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Tastes Differ Between Generations

Mori H*

Professor Emeritus, Senshu University, Japan

***Corresponding author:**

Hiroshi Mori,

Professor Emeritus, Senshu University, Japan

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1. Introduction

G. Stigler and G. Becker, two Nobel Prize winners, state, "tastes neither change capriciously nor differ importantly between people. On this interpretation one does not argue over tastes for the same reason that one does not argue over the Rocky Mountains—both are there, will be there next year, too, and are the same to all men (*AER*, 1977) [1]. However, per capita at-home consumption of selected products, say: meat, fish, etc. may not be nearly the same among age groups at a chosen year, 1980, for example. Empirically, the young in their 20s and 30s in 1980, ate distinctly less fish than the older age groups in their 50s and 60s in Japan [2;3]. When they reach their 50-60s in 2010, 3 decades ahead, will they eat more fish, economic variables assumed unchanged, following the same transformation of eating habits over the life cycle? (Schrimper, 1979, p.1059) [4]. We address this question in this note.

2. Age/Cohort Effects in Changes in Per Capita Consumption

The author and his small group have conducted a quite few analyses of food consumption, with generational/cohort effects explicitly incorporated. One of the difficulties they have come across is the data: per capita consumption by age on continuous length of time is not readily available. Japan's *National Nutrition Surveys* [5], which have been conducted every year since 1946, started to publish food consumption by individual age groups only in 1996. The Republic of Korea initiated *Korea National Health and Nutritional Examination Surveys* in 1998, followed by the second survey in 2001, and the third one in 2005 [6].

A number of nations publish comprehensive surveys of household expenditures on various products, milk, bread, rice, ---, fish by variety, beef, pork, chicken, vegetables --, by a large number of households throughout the country. In the case of Japan, 8,000 households are surveyed by a diary system on a 6 month-rotation: *Family Income and Expenditure Surveys* (*FIES*) [7]. *FIES* started in 1979 to classify the data by the age groups of household head (HH): ~24, 25~29, 30~34, ---, 60~64 and 65~, along with the household sizes and annual expenditures. USDA has been conducting its own household food consumption surveys, classified by age groups of household head. The Republic of Korea has been conducting household expenditure surveys, classified by HH age groups since 1982, with household age structures identified but without prices paid: quantities are not published explicitly [8].

Take one simple example: We face households headed by men or women, 30 and 50 years of age and 3 persons in each household consume 40 and 60 kgs of rice, respectively. Dividing household consumption, 40 and 60 kg by the number of persons contained, 3 to derive that individuals 30 and 50 years old should consume 13.3 and 20.0 kg, per person, respectively: commonplace procedures of estimation. Those children in households with the HH 30 years of age are normally infants, who do not eat much rice. On the other hand, children household with HH 50 years of age are likely either high school or college students in age who eat substantially more rice than their parents. Intuitively, infants eat less than 20 % of what their parents eat and children in high school or college eat 20% more rice than their parents. Q_{30}=40/ (2+1*0.2) =18.2; Q_{50}=60/ (2+1*1.2) =18.8 could be realistic estimates, although the parameters employed are not published[1]. In order to overcome this

shortcoming, the author designed the following model:

$2*Q_{30} + 1*Q_2 + e_{30} = H_{30}$ (1)

$2*Q_{50} + 1*Q_{20} + e_{50} = H_{50}$ (2)

e_j : error term involved in equation for household headed by person j years old.

We try to estimate individual consumption by age, by means of the least squares method. In addition, the author sets at least one more condition, such as that individual consumption of neighboring ages should be close each other or the differences between neighboring age groups in per capita consumption should be close to zero in the case of more complex household structures.

[1] The government, Republic of Korea, appends household age structures by HH age groups in *Household Income and Expenditure Surveys*.

Table 1 denotes the author's estimates of individual at-home consumption of fish by age in 1979 through 2008(Mori and Saegusa [2]). Those in their early 20s in 1979 aged to their early 50s in 2009. Their individual consumption increased from 11.3 to 13.8 kg, whereas per capita consumption by those in their early 50s decreased 19.0 to 13.8 kg, implying positive age effects and negative (birth) cohort effects in at-home fish consumption. The theme is going to be enumerated without sophisticated/ rigorous mathematics throughout this note.

3. How to Approach Age/Period/Cohort Effects from Period/Age Tables

Per capita consumption of given products by calendar year is readily available, if consumption is nearly equal to supply, over a certain period of time. This is what food economists depend on, when determining demand elasticities. It is implicitly assumed that population is reasonably stable in age structure and that "tastes" in the society do not change capriciously. Some governments provide per household consumption of given products by age of household head at certain period of time[2]. As already discussed, ages of other members of household are not always close to HH in age. It is therefore not realistic at all to assume that all members should be close to HH in age. The national Census, which takes place every five years could provide the information to surmise the age structure of household by HH ages. However, the author has found it actually difficult and very time consuming to construct household age structure by HH age groups. *National Surveys of Family Income and Expenditure*, Bureau of Statistics, provide the exact age structure of household by HH age groups, the same fashion as *FIES*, but only occasionally (refer to Table 2 attached [9]).

[*2] *Family Income and Expenditure Surveys* started to classify household expenditures by HH age groups in 1979 in Japan on regular basis.

In this respect, *Household Income Expenditure Surveys* by Statistics Agency, Republic of Korea append exact household age structures by HH age groups in each issue or every year. The author will present how to derive per capita expenditures on food groups, vegetable products in Table 3, including *kimchi* (fermented vegetables) purchased at stores.

When age structures are given by HH age groups, 20~24, 25~29, 30~34, ---, 50~54, --, 65~, you should be able to conjecture per capita at-home consumption (expenditures) of selected products by age groups by solving the equations below, (3) and (4):

The Statistics Korea, *HIES*, annual reports publish average household consumption by 10 HH age groups, ~24, 25~29, …, 60~64, and 65~ years old. The model is composed of 10 household equations and 12 assumption equations of gradual changes in per capita individual consumption between successive age groups. 10 household equations are as follows.

$$H_j - \sum_{i=1}^{12} C_{ij} X_i = \varepsilon_j \ (j = 1, \ldots, 10;\ i = 1, \ldots, 12) \qquad (3)$$

where C_{ij} = number of persons in the i household age group in the j^{th} HH age group, X_i = average per capita consumption of persons in the i^{th} age group (to be estimated), H_j = average household consumption of the j^{th} HH age group (from *HIES* annual report), ε_j = disturbance term of $N(0, \sigma^2)$.

12 assumption equations are added as constraints,

$$X_k - X_{k+1} = E_k \ (k = 1,..,12) \qquad (4)$$

We estimated parameters, X_i, using the weighted least square method with constraints, i.e., to minimize,

$$\sum_{j=1}^{10} w_j (H_j - \sum_{i=1}^{12} C_{ij} X_i)^2 + \sum_{k=1}^{11} w_k (X_k - X_{k+1})^2 \qquad (5)$$

With w_j and w_k set at 1.0, to start with.

Table 3 enumerate the author's estimates of per capita at-home expenditures on vegetables by individual household members in South Korea, from 1990 to 2019 every 5 years (1990-91, 1995-96, ---, 2015-16, 2019, to save space). Expenditures have been converted into 2010 won. Older households may purchase higher priced produce and all households as a whole may have purchased the greater amounts of processed (the more value added) vegetables lately.

Table 3 demonstrates that younger Koreans (newer generations) have turned away drastically from vegetables in at-home diets, which reminds the author of "wakamono no kudamono-banare", steering away from fruit by the young) remarked by the*1994 White Paper on Agriculture*, Japanese government [10]. The author has suspected for some time that children's drastic reduction in fruit consumption may have contributed to the plateau in height development in Japan since the early 1990s, Table 4 [11]. Tastes do change and differ between cohorts.

Table 1: Changes in individual at-home consumption of fish by age groups in Japan,1979 to 2008 (kg/person)

	10~14	15~19	20~24	25~29	30~34	35~39	40~44	45~49	50~54	55~59	60~64	65~69
1979	9.79	10.28	11.34	12.23	13.8	14.79	15.06	16.5	18.97	19.89	20.38	19.39
1989	7.51	8.39	8.49	8.53	10.37	12.25	14.61	17.28	18.59	19.13	19.56	18.91
1999	3.84	5.15	5.96	6.62	8.26	10.1	12.65	15.62	18.33	20.25	20.43	19.95
2008	2.24	3.28	4.52	5.82	7.07	8.11	9.24	11.21	13.83	16.36	18.45	19.11

Source: Mori and Saegusa[2], period cut to 4 years

Table 2: Example of Household Age Composition by HH Age Groups, Japan, 1989

	Household HH Age Groups							
Age	under 25	25~29	30~34	35~49	50~54	55~59	60~64	65~69
under 3	0.51	0.65	0.57	*	0.03	0.06	*	*
3~5	0.08	0.26	0.58	*	0.02	0.06	*	*
6~11	0.02	0.08	0.38	*	0.05	0.05	*	*
12~14	0	0	0.02	*	0.09	0.02	*	*
15~17	0.04	0	0	*	0.26	0.06	*	*
18~29	1.85	1.85	0.39	*	1.01	0.76	*	*
30~64	0.2	0.26	1.77	*	1.97	2.13	*	*
65~	0.04	0.05	0.09	*	0.28	0.23	*	*

Sources: National Survey of Family Income and Expenditure Survey, 1989

Table 3: Changes in per capita at-home monthly expenditures on vegetables, including processed vegetables by age of household members, 1990-2019, South Korea, (in 2010 wons)

Year old	1990	1991	1995	1996	2000	2001	2005	2006	2010	2011	2015	2016	2019
0-9	3572	3572	4042	4067	5180	4285	6297	6516	5477	1166	1367	823	100
10~14	4605	4605	5474	5486	6548	5748	8146	8446	6870	3905	3431	3035	2020
15~19	4366	4366	5365	5345	7674	6861	6621	7870	6311	7227	6530	6700	5639
20~24	4079	4079	5387	5263	8975	8184	5835	8048	6870	11165	10394	11046	10458
25~29	5280	5280	7039	7313	10846	10113	8427	10199	10198	15305	14675	15378	15659
30~34	5842	5842	8371	8675	13003	12364	12650	13468	15764	20217	19130	19590	20917
35~39	6719	6719	10243	10647	15207	14762	15579	15566	20199	25553	23171	24014	25955
40~44	7632	7632	11762	12498	17154	17041	16732	16382	21767	30557	27346	28663	31319
45~49	8311	8311	12849	13585	18910	18985	17122	16999	22504	35520	31895	33929	37613
50~54	8186	8186	13799	14405	20766	20786	19550	19607	25648	40769	37506	40242	45097
55~59	8425	8425	14850	15361	22339	22526	23837	23436	31195	46052	43544	46658	53147
60~64	9212	9212	14971	15784	23408	23955	26290	25346	34322	50580	48294	51752	59671
65~69	7232	7232	12490	13627	23883	24682	22195	21973	29226	47959	46665	50115	57853

Sources: Derived by the author from Household Expenditure Surveys, 1990~2019

Table 4: Changes in per capita at-home fresh fruit consumption in Japan, 1971 ~2010 (kg/year)

age/ year	1971	1980	1985-86	1990	1995-96	2000	2010
0~9 yo	36.3	26.5	15.2	8.9	4.7	2.3	2.4
10~19	45.6	30.5	20.1	14.9	9.4	5.7	4.4
20~29	48.3	31.5	23.4	16.8	15.1	11.8	9.8
30~39	46.1	43.8	36.6	30.4	23.6	21.8	14.8
40~49	51.0	52.6	48.5	44.9	37.2	33.4	20.5
50~59	54.4	59.9	56.6	54.0	50.5	48.5	32.1
60~69	44.5	58.5	61.1	62.0	58.7	60.7	53.3
70~	41.2	54.2	59.6	60.3	62.1	65.8	58.8
average	45.6	41.6	36.4	33.8	31.5	31.1	27.7

Sources: Calcurated by the author, by means of TMI mode[15].

4. Brief Conclusion

In a dynamic society, taste changes and differ importantly between people, and in particular, between generations.

If per capita consumption by age at a given period of time is provided, birth cohort effects can be identified. Future consumption by age will be predicted in a robust manner (Mori, Saegusa, Stewart, and Dyck) [2;3]. Blum states "a high consumption of animal protein does not result in increasing body height, if overall consumption of calories and other essential nutrients is insufficient [12; 13]. Mori, Cole and S.Kim conclude that *Kimchi* should contain some essential nutrients[14]. Recognizing that tastes differ across age [15] can lead to useful insights about changes in human behavior.

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