

Analysis of Participation by Female Seniors in the Korean Job Creation Program for the Elderly¹

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Abstract

The high aging rate in Korea is unprecedented in the history of the nation. However, the public system for supporting old people financially is insufficient. As a way of coping with rapid aging, the government of Korea launched a job creation program for the elderly in 2004. Five years after its inception, it has now taken the position as a full-scale public labor project.

The previous researches on the program were mainly concerned with two issues from gender-neutral perspective, building a system of the program and evaluating its performance. Their findings are also limited as they used the surveys of small sample size collected at a particular time and location, and their methodology relied mainly on subjective opinions by the program participants.

The present research is based on more reliable and comprehensive data for empirical analysis and investigates socio-economic conditions of the participants, their participation motives, work types, and also their participation frequency from gender perspective. Female participants were less educated, economically weak, and lived alone. Because of their disadvantaged socio-economic status, they were more likely to choose public service over education in work type. Also, they tended to participate repeatedly in the program to earn income rather than for self-development or social participation. Considering the behavior of female participants, we would suggest that the program be redesigned to fortify income function so that females who have participated for longer periods can be benefited with higher wages and extended work days.

Key words

job creation program for the elderly, female work participation, frequency analysis

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Introduction

Korea witnesses the ever-increasing elderly population of age 65 years and over. The elderly population grew from 7.2 percent of the whole population in 2000 to 10.7 percent in 2009. Moreover, the percentage is expected to climb to 14.3 percent in 2018. On the other hand, as family nuclearization and defamiliarization is widespread, the traditional support of parents by children is weakening (Kim, 2008). Though both increasing old people and attenuating private support makes the government's role for supporting the elderly population impending, the public support system for older people is still limited in Korea. A primary public support in Korea is the national pension, a fully funded system where an old recipient is entitled only to the amounts that he or she contributed while in working ages. Since it was introduced in early 1990's, there are only few older people who are benefited by the pension. In order to provide pension to most older people regardless of contribution, the government launched recently another public support system, a basic old-age pension that is financed by the government's budget. However, the amount of pension is so small that it can not sufficiently meet older people's financial needs

Under the weak private care and the limited public support, older people themselves have to seek for means of earning income. Since age-discrimination practice is prevalent in the Korean labor market, it is difficult for the elderly to work as employees in the private sector unless engaged in agriculture or self-owned enterprise. With the older population expanding rapidly, an assertion was mounting that older people are no longer a passive and silent group, but are rather an active one as labor force and social participants. Pressured by an increased political influence of older people, the government finally initiated the public job creation program for the elderly in 2004 so that they can work and earn income. The program financed by the government's budget has three goals supplementary income, health promotion, and social participation.

The program was expanded across the nation in 2005 following a trial operation in 2004. In 2006, the Korea Labor Resource Development Institute for the Aged (KLRDIA) was established to plan, operate, and evaluate this program. No other countries have seen such a public work program for older people carried out uniformly across the whole nation.

The program has operated for five years and rooted down as a representative public work program.

Those of age 65 years or over are eligible for participating in the public job creation program for the elderly. Except for their age, the participants in the program are heterogeneous in terms of personal traits and household backgrounds. Since these older people spent their school age years when the secondary education was not common and college education rare, their education years vary a lot. Because they lived for many years on different career paths, the participants' current incomes are dispersed broadly. And their purposes of participating in the program are diverse as well. Those underprivileged participate largely for income while those affluent do so for self-development or social participation. It is noticeable that old women are adversely positioned. Female seniors are generally disadvantaged in labor market career and education therefore, their economic status is weak, and their poverty rate is high (Seok & Lim, 2007; Park, 2002).

Such a disadvantaged status of female seniors is also observed in this program. Female seniors appeared to be different in participation motive, work type, and participation frequency. Compared to male counterparts, female participants in the program were lower in education, more likely to live alone, and have less volunteer experience. Also, female participants lacked professional experience and had lower economic status. The public job creation program has four types of works.² Many of the female participants worked in public service consisting of menial jobs than in education because of their disadvantaged status. Those in education were more educated and could have a better opportunity for social participation or self-development in the program. Even though the government seemed to put an emphasis on social participation, many female seniors perceived the program as a means of earning income. From an analysis of participation frequency, we can find that the poor participated in the job program more frequently. This tells us that female seniors who are generally

² The job program has four types of work. Education and public service are one in which most of old people participate. Those in public service are engaged in delivering public services such as cleaning street, protecting environment, and maintaining public facilities. On the other hand, those in education are placed as instructors in public educational facilities or welfare facilities (Korea Labor Resource Development Institute for the Aged, 2007).

poor repeatedly participate in the program to earn incomes necessary for their survival.

In this research, first, we choose male participants as a comparison group and compared their personal traits, participation motive, and participation behavior with female participants. Secondly, we attempt to reveal what factors make female participants chose public service more often than males. Thirdly, we investigate how often the females participated in the same work type, and to what extent their repeated participation was related to their poor economic status.

Literature

Previous researches at the starting stage of the public job creation program for the elderly were interested in justifying its need, and proposed mostly a system to implement it (Seo, 2004). Then, at the settling stage of the program, many researches evaluated the status quo of the program and suggested how to improve it (Yim, 2008).

There were also several researches that focused on whether the program achieved the three goals (Kim, 2008; Kweon & Choi, 2007; Kweon, Kim, Lim, & Lee, 2007; Kweon & Park, 2007; Lim & Lee, 2008). Most of the studies on the subject were concerned with participants' overall satisfaction, not considering each of the three goals separately. Some researches employed more detailed approaches for performance assessments of the program.

For example, Kweon and Park (2007) proposed three performance categories such as participant's satisfaction, social involvement, and subjective evaluation, and measured what a participant felt in each category. Kweon and Choi (2007) inspected the effect of program participation on life stability, and concluded that participants, especially those involved in education, had greater satisfaction than non-participants. Their main method was to measure satisfaction of participants through surveys and then to seek how the satisfaction is related to their attributes. Most of the researches used subjective indicators such as satisfaction and life quality. On the other hand, Lim and Lee (2008) found exceptionally using the national health insurance data that participants spent less in medical expenditure than non-participants. They showed an empirical result that a specific goal of promoting health was achieved.

Regretfully, all of the previous researches on the public job creation program were conducted from gender neutral perspective. Indeed, the researches of analyzing female senior in work are rare in Korea. Though not related to the program, a study by Park (2002) for example is the only one that investigated labor participation by female seniors. It observed that most of the female seniors working in Jeon-buk Province held menial jobs and their economic status was lower.

The present research is distinguished from these previous researches in two aspects. First, we analyze participation motives and behaviors of female seniors from gender perspective. In particular, we show that repeated participation by female seniors in the program was influenced by their perception of the program and their disadvantaged status. Secondly, we use a comprehensive data set assembled by KLRDIA, enhancing research reliability and providing a reliable empirical conclusion. The previous researches were conducted using samples (ranging from 100 to 300 subjects), each collected at a particular location and at a particular time. In contrast to these researches, we use a national data in the analysis and especially a longitudinal data in the investigation of repeated participation.

Overview of Participants' Characteristics

Participants' Characteristics by Work Type and Gender

We use the original data of the Job Creation Program Survey 2007 conducted by KLRDIA. The survey includes detailed information of participation motive, education, economic status, and career. It has a total of 2,987 participants residing across the nation. Out of them, 1,810 seniors, about two thirds of them, participated in public service and education. The participants in education were quite different from those in public service in terms of personal characteristics and work behavior. Also, the two work types are opposite in the nature of work. Thus, the analysis of those in the two types would be useful for illuminating behaviors of the participants as well as attitudes toward the program.

Among the participants in the two types, males were 960 persons (53 percent) and females 850 persons (47 percent). Out of the 960 males, 751 seniors (78.3 percent) participated in public service and 209 seniors (21.7 percent) in education. Also, out of the 850 females, 720 seniors

(84.7 percent) participated in public service whereas 130 persons (15.3 percent) in education. Male seniors tended to participate in education more than female seniors.

In terms of age, those under age 70 and those over age 70 constituted 35.1 percent, and 63.8 percent of male participants respectively, whereas both age groups had 44.5 percent and 55.1 percent of females respectively. Overall, male participants were more aged than their female counterparts. We looked at participants' ages in details by gender and work type. In the public service, male participant under age 70 represented 29.7 percent while those over age 70 were 69.2 percent. The two age groups were 54.6 percent and 44.0 percent respectively of male participants in education. On the other hand, those under 70 and those over 70 were 40.4 percent and 58.1 percent respectively of female participants in public service. The two groups were 67.0 percent and 32.3 percent of female participants in education, respectively. Regardless of gender, the participants in education were younger.

Male participants were more educated than female ones. About 35.7 percent of male participants were educated more than 12 years while only 11.1 percent of the females were educated for the same number of years. For males, 22.9 percent of the participants in public service were educated more than 12 years whereas 81.8 percent of participants in education had the same number of years of education. For females, only 3.3 percent of participants in public service were educated more than 12 years, whereas 53.8 percent of participants in education were educated that much. Regardless of gender, participants in education were educated the most.

When we look at the number of household members, 12.4 percent and 58.1 percent of male participants were respectively from one-person household and two-person household. On the other hand, 40.4 percent and 33.8 percent of female participants were from both household types. These findings imply that a significant number of female participants lived alone. Male participants in public service from, one-person households and two-person household constituted 14.1 percent and 57.5 percent respectively. But, for male participants in education, they represented 6.2 percent and 60.3 percent of them respectively. On the other hand, for female participants in public service, both household types had 43.2 percent and 32.4 percent of them respectively. However, female

participants in education, represented 23.8 percent and 41.5 percent respectively of both household types. Regardless of gender, participants in education were more likely to come from two-person household.

We now turn to volunteer experience. About 22.1 percent of male and 18.6 percent of female participants volunteered, showing that males were more active in volunteer work. Meanwhile, 15.6 percent of male participants in public service had volunteer experience while 45.5 percent of males in education did. Similarly, 12.2 percent of female participants in public service volunteered while 53.8 percent of females in education did. Volunteer experience was high among participants in education, regardless of gender.

Table 1
Participants' Characteristics

Unit: N, %

		Male						Female					
		Public service		Education		Total		Public service		Education		Total	
Age	Under 65	10	1.3	29	13.9	39	4.1	32	4.4	34	26.2	66	7.8
	65~70	213	28.4	85	40.7	298	31.0	259	36.0	53	40.8	312	36.7
	71~75	311	41.4	70	33.5	381	39.7	275	38.2	30	23.1	305	36.9
	76~	209	27.8	22	10.5	231	24.1	143	19.9	12	9.2	155	18.2
	No Answer	8	1.1	3	1.4	11	1.1	11	1.5	1	0.8	12	1.4
Education	No Educated	109	14.5	3	1.4	112	11.7	351	48.8	11	8.5	362	42.6
	Elementary School	314	41.8	23	11.0	337	35.1	305	42.4	25	19.2	330	38.8
	Middle School	152	20.2	12	5.7	164	17.1	40	5.6	23	17.7	63	7.4
Number of Household Members	1-Person	106	14.1	13	6.2	119	12.4	312	43.3	31	23.8	343	40.4
	2-Persons	432	57.5	126	60.3	558	58.1	233	32.4	54	41.5	287	33.8
Volunteer Experience	Yes	117	15.6	95	45.5	212	22.1	88	12.2	70	53.8	158	18.6
	No	630	83.9	114	54.5	744	77.5	630	87.5	60	46.2	690	81.2
	No answer	4	0.5	0	0.0	4	0.4	2	0.3	0	0.0	2	0.2
Total		751	100	209	100	960	100	720	100	130	100	850	100

The Economic Status of Participants by Work Type and Gender

We were interested knowing about the occupations that participants held for the longest period. For male participants, professionals constituted 9.4 percent, office workers 7.7 percent, farmers 23.9 percent, menial workers 15.5 percent, and the jobless 13.1 percent. For female participants, service workers represented 6.9 percent, salespersons 5.9 percent, famers 20.1 percent, menial workers 15.2 percent, and the jobless 38.2 percent. For male participants in public service, technicians accounted for 7.1 percent, office workers 6.3 percent, farmers 28.2 percent, menial workers 18.5 percent and the jobless 13.8 percent. For male participants in education, senior managers were 9.6 percent, professionals 31.6 percent, office workers 12.9 percent, farmers 8.1 percent, and the jobless 10.5 percent.

Meanwhile, for female participants in public service, service workers represented 6.9 percent, salespersons 5.6 percent, farmers 22.4 percent, menial workers 17.2 percent, and the jobless 38.8 percent. For female participants in education, professionals accounted for 15.4 percent, technicians 6.9 percent, salespersons 7.7 percent, and the jobless 35.4 percent. Regardless of gender, participants in public service were found to be more in agriculture and menial jobs, while participants in education were more likely to come from professional jobs.

Table 2
The Jobs Held by Participants for the Longest

	Unit: %											
	Male						Female					
	Public	Service	Education	Total	Public	Service	Education	Total	Public	Service	Education	Total
Managers	21	2.8	20	9.6	41	4.3	5	0.7	3	2.3	8	0.9
Professional	24	3.2	66	31.6	90	9.4	6	0.8	20	15.4	26	3.1
Technicians	53	7.1	13	6.2	66	6.9	9	1.3	9	6.9	18	2.1
Office Worker	47	6.3	27	12.9	74	7.7	6	0.8	6	4.6	12	1.4
Service Worker	29	3.9	6	2.9	35	3.6	50	6.9	9	6.9	59	6.9
Salesperson	38	5.1	5	2.4	43	4.5	40	5.6	10	7.7	50	5.9
Farmers	212	28.2	17	8.1	229	23.9	161	22.4	10	7.7	171	20.1
Skilled Worker	42	5.6	9	4.3	51	5.3	17	2.4	5	3.8	22	2.6
Machinery/Equipment Installers/Constructor	16	2.1	0	0.0	16	1.7	2	0.3	0	0.0	2	0.2

If we look at household expenditure, a measure of economic status, 55.8 percent of male participants had monthly expenditures of less than 500,000 Korean won and 25.8 percent did expenditures of between 500,000 and 1,000,000 Korean won. On the other hand, 73.3 percent and 16.1 percent of female participants belonged to the lower and higher expenditure brackets respectively. Generally, female participants had lower incomes. For male participants in public service, 65.0 percent and 24.2 percent had expenditures of less than 500,000 Korean won and of between 500,000 and 1,000,000 Korean won respectively. For male participants in education, two expenditure brackets represented 23.3 percent and 31.6 percent respectively. On the other hand, 79.9 percent and 12.9 percent of female participants in public service had lower and higher expenditures respectively. For female participants in education, 36.9 percent and 33.8 percent were in lower and higher expenditure brackets respectively. Regardless of gender, participants in education had relatively higher expenditures.

Table 3
Household Expenditure of Participants

Unit: 1000 Korean Won, %

Household expenditure	Male						Female					
	Public Service		Education		Total		Public Service		Education		Total	
0~50	488	65.0	48	23.0	536	55.8	575	79.9	48	36.9	623	73.3

The Motivation of Participants by Work Type and Gender

When we examine participation motive for the job program, 48.5 percent of male participated for living expenses and 19.9 percent for allowance, but 15.6 percent for social participation and 5.0 percent for self development. On the other hand, 62.9 percent of females participated for living expenses and 18.6 percent for allowance, but 7.5 percent for social participation and 3.6 percent for self development. Based on these findings, we can infer that female participants were more interested in earning money. About 57.9 percent of male participants in public service joined for living expenses and 21.3 percent for allowance, while 8.4 percent for social participation and 2.4 percent for self development. A mere

4.8 percent of male participants in education sought for living expense and 14.8 percent for allowance, while 41.6 percent for social participation and 14.4 percent for self development. About 70.4 percent of female participants in public service did for living expense and 19.7 percent for allowance, while 3.3 percent for social participation and 1.1 percent for self development. About 21.5 percent of female participants in education aimed at living expenses and 12.3 percent at allowance, while 30.8 percent at social participation and 17.7 percent at self development. Regardless of gender, participants in education were motivated more by social participation or self development than by income.

We looked at what value participants weighed after the program was finished. Of male participants, those who valued income, work enjoyment, health promotion, and social participation constituted 33.9 percent, 24.1 percent, and 14.1 percent, and 14.0 percent respectively. For females, income was valued by 53.6 percent, work enjoyment by 19.9 percent health promotion by 8.5 percent, and social participation by 5.6 percent. Thus, females were found to be more interested in income.

For male participants in public service, those who valued income, work enjoyment, health promotion, and social participation represented 40.2 percent, 22.2 percent, 14.9 percent, and 9.3 percent respectively, whereas for male participants in education, the corresponding figures were 11.0 percent, 30.6 percent, 11.0 percent, and 30.6 percent respectively. For female participants in public service, income was valued by 61.0 percent, work enjoyment by 16.0 percent, health promotion by 8.3 percent, and social participation by 3.3 percent, whereas for female participants in education, the corresponding figures were 13.1 percent, 41.5 percent, 9.2 percent, and 18.5 percent. Regardless of gender, participants in education were found to be more satisfied with work enjoyment and social participation.

We interested seeing whether participants were willing to continue the same work for no compensation after the job program ended. About 39.2 percent of male participants were willing to do so, while 45.3 percent wanted a compensated work, and 15.4 percent had no intention of continuing. About 29.9 percent of female participants agreed to a voluntary work, while 50.2 percent wanted compensated work, and 19.5 percent had no intention to work further. Females tended to prefer a com-

pensated to a volunteer work program.

About 33.7 percent of male participants in public service had willingness to work voluntarily while 49.7 percent wanted compensated work and 16.5 percent had no intent to work longer. About 58.9 percent of male participants in education favored volunteer work while 29.7 percent did compensated work, and 11.5 percent had no intent to work further. On the other hand, 24.9 percent of female participants in public service were willing to volunteer while 53.8 percent wanted compensated work, and 21.1 percent had no intent to work further. About 57.7 percent of female participants in education were willing to volunteer, while 30.8 percent preferred compensated work and 10.8 percent had no intent to work. Therefore, participants in education were more willing to volunteer than those in public service, regardless of gender.

Table 4
Participation Motives, Participation Value, and Volunteer Intention

		Male						Female					
		Public Service		Education		Total		Public Service		Education		Total	
Participation Motives	Living Expense	435	57.9	31	14.8	466	48.5	507	70.4	28	21.5	535	62.9
	Allowance	160	21.3	31	14.8	191	19.9	142	19.7	16	12.3	158	18.6
Participation Value	Income	302	40.2	23	11.0	325	33.9	439	61.0	17	13.1	456	53.6
	Associating Coworkers	66	8.8	20	9.6	86	9.0	54	7.5	12	9.2	66	7.8
Volunteer Work	Unpaid Work	253	33.7	123	58.9	376	39.2	179	24.9	75	57.7	254	29.9
	Paid Work	373	49.7	62	29.7	435	45.3	387	53.8	40	30.8	426	50.2
Total		751	100	209	100	960	100	720	100	130	100	850	100

We observed that female participants were lower in terms of socio-economic status than males. It obviously affected their participation motive and value. Female participants were less educated, more likely to live alone and passive in social participation such as volunteer work. In terms of career job, female participants were more likely to be in service industry or the jobless state. At the same time, they were less likely to be engaged in professional jobs or office works. Also, female participants were economically weak as their lower expenditures showed.

Females in adverse economic conditions participated to earn income rather than to attain social participation or self development. Because they perceived the program as an earning means, female participants tended to be more negative towards unpaid volunteer work than male participants. Lastly, because of their lack of education and job career, female seniors participated more in public service rather than in education that is suitable for social participation and self development.

Empirical Analysis

In this section, we conduct two empirical analyses to support two major findings of female participants theoretically. First, female seniors were found to participate more in public service because of their lack of education and job career. Second, they tended to participate repeatedly in order to seek incomes. We employ a logit model to reveal what characteristics female seniors had for choosing more public service than education. Then, we use a binomial probability model to investigate also what characteristics prompted them to participate in public service repeatedly.

Logit Analysis of Work Type

First, we use the logit model in order to analyze how gender influenced participants in choosing between public service and education. A sample of 1,101 was obtained out of the 2007 survey after eliminating those with incomplete personal information. Among the study subjects, males were 696 with 528 (75.9 percent) in public service, and 168 (24.1 percent) in education. Females are 405 with 333 (82.2 percent) and 72 (17.8 percent) in public service and education respectively.

Participants in public service were assigned, one and those in education zero for dependent variable. Gender is used as one of the explanatory variables in order to find its effect on work type. Other control variables include residence, health status, volunteer experience, life satisfaction, economic status, and household expenditure. Also, education, the occupation held for the longest, and the previous income from the occupation are used as control variables to reflect career and background. Gender and volunteer experience are dummy variables, and age, education, income, and household expenditure are continuous values. Residence is a catego-

rical variable with Seoul, other metropolitan cities, and other regions. Job is also a categorical variable with agriculture, manufacturing, construction, education, public administration, personal service, and others. Lastly, health status, life satisfaction, and economic status are ordered discrete values.

In order to test the model's robustness, we create four models with different combinations of variables. The first model takes all the variables. According to the estimation result, the coefficients of gender and age are significantly positive. It means that males and the more aged were more likely to choose public service. As education and volunteer experience both have negative coefficients, people with higher education and volunteer experience tended to prefer education to public service. And, because education in job category has a negative coefficient, those who held career in education institutions had a higher probability of choosing education. Lastly, the coefficients of economic status and household expenditure are both significantly negative. Therefore, those in high income groups were more likely to choose education. Other models also provided similar outcomes. However, because the coefficient of life satisfaction is significantly negative in model two and four, those with a positive attitude for life were more likely to take education over public service.

From these estimation results, we can find that public service was chosen more by males, the more aged, the less educated, the poor, and those with lower life satisfaction. On the other hand, education was selected more by females, the younger, the well-educated, those who worked in education or professionals, the economically privileged, and those with greater life satisfaction. In particular, a careful interpretation is required for the estimation result of more participation in education by females. In fact, it indicates that under other conditions being equal, females had higher chances of choosing education than males did. However, given the situation where economic status, job career, and education are generally low for females, the logit estimation tells us that females having such lower socio-economic status were generally more likely to participate in public service than males. It coincides with the results from Table 1.

Table 5
Logit Estimation of Work Type

Variables	Model 1		Model 2		Model 3		Model 4		
	Coefficient	S. D.	Coefficient	S. D.	Coefficient	S.D.	Coefficient	S. D.	
Constant	0.9973	1.7491	1.4365	1.6529	-0.3049	1.6830	1.9868	1.6908	
Gender	0.5892**	0.2618	0.7506***	0.2403	0.5370**	0.2525	0.7378***	0.2471	
Age	0.0672***	0.0230	0.0593***	0.0221	0.0779***	0.0223	0.0578**	0.0226	
Region	Seoul	-0.1373	0.3020	-0.0290	0.2838	-0.1027	0.2969	-0.1871	0.2915
	Metropolitan	-0.0097	0.2419	0.1100	0.2220	0.1109	0.2327	-0.0285	0.2340
Education	-0.3280***	0.0437	-0.4272***	0.0391	-0.3648***	0.0413	-0.3821***	0.0400	
Job	Agriculture	0.3248	0.3600			0.2898	0.3498		
	Manufacturing	0.1465	0.3308			0.2497	0.3254		
	Construction	0.3545	0.4618			0.3810	0.4468		
	Education	-1.2972***	0.4038			-1.7042***	0.3813		
	Public Administration	-0.0855	0.3526			-0.2425	0.3367		
Personal Service	-0.6804*	0.3654			-0.4013	0.3563			
Previous Income	0.0001	0.0011	-0.0020**	0.0009			-0.0004	0.0010	

Note. * 10% significance, ** 5% significance, *** 1% significance

Binomial Probability Model of Participation Frequency

We used the data from KLRDIA for the frequency analysis of all the participants residing in Seoul. Because the data for 2004 and 2005 did not distinguish work type, we used only 2006~2008 data of 6,836 persons and traced their participation over three years. Before unfolding an empirical model, we first discussed the traits of those individuals in the data sample.

About 40 percent of participants joined once and then dropped out. Because many participants in public service wanted to earn income for living expenses, a small amount of 200,000 Korean Won paid by the program was not enough for enticing them to stay in the program for another year. On the other hand, more than 60 percent of those in education participated over three consecutive years. It seems that they were satisfied with more social participation or self development than with pecuniary compensation, and hence seemed to repeatedly participate.

Table 6 shows how individual attributes influenced participation frequency for each gender and each work type. Participation frequency of

males in public service increased as household expenditure decreased. But it decreased for male participants who own a house. For male participants in education, the frequency increased with education, the number of household members, and house expenditure respectively. But it decreased for those living alone. On the other hand, for females in public service, the frequency increased with the number of household members but moved inversely with household expenditure. It decreased for those owning a house. For female participants in education, the frequency increased with education, household expenditure, and the number of household members respectively. It decreased for those who live alone.

Table 6
The Relationship of Frequency and Individual Attributes

Unit: N, %

	Male						Female					
	Public Service (3,208)			Education (660)			Public Service (2,369)			Education (608)		
	Once	Twice	Thrice	Once	Twice	Thrice	Once	Twice	Thrice	Once	Twice	Thrice
Number	1,280	929	999	144	113	403	926	648	795	154	118	336
	39.9	28.9	31.2	21.8	17.1	61.1	39.1	27.3	33.6	25.3	19.4	55.2
Age	75.64	75.78	76.07	72.36	72.01	72.51	75.12	75.42	75.23	70.39	70.37	69.82
Living Alone	0.40	0.22	0.22	0.42	0.27	0.16	0.50	0.44	0.49	0.58	0.42	0.26
# Of Household Members	1.35	1.67	1.49	1.07	1.51	1.79	1.15	1.30	1.18	1.01	1.25	1.57
Education	7.99	7.85	7.90	12.18	13.31	14.22	4.86	4.33	4.56	10.18	10.96	12.16
Owning House	0.68	0.61	0.51	0.87	0.84	0.81	0.54	0.46	0.34	0.82	0.87	0.80

Binomial probability model is employed to explore the participation frequency over three years. Since all subjects of the sample participated in the 2006 job programs, it is enough to count frequency such as 0, 1, and 2. We take age, education, the number of household members, and household expenditure as explanatory variables. Household expenditure is used as discrete values of 1 to 5: less than 100,000 Korean won, 100,000~300,000, 300,000~500,000, 500,000~1,000,000, and more than 1,000,000. Owning a house and living alone are used as dum-

my variables.

Let P_i denote participation probability of individual i in binomial model, and Y_i participation frequency of individual i . Then, the frequency probability is:

$$P(Y_i = y_i) = \frac{2!}{y_i!(2-y_i!)} p_i^{y_i} (1-p_i)^{(2-y_i)}.$$

We remark that participation probability p_i 's of participants differ depending on their personal attributes. Since probability is between 0 and 1, it can take logit function $p_i = \frac{e^{x_i\beta}}{1+e^{x_i\beta}}$ of an individual's attributes vector x_i . Then, the frequency is represented by:

$$P(Y_i = y_i) = \frac{2!}{y_i!(2-y_i!)} \left(\frac{e^{x_i\beta}}{1+e^{x_i\beta}} \right)^{y_i} \left(\frac{1}{1+e^{x_i\beta}} \right)^{(2-y_i)}.$$

Logarithm of the frequency probability is denoted by:

$$\log P(Y_i = y_i) = y_i \{ \log(e^{x_i\beta}) - \log(1+e^{x_i\beta}) \} - (2-y_i) \log(1+e^{x_i\beta}).$$

If the frequency probability of each individual is independent of each other, the likelihood function is:

$$L = \sum_{i=1}^N \left[y_i \{ \log(e^{x_i\beta}) - \log(1+e^{x_i\beta}) \} - (2-y_i) \log(1+e^{x_i\beta}) \right].$$

We can estimate the coefficient vector β that maximizes the likelihood function using MLE (maximum likelihood estimation).

Since the mean of binomial distribution is $E(y_i) = np_i$, the sign of estimated coefficients β_j tells the direction of the effect of an explanatory variable on mean frequency:

$$\frac{\partial E(y_i)}{\partial x_{ij}} = \frac{\partial np_i}{\partial x_{ij}} = n \frac{\partial}{\partial x_{ij}} \left(\frac{e^{x_i \beta}}{1 + e^{x_i \beta}} \right) = n \beta_j p_i (1 - p_i)$$

When we look at the estimation of model 1 (male participants in public service), the coefficient of age is positive but the coefficients of household expenditure and the number of household members are both negative. On the other hand, dummy variables of living alone and owning a house are both negative. This would suggest that participation frequency of a male in public service increased as he was older. Also it increased as household expenditure was smaller or when he did not own house.

We now turn to the estimation of model 2 (male participants in education). Education, age, and the number of household members are each positive, but living alone and owning a house are both negative. This would imply that participation frequency of a male in education rose as the number of household members increased, or education became higher. On the other hand, it increased when he lived with family.

The estimation results are not quite different for females. When we look at the estimation of model 3 (female participants in public service), the number of household members is positive while owning a house and household expenditure are both negative. A female participated more in public service as the number of household members multiplied or the economic status became poor. It insinuates that a female repeatedly participated in public service with a desperate purpose of supporting her family. In the estimation of model 4 (female participants in education), living alone is negative but education is positive, implying that more participations were made by a high-educated female with family.

Especially, the coefficient of household expenditure for a female participant in public service is larger than for a male. And, the coefficient of the number of households for a female participant in public service is positive unlike one for a male. This would imply that economic status affected participation frequency of a female in public service more than it did to a male. This point is important because more females participated in public service.

From the statistical inference point of view, it is desirable to employ the binomial probability model rather than linear regressions. Linear regressions do not put any constraint on frequency range while the binomial probability model has only frequency of 0 through 2. Generally, if we put such a theoretically appropriate restriction on model structure, we are able to obtain a better efficient estimation. As we see from Table 7 to Table 10, the binomial probability models have coefficients with larger t values.

Table 7
Model 1 (Male Participants in Public Service Type)

	Linear Regression		Binomial Probability	
	Coefficient	S. D.	Coefficient	S. D.
Constant	1.356***	0.2310	0.7414**	0.3540
Age	0.0049*	0.0028	0.0103**	0.0042
Living Alone	-0.3754***	0.0390	-0.7965***	0.0599
# Of Household Members	-0.0290**	0.0117	-0.0600***	0.0185
Education	0.0022	0.0040	0.0050	0.0061
Owning House	-0.1869***	0.0300	-0.3935***	0.0457
House Expenditure	-0.1603***	0.0198	-0.3383***	0.0321

Table 8
Model 2 (Male Participants in Education)

	Linear Regression		Binomial Probability	
	Coefficient	S. D.	Coefficient	S. D.
Constant	0.3945	0.5595	-1.5167*	0.8753
Age	0.0072	0.0060	0.0176*	0.0095
Living Alone	-0.2791***	0.0914	-0.5825***	0.1487
# Of Household Members	0.0415	0.0254	0.1205**	0.0510
Education	0.0417***	0.0098	0.0930***	0.0148
Owning House	-0.1184	0.0827	-0.3091**	0.1408
House Expenditure	0.0026	0.0454	0.0150	0.0781

Table 9
Model 3 (Female Participants in Public Service)

	Linear Regression		Binomial Probability	
	Coefficient	S.D.	Coefficient	S.D.
Cvconstant	1.5881***	0.2739	1.2230***	0.4080
Age	0.0001	0.0035	0.0003	0.0052
Living Alone	0.0022	0.0494	0.0040	0.0722
# Of Household Members	0.0351**	0.0164	0.0733***	0.0236
Education	0.0021	0.0050	0.0043	0.0074
Owning House	-0.2151***	0.0361	-0.4424***	0.0528
House Expenditure	-0.1847***	0.0234	-0.3838***	0.0353

Table 10
Model 4 (Female Participants in Education)

	Linear Regression		Binomial Probability	
	Coefficient	S. D.	Coefficient	S. D.
Constant	1.0758**	0.5084	0.1521	0.7942
Age	0.0005	0.0062	0.0013	0.0095
Living Alone	-0.4615***	0.0926	-1.0430***	0.1436
# Of Household Members	-0.0141	0.0905	-0.0380	0.0457
Education	0.0427***	0.0092	0.0979***	0.0141
Owning House	-0.0845	0.0855	-0.2007	0.1273
House Expenditure	-0.0106	0.0472	-0.0211	0.0769

Conclusion

The job creation program for the elderly has operated for five years and has become an important means for the implementation of the policy for senior welfare. We looked into economic status, participation motive, and repeated participation from gender perspective.

In this study, we found that female seniors were lower than males in the ratings of education, career, family background, asset, and economic status. Because of these vulnerable natures, female seniors participated in

the program for income rather than for social participation or self development. Because of insufficient career and lower education, female seniors seemed to choose public service over education that is believed to promote social participation and self development.

Also, we discerned that because of this disadvantaged socio-economic status of female seniors, they generally participated repeatedly. A female senior participated in public service more frequently as her economic status became lower. Also, it is found that economic status played a crucial role in participation frequency in public service for a female senior than it did for a male. This finding coincides with the 2007 survey result that female seniors participated to earn income for supporting their family.

The program pays a participant a small amount of 200,000 Korean won per month, and gives only seven months of work a year. Given this wage condition, the primary goal of this program is believed to enhance social participation and self development rather than to provide an income source. Despite this fact, we witnessed that many of the female participants in inferior economic status repeatedly participated in the program to earn income. This behavior of female seniors awakens us to their degraded economic situation.

In due consideration of these conspicuous finding about financially disadvantaged female seniors, we can introduce an alternative policy proposal to the current gender-neutral job program. Now, many female seniors living alone do not have other income sources except for the basic old-age pension. Undoubtedly, such female seniors are seeking additional income. Therefore, it seems to be necessary to re-design the job creation program for the elderly. For an example, we need to fortify the income function of the job program such that female seniors who have participated to earn income for longer periods can be benefitted with higher wage in combination with extended work days.

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