solution than in a three-group solution (Table 1). Hence, clustering into two groups is selected.

Table 2. Demographic characteristics of the sample (N = 2,012)

Variables		Population	Ratio (%)	Variables		Population	Ratio (%)
Residential area	Seoul	368	18.3	Household Income (10,000 KRW)	Below 199	312	15.5
	Incheon/Gyeonggi	500	24.9		200-299	519	25.8
	Busan/Ulsan/Gyeongnam	332	16.5		300-399	661	32.9
	Daegu/Gyeongbuk	211	10.5		Above 400	501	24.9
	Daejeon/Chungnam /Chungbuk	240	11.9		No response	19	0.9
	Gwangju/Jeonnam /Jeonbuk	237	11.8	Housing	Detached house	669	33.3
	Gangwon	74	3.7		Apartment	1001	49.8
	Jeju	50	2.5		Row house/Villa	270	13.4
Gender	Male	1004	49.9		Officetel/One-room apartment	70	3.5
	Female	1008	50.1		No response	2	0.1
Age	20-29	399	19.8	Number of family members	1	143	7.1
	30-39	478	23.8		2	347	17.2
	40-49	485	24.1		3	515	25.6
	50-59	406	20.2		4	822	40.9
	60-69	244	12.1		More than 5	185	9.2
Education	Less than high school	1192	59.2	Working status of wife	Housewife	412	20.5
	College	780	38.8		Working wife	378	18.8
	Post-graduate	34	1.7		Total	790	39.3
	No response	6	0.3	Missing value		1222	60.7
Marriage	Married	1475	73.3	Children	Have at least one child	862	42.8
	Single	498	24.8		Have no children	1150	57.2
	Other	39	1.9	Total population		2012	100

Table 2 reports the descriptive statistics of the variables used for the empirical analysis of the logit model. As discussed, time-related lifestyles drawn from the cluster analysis are converted into binary variables as a dependent variable. As discussed later, one of the identified groups is "relatively time-saving (time-caring)" and the other is "relatively time-spending." Meanwhile, gender, age, education, household size, occupational status of wife, marriage, monthly household income, and residence in the city are chosen as the socioeconomic variables that affect the dependent variable.

4. Results

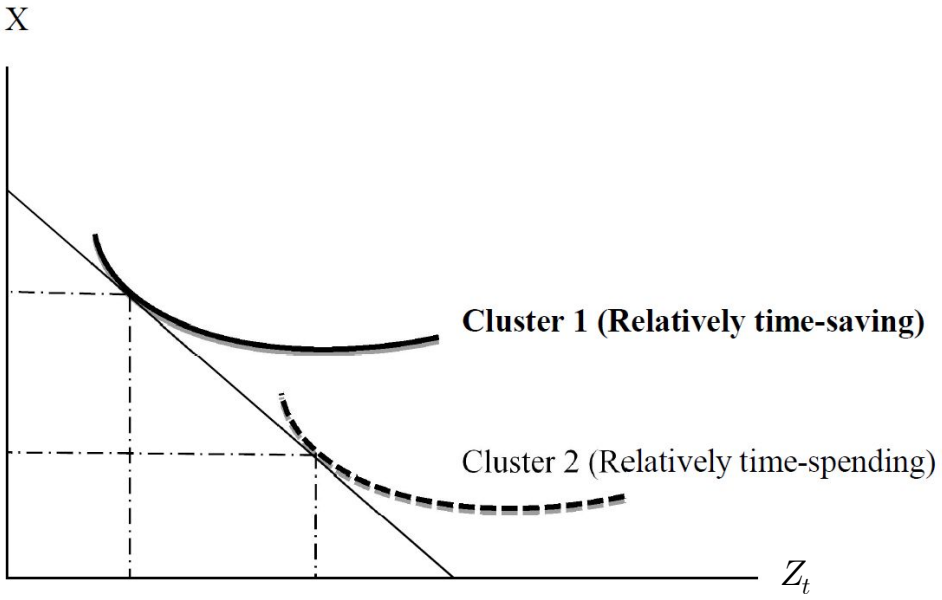
4.1. Cluster Analysis: Determination of Time-Related Lifestyles

Cluster analysis is performed to divide the respondents into different segments based on their valuations of food preparation time. The classification variables used in the cluster analysis are the four questions related to food-consuming style, as depicted in Table 3. The households are classified into two clusters consisting of 1154 and 858 individuals, respectively. Cluster 1 consists of people who respond positively to the questions related to time-saving behavior. As seen in Q2, which captures a direct perception of time scarcity, the cluster center is higher in Cluster 1 than in Cluster 2, meaning that individuals grouped into Cluster 1 are more likely to save time on meal preparation at home. Individuals in Cluster 1 also respond positively to Q8 and Q9, indicating that they tend to pursue convenience in food production at home. In the case of Cluster 2, on the other hand, the cluster centers are lower in questions related to time-saving or convenience behavior. Conversely, the cluster center of Q5 is higher in Cluster 2, meaning that the households of Cluster 2 are likely to take their time in food production, assuming that having rice at a meal takes more time than other kinds of food such as ready-to-eat meals or convenience foods. Thus, we name Cluster 1 and Cluster 2 the "relatively time-saving food consumption pattern" group and the "relatively time-spending food consumption pattern" group, respectively.

Table 3. Estimation result of cluster analysis based on food preparation time

	Question	Cluster 1 (N = 1154) Time-saving	Cluster 2 (N = 858) Time-spending
Q2	I eat processed foods owing to lack of time for cooking	3.51	1.93
Q5	I tend to feel like having a square meal with rice	3.78	4.36
Q8	I purchase a large amount of food products at a time	3.33	2.41
Q9	I prefer major supermarkets to conventional markets	3.89	3.13

Figure 2. The isoquant of the respondents differentiated by the results of cluster analysis



Note: X is purchased food materials and Z_t is amount of time spent for meal preparation.

Figure 2 shows how the consumer segments can be identified with their isoquant when applying the derived clusters to the household production theory, where X is th Z_t chased food material and Z_t denotes the time for meal preparation[2]. Consumers in Cluster 1, who tend to save time on meal preparation (Z_t), will be less likely to spend their time but more likely to spend lavish amounts of money on eating out or purchasing home meal replacement products. Conversely, members of households in Cluster 2, who are less sensitive to time scarcity, would not spend their money on eating out or home meal replacement products. Instead, they will be more likely to spend their time on food production at home. We can also interpret the opportunity cost of food preparation time to be higher for consumers in Cluster 1, who have the time-saving lifestyle, compared to those in Cluster 2.

In Table 4, cross-analysis is conducted to capture the socioeconomic properties of each cluster. The result shows that there are significant differences between the two clusters for most variables.

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2 Assume that the budget constraints of both clusters are the same.

Table 4. Result of cross-analysis using drawn clusters

		Cluster 1 (N = 1154)	Cluster 2 (N = 858)	Total
		Time-saving	Time-spending	
Gender	Male	600(52.0%*)	404(47.1%)	1008(50.1%)
	Female	554(48.0%)	454(52.9%*)	1004(50.1%)
Monthly household income (10,000 KRW)	Below 199	143(12.4%)	169(19.7%*)	312(15.5%)
	200-299	278(24.1%)	241(28.1%*)	519(25.8%)
	300-399	393(34.1%*)	268(31.2%)	661(32.9%)
	Above 400	326(28.2%*)	175(20.4%)	501(24.9%)
	No response	14(1.2%)	5(0.6%)	19(0.9%)
Age	20-29	309(26.8%*)	90(10.5%)	399(19.8%)
	30-39	309(26.8%*)	169(19.7%)	478(23.8%)
	40-49	276(23.9%)	)209(24.4%)	485(24.1%)
	50-59	196(17.0%)	210(24.5%*)	406(20.2%)
	60-69	64(5.5%)	180(21.0%*)	244(12.1%)
Education	Less than high school	607(52.6%)	585(68.2%*)	1192(59.2%)
	College	519(45.0%*)	261(30.4%)	780(38.8%)
	Post-graduate	23(2.0%*)	11(1.3%)	34(1.7%)
	No response	5(0.4%)	1(0.1%)	6(0.3%)
Marriage	Married	769(66.6%)	706(82.3%*)	1475(73.3%)
	Single	367(31.8%*)	131(15.3%)	498(24.8%)
	Other	18(1.6%)	21(2.4%)	39(1.9%)
Children	Have at least one child	518(44.9%)	344(40.1%)	862(42.8%)
	Have no children	636(55.1%)	514(59.9%)	1150(57.2%)
Number of family numbers	1	103(8.9%)	40(4.7%)	143(7.1%)
	2	154(13.3%)	193(22.5%*)	347(17.2%)
	3	304(26.3%)	211(24.6%)	515(25.6%)
	4	492(42.6%*)	330(38.5%)	822(40.9%)
	More than 5	101(8.8%)	84(9.8%)	185(9.2%)
Housing	Detached house	351(30.4%)	318(37.1%*)	669(33.3%)
	Apartment	594(51.5%*)	407(47.4%)	1001(49.8%)
	Row house/Villa	162(14.0%)	108(12.6%)	270(13.4%)
	Officetel/One-room apartment	46(4.0%)	24(2.8%)	70(3.5%)
	No response	1(0.1%)	1(0.1%)	2(0.1%)
Residential area	Seoul	245(21.2%*)	123(14.3%)	368(18.3%)
	Incheon/Geyonggi	297(25.7%)	203(23.7%)	500(24.9%)
	Busan/Ulsan/Gyeongnam	193(16.7%)	139(16.2%)	332(16.5%)
	Daegu/Gyeongbuk	117(10.1%)	94(11.0%)	211(10.5%)

(Continued)

		Cluster 1 (N = 1154)	Cluster 2 (N = 858)	Total
		Time-saving	Time-spending	
	Daejeon/Chungnam/Chungbuk	158(13.7%*)	82(9.6%)	240(11.9%)
	Gwangju/Jeonnam/Jeonbuk	94(8.1%)	143(16.7%*)	237(11.8%)
	Gangwon	31(2.7%)	43(3.6%)	74(3.7%)
	Jeju	19(1.6%)	31(3.5%)	50(2.5%)
Occupational status of wife	Housewife	194(49.1%)	218(55.2%*)	412(52.2%)
	Working wife	201(50.9%*)	177(44.8%)	378(47.8%)
Household members	Single	103(8.9%*)	40(4.7%)	143(7.1%)
	Without children	96(8.3%)	164(19.1%*)	260(12.9%)
	Having at least one child	935(81.0%*)	645(75.3%)	1580(78.6%)
	Other	20(1.7%)	8(0.9%)	28(1.4%)

Note: * = higher compared to the other cluster

Cluster 1. Time-saving lifestyle

First, more than half (52.0%) of respondents in Cluster 1 ("relatively time-saving "lifestyle) are female. Regarding the monthly household income, a large portion of those with higher household incomes are grouped into this cluster. Compared with the other cluster, this group shows a high percentage of younger people in their twenties (26.8%) and thirties (26.8%). In the case of marital status, there are comparatively more single households (31.8%) than the average (24.8%). Concerning whether the household includes children, a high proportion of people having at least one child are classified into the time-saving lifestyle. With respect to the number of family members, 42.6% of Cluster 1 respondents have a family size of four, which is higher than the average for both clusters (40.9%). Further, the percentage of people living in apartments is relatively high (51.5%) compared to Cluster 2. Finally, Cluster 1 contains a higher ratio of households with at least one child (81.0%) than the average (78.6%).

Cluster 2. Time-spending lifestyle

Cluster 2, identified as a "relatively time-spending" food consumption style, includes a higher proportion of females (52.9%) than males (47.1%). A high percentage of low-income

households with income of less than KRW 3,000,000 per month belong to this cluster, which is the opposite trend from the time-saving lifestyle in Cluster 1. In addition, unlike the time-saving lifestyle, a high proportion of people in their fifties (24.5%) and sixties (21.0%) belong to this group, making members of this group older than those in Cluster 1. Respondents with a low level of education, such as less than high school, are represented at a higher rate (68.2%) in this cluster than the average (59.2%). Concerning whether the respondents are married or not, this group includes a higher percentage (82.3%) of people who are married than the average (73.3%). Cluster 2 also contains a larger proportion of households without children (59.9%) than those having at least one child (40.1%). In terms of number of family members, 22.5% of households in Cluster 2 have two members, which is a greater proportion than in the other cluster.

4.2. Binomial Logit Analysis: Identifying Determinants of the Time-Saving Lifestyle

As the food consumption style related to the perception of time scarcity is a key variable in our analysis, we first consider two alternative dependent variables: a direct perception of time scarcity (Q2) and time-related lifestyles derived from the cluster analysis including other time-related questions. The questions related to food production time and used to classify the households are found to be significantly correlated with the key question (Q2), meaning that considering those questions is critical for capturing households' time perception[3]. Therefore, we choose the two clusters derived from the cluster analysis in the previous section for the dependent variable. Since we focus on the determinants of time scarcity in food production, we apply the binomial logit model (1 = time-saving lifestyle and 0 = time-spending lifestyle). Detailed statistics of the variables used in the estimation are presented in table 5.

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3 In the Appendix, we attach the correlation matrix of food production time-related questions with Q2.

Table 5. Descriptive statistics for the variables used in the estimation

Dependent Variable	Definition		Mean	Std. Dev.
lifestyle	Lifestyle based on food production time	1 = "time-saving", 2 = "time-spending"	0.5736	0.4947
fe	Gender	Female = 1, Male = 0	0.5010	0.5001
age	Age	20-29 = 25, 30-39 = 35, 40-49 = 45, 50-59 = 55, 60-69 = 65	43.1014	12.9711
age20	20-29	20-29 = 1, Others = 0	0.1983	0.3988
age30	30-39	30-39 = 1, Others = 0	0.2376	0.4257
age40	40-49	40-49 = 1, Others = 0	0.2411	0.4278
age50	50-59	50-59 = 1, Others = 0	0.2018	0.4014
age60	60-69	60-69 = 1, Others = 0	0.1213	0.3265
edu	Education level	More than college graduation = 1, Less than high school graduation = 0	0.4046	0.4909
married	Marriage	Married = 1, Single or other = 0	0.7331	0.4424
child	Children	Have at least one child under 18 = 1, Have no children under 18= 0	0.4284	0.4950
num	Number of family members		3.3111	1.1633
housew	Working status of wife	Housewife = 1, Other = 0	0.2048	0.4036
income	Monthly household income (unit: KRW 10,000)	Below 199 = 1, 200-299 = 2, 300-399 = 3, Above 400 = 4	323.4697	131.7804
hinc	High level of household income (unit: KRW 10,000)	Above 400 = 1, Below 400 = 0	0.2490	0.4325
seoul	Residential area	Seoul = 1, Other = 0	0.1829	0.3867
psense	Price sensitivity	Check price per quantity = 1, Do not check = 0	0.3705	0.4830

The estimated parameters for the logit model are presented in Table 6. In our analysis, we focus in particular on age and income as factors influencing a time-saving food consumption pattern. We also examine consumers' preferences for food preparation time in relation to gender, marital status, education level, household size, wife's occupational status, living with children, and residential area. The estimated results are generally consistent with the theoretical expectation and the findings of other studies. In Table 6, models (1) to (4) are different for *age* and *income* variables; models (1) and (3) include continuous age variables, while models (2)

and (4) are estimated with the dummy variables to capture the specific effects of each age cohort. Further, models (1) and (2) include income itself, while models (3) and (4) include the dummy variable of high level of income (more than KRW 4,000,000 per month).

Table 6. Estimation results (1)

Variables		(1)	(2)	(3)	(4)
		Time-saving lifestyle			
Gender	*fe*	-0.0428	-0.0458	-0.0401	-0.0464
		(0.114)	(0.114)	(0.114)	(0.114)
Marriage	*marr*	0.0194	-0.0100	0.0582	0.0174
		(0.168)	(0.176)	(0.166)	(0.174)
Household income	*income*	0.0014***	0.0012**		
		(0.0005)	(0.0005)		
High level of income	*hinc*			0.252**	0.225*
				(0.118)	(0.118)
Age	*age*	-0.0451***		-0.047***	
		(0.0056)		(0.0055)	
	age20		0.948***		0.961***
			(0.199)		(0.198)
	age30		0.286**		0.265*
			(0.141)		(0.140)
	age50		-0.229		-0.252
			(0.158)		(0.158)
	age60		-1.179***		-1.266***
			(0.203)		(0.199)
Education	*edu*	0.223**	0.258**	0.239**	0.271**
		(0.107)	(0.109)	(0.106)	(0.108)
Number of family members	*num*	-0.142***	-0.166***	-0.114**	-0.146***
		(0.0509)	(0.0519)	(0.0486)	(0.0499)
Occupational status of wife	*housew*	-0.191	-0.160	-0.192	-0.151
		(0.141)	(0.142)	(0.141)	(0.142)
Having children	*child*	0.0592	0.149	0.0656	0.155
		(0.127)	(0.138)	(0.126)	(0.137)
Residential area	*seoul*	0.451***	0.463***	0.467***	0.475***
		(0.131)	(0.131)	(0.130)	(0.131)
Price sensitivity	*psense*	-0.262**	-0.274***	-0.257**	-0.271***

(Continued)

Variables	(1)	(2)	(3)	(4)
	Time-saving lifestyle			
	(0.102)	(0.103)	(0.102)	(0.102)
cut1 constant	2.248***	0.344	2.577***	0.582**
	(0.299)	(0.245)	(0.282)	(0.228)
Observations	1,992	1,992	2,011	2,011

Note: Standard errors are shown in parentheses. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

As explained, we consider income and age as two major factors affecting the time-saving lifestyle. The household income has a significant and positive effect on time-saving lifestyle in both models (1) and (2). Considering the interpretations of the estimated coefficients, households with higher income tend to perceive intense time scarcity and have time-saving lifestyles, as they have higher opportunity cost of time. They would substitute their time for meal preparation with working time for earnings. In a previous study, Yu et al. (2002) assert that the women's time for the household decreases as the household income increases. Another income-related estimator, *hinc* (households earning more than KRW 4,000,000 per month) is also shown to be positive, supporting the idea that people with a high level of income would have a higher opportunity cost of time for food preparation.

As hypothesized, the coefficient of age is estimated to be negative in models (1) and (3), and statistically significant at the 1% level. This implies that older people tend to spend their time on meal preparation, whereas younger generations are more sensitive to time scarcity and thus would rather eat out or purchase home meal replacements than cook at home. This finding is identical to a former study that found both males and females tend to spend their time on household production at older ages (Yu et al., 2002). When comparing age cohorts in model (2) and model (4), where households in their forties are the base dummy, the coefficients of young consumers in their twenties and thirties are found to have positive coefficients, while those in their fifties and sixties have negative coefficients. This indicates that people who are younger than 40 are more likely to have time-saving lifestyles as compared to the older generations. Conversely, people who are in their fifties and sixties have a higher probability of preferring to

cook at home than do people in their forties. This supports our study's assumption that consumers' time-saving or time-spending food consumption pattern would differ from one generation to another owing to the rapid economic growth in Korea.

Four other control variables affecting the time-saving lifestyle are found to be education level, household size, living in an urban area, and degree of sensitivity to price. In the survey results used in this study, the question of whether the consumer checks the price per unit is included. We regard the consumers who answered "yes" to this question as price-sensitive consumers and those who answered "no" as price-insensitive consumers. For the logit analysis, price-sensitive consumers are coded as 1 (dummy coding). The education variable yields the expected positive sign, showing that more educated households have a higher probability of being clustered into the time-saving lifestyle and are very sensitive to time pressure. This is consistent with previous research (Hill and Stafford, 1974; Guryan et al., 2008) that asserts that parents with a high level of education spend less time in household production than do those with lower levels of education. For the variable of household size, households with a higher number of family members are expected to spend more time on food preparation. The result shows a negative impact, that is, households with a smaller family size tend to save time on food preparation, which is consistent with our expectation.

In the case of the wife's occupation, it is proven in several previous studies that housewives tend to allocate more of their time to household production than do working moms (Brines, 1994). In this study, however, the occupational status of the wife shows no impact on time-saving lifestyle. The sign of the *child* variable in this study was also expected to be negative, as many studies have found that households having children spend much more time on the household (Brines, 1994; Presser, 1994; Sanchez and Thomson, 1997). However, we found no relationship between having children and the time-saving lifestyle: the coefficients are found to be positive but not significant. On the other hand, to obtain the regional impact on the time-saving lifestyle, we used dummy coding (Seoul = 1, other = 0), where Seoul is considered a metropolitan area in Korea, with the expectation that people living in Seoul would perceive

higher time scarcity than rural households owing to their busy routines. According to Strober and Weiberg (1980), purchasing meals away from home appears to be a time-buying strategy of households with employed wives, where urban residence is an important factor. As seen in the estimation result in Table 6, the opportunity cost of residents in the urban area of Seoul is higher than that of those who live far from Seoul. Lastly, the variable of *psense* captures consumers who are sensitive to price. The result shows a negative impact, meaning that price-sensitive consumers have a high probability of spending their time on food production at home. We can interpret that time-saving consumers would less care about price as they take short time for shopping.

To test the stated hypothesis of a generation difference in opportunity cost of time for meal preparation, we estimate the logit model for different generations, reported in Table 7[4]. The result shows that there is a generation gap in time-saving food consumption patterns, as the significant determinants of each generation are different. For example, households in their twenties are significantly affected only by household size, while households in their thirties are affected by household size, occupational status of the wife, and price sensitivity. People in their forties have the highest number of significant variables: household income, household size, having children, urban residence, and price sensitivity. The positive sign on the variable *child* suggests that the people in this age tend to put more time to prepare meal for feeding their children. People in their fifties are affected only by urban residence. Finally, having a time-saving lifestyle for households in their sixties depends on family size and living with children under 18.

4 We divide the data into five subsamples based on age cohorts (20−29, 30−39, 40−49, 50−59, and 60−69).

Table 7. Estimation results (2)

Variables	(1) 20-29	(2) 30-39	(3) 40-49	(4) 50-59	(5) 60-69
fe	-0.0381	-0.0801	0.376	-0.113	-0.225
	(0.260)	(0.241)	(0.237)	(0.255)	(0.438)
marr	0.227	0.406	-0.284	-0.315	-0.731
	(0.479)	(0.372)	(0.458)	(0.515)	(0.655)
inc	-0.0007	-0.0001	0.0039***	0.0011	0.0014
	(0.0012)	(0.0011)	(0.0011)	(0.0010)	(0.0014)
edu	-0.0521	0.305	0.156	0.407	-0.438
	(0.261)	(0.211)	(0.204)	(0.272)	(0.571)
num	-0.261**	-0.179*	-0.250**	-0.131	0.449**
	(0.126)	(0.108)	(0.115)	(0.114)	(0.190)
housew	-0.587	-0.577**	-0.0363	0.115	0.0662
	(0.708)	(0.278)	(0.276)	(0.290)	(0.454)
seoul	-0.255	0.472*	0.772***	0.629**	0.506
	(0.308)	(0.274)	(0.276)	(0.276)	(0.382)
child	-0.169	-0.184	0.705***	0.0668	-1.474**
	(0.344)	(0.372)	(0.257)	(0.287)	(0.667)
psense	0.0923	-0.458**	-0.626***	-0.154	0.0262
	(0.275)	(0.209)	(0.207)	(0.215)	(0.335)
Constant	2.458***	1.190***	-0.530	0.208	-1.673**
	(0.530)	(0.434)	(0.512)	(0.533)	(0.726)
Observations	391	472	482	403	244

Note: Standard errors are shown in parentheses. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

Income, a major interest of our study, does not affect generations other than people in their forties. For the other control variables, gender, marriage, and education level are found to have no impact on all generations. The impact of household size is consistently negative for households in their twenties to forties, while households in their sixties are affected positively by the household size. We can think of the positive sign of households in their sixties as a case of dual-income households, where kids are taken care of by their grandparents who live with their married son or daughter.

Wife's occupational status is found to have a negative effect on people in their thirties,

meaning that housewives in their thirties enjoy spending their time on food production at home. In the case of having children, the coefficients are positive for households in their forties, which is the intense child-care period, when parents become the most devoted to their children. Conversely, *child* is negative for people in their sixties; we can also interpret this as a case of households caring for their grandchildren in dual-income families. As the number of dual-income families increases in Korea, many children are looked after by their grandparents. Urban residence, on the other hand, has a significant and positive effect for households in their thirties, forties, and fifties. Finally, price sensitivity is found to have a negative effect on households in their thirties and forties.

To measure the degree of the explanatory variables' impact, the marginal effects of the significant variables are computed, as seen in Table 8. Comparing the coefficients of the significant variables, urban residence has the largest impact on time-saving food consumption patterns. Households that are highly affected by urban residence are those in their forties (0.1778), fifties (0.1553), and thirties (0.1010). Regarding household size, it negatively affects the time-saving lifestyle. Households in their forties are most negatively affected (-0.0611) by household size among all the generations. People in their sixties, on the other hand, are positively affected by household size, with the highest marginal effect (0.0843). Concerning the *child* variable, households in their forties are less affected (0.1778) by having children under 18 compared to those in their sixties (-0.1980). From this, we can assume that the senior generation's time-related lifestyle highly depends on living with children under 18, probably their grandchildren. Household income has the least impact on time-saving lifestyle, only affecting households in their forties. Lastly, price sensitivity affects households in their thirties and forties, and those in their forties are more affected by checking the price per quantity of food products.

Table 8. Marginal effects on the time-saving lifestyle

Variables	(1) total	(2) 20-29	(3) 30-39	(4) 40-49	(5) 50-59	(6) 60-69
fe	-0.0104	-0.0065	-0.0181	0.0918	-0.0282	-0.0423
	(0.0047)	(0.0446)	(0.0543)	(0.0576)	(0.0637)	(0.0825)
marr	0.0047	0.0372	0.0939	-0.0678	-0.0786	-0.1566
	(0.0410)	(0.0746)	(0.0876)	(0.1064)	(0.1272)	(0.1542)
inc	0.0003***	-0.0001	-0.00003	0.0009***	0.0003	0.0003
	(0.0001)	(0.0002)	(0.0002)	(0.0003)	(0.0003)	(0.0003)
age	-0.0110***					
	(0.0014)					
edu	0.0541**	-0.0089	0.0695	0.0383	0.1014	-0.0745
	(0.0258)	(0.0450)	(0.0486)	(0.0499)	(0.0670)	(0.0872)
num	-0.0346***	-0.0448**	-0.0404*	-0.0611**	-0.0328	0.0843**
	(0.0124)	(0.0213)	(0.0244)	(0.0282)	(0.0285)	(0.0354)
housew	-0.0470	-0.1151	-0.1350**	-0.0089	0.0287	0.0125
	(0.0348)	(0.1547)	(0.0667)	(0.0678)	(0.0726)	(0.0861)
seoul	0.1065***	-0.0456	0.1010*	0.1778***	0.1553**	0.1021
	(0.0296)	(0.0572)	(0.0550)	(0.0580)	(0.0662)	(0.0819)
child	0.0144	-0.0298	-0.0410	0.1738***	0.0167	-0.1980***
	(0.0309)	(0.0622)	(0.0822)	(0.0627)	(0.0717)	(0.0592)
psense	-0.0641**	0.0157	-0.1044**	-0.1534***	-0.0384	0.0049
	(0.0251)	(0.0463)	(0.0478)	(0.0503)	(0.0536)	(0.0632)
Obs.	1992	391	472	482	403	244

Note: Standard errors are shown in parentheses. ***, **, and * denote significance at the 1 percent, 5 percent, and 10 percent levels, respectively.

5. Summary and Conclusion

This study assumes that the rapid economic growth in South Korea from the early 1960s to the late 1990s may have induced the change in food consumption patterns in the country, such as a decline in home cooking owing to time scarcity. Since women are major participants in meal preparation in Korea, we assume time scarcity in food production has also changed in

accordance to the drastic change in the labor force participation of women. In this regard, this study aims to classify respondents according to their time preference in food preparation and derives factors affecting time-saving food consumption patterns.

In previous research about the household production theory, most studies used records of time use data or survey questions asking participants how much time they spend on meal preparation. In this study, however, we consider individual attitudes toward food preparation time to capture the perception of time scarcity. To classify consumers by means of their perception of food preparation time, we used the cluster analysis, which is an effective tool for the classification of consumers' lifestyle and thus has been used widely in the marketing research area. Based on the household production theory, in which households allocate their time for food preparation to maximize their utility, we identified two different clusters of lifestyles depending on four questions highly related to food preparation time. This verifies the hypothesis that individual consumers' time allocation for food preparation differs based on their perception of time.

Our main results show that having the time-saving lifestyle is highly related to socioeconomic factors such as monthly household income, age, education level, number of family members, residence in an urban area, and price sensitivity; six out of 10 variables were found to be significant at the 10 percent level or higher. Households with higher family income and more education, and who live in urban area are more sensitive to time scarcity. On the other hand, the younger generation, households with a large household size, and consumers who check the price per unit of food tend to be less sensitive to time shortage and they tend to spend their time on food preparation.

These findings provide specific information on the demographic properties of people having the time-saving lifestyle. Furthermore, the findings are also helpful for identifying the food products highly depending on consumers' time perception. If food providers, retailers, sellers, and consumers of these kinds of food products are specifically informed about the time-related lifestyle of consumers, the results of this study will be very efficient in helping them to create

appropriate strategies that best match their target buyers' preferences, especially as they relate to time perception.

The result of this study shows the existence of a gap between generations. For instance, the impact of household size on time-saving lifestyle differs for consumers in their forties and sixties. This supports the hypothesis that a generation difference exists in terms of the opportunity cost of time for meal preparation. Living with children under 18 also has different impacts: it has a positive effect for households in their forties but a negative effect for households in their sixties. This could come from the effects of caring for grandchildren. In other words, dual-income families tend to depend on their parents to take care of their children, since both are busy earning household income. When marginal effects on the time-saving lifestyle are computed, we find metropolitan residence to have the largest impact on the time-saving lifestyle, while income has the least impact. Comparing the marginal impacts of independent variables, those most affected by household size are consumers in their sixties. In the case of urban residence, households in their forties show the highest level of marginal effect.

This study contributes to the literature in that it is the first attempt to investigate the relationship between consumers' socioeconomic characteristics and food consumption patterns by clustering consumers into several groups according to their perception of the opportunity cost of time. However, to elicit more useful information regarding marketing strategies or policies, it will be important to delve into the relation between consumers' time-related lifestyle and the consumption of specific food products. Future studies should be developed in this direction.

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Appendix

A1. Correlation Matrix of questions with Q2

		Q2	
		Pearson correlation co-efficient	P-value
Q1	I prefer home-made food	-0.261**	0.000
Q2	I eat processed foods owing to lack of time for cooking	1	
Q3	I prefer vegetables to meat	-0.121**	0.000
Q4	I purchase organic or environmentally friendly food products even if they are costly	-0.032	0.336
Q5	I tend to like having a square meal with rice	-0.123**	0.000
Q6	I tend to spend a lavish amount of money on food products	0.034	0.282
Q7	I try not to eat processed foods	-0.148**	0.000
Q8	I purchase a large amount of food products at a time	0.318**	0.000
Q9	I prefer major supermarkets to conventional markets	0.232**	0.000
Q10	I tend to make a plan before shopping	-0.067*	0.032
Q11	I tend to go shopping in the same place	0.044	0.135
Q12	I highly depend on well-known brands when purchasing food products	0.132**	0.000
Q13	I do not care to purchase processed foods through the Internet or TV channels	0.310**	0.000
Q14	Food is not eaten to enjoy its taste but to manage health or nutrition	-0.064*	0.049
Q15	I like to try food products I have not purchased before	0.225**	0.000
Q16	I have no hesitation to purchase imported processed foods	0.299**	0.000
Q17	I like to purchase new food products	0.254**	0.000
Q18	In the case of processed foods, brands that have been advertised are credible to purchase	0.227**	0.000
Q19	I tend to purchase processed food produced with domestic raw materials even if they are expensive	0.076*	0.019
Q20	I tend to buy unplanned purchases owing to discounted prices or buy-one-get-one-free sales.	0.214**	0.000
Q21	I remember the prices of products I frequently purchase	0.040	0.200
Q22	I think it is more economical to buy a small amount	-0.006	0.841
Q23	I have preferred manufacturing companies or brands when purchasing food products	0.077*	0.016

Note: Pearson's correlation coefficient is denoted as $\gamma_{ij} = \frac{s_{ij}}{s_i s_j}$, where i and j are two variables, s_{ij} is the covariance between the two variables, and s_i and s_j are the standard deviations of the variables i and j, respectively.