Economic Valuating Household Work in Korea, 1999 and 2004

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Ⅰ. Introduction

The economic importance of unpaid work in the household arises from the fact that the tasks may also be contracted out to workers in the market economy. This means, for example, that shifts over time between what is undertaken in the market and nonmarket economies will distort conventionally measured growth rates.

Although there has been some interest in including unpaid work in the SNA of the Korea, until recently, there were few incentives for allocating resources to measuring the economic value unpaid work. However, initiatives that were started by Euro-stat and the Forth United Nations World Conference on Women in Beijing in the use of time-use surveys as a method of valuing unremunerated work, have provided renewed interest in measuring unpaid work in Korea.

Accounting for household production requires an expansion of the conventional national accounts production boundary. A complete household satellite account would contain a comprehensive and integrated presentation of household economic activities that contribute to individual welfare, such as production, income redistribution and wealth accumulation. Statistics Korea has not undertaken work to compile a full satellite account but has a short-long history of compiling the labor component of household production.

Conventional economic statistics, such as the national accounts and employment measures, are largely designed to measure the market economy and exclude (in developed economies at least) most of the non-market productive activities occurring within the household. It is clear that the goods and services resulting from such activities are source of utility to the members of the household and other households and contribute to their well-being. The volume of household production is significant: on average, people spend roughly 30% more time in unpaid work than they do in market work. For many applications, such as welfare studies, more comprehensive analysis of production and consumption is required to track these phenomena over time, and as individuals shift their allocation of available hours between paid market works, unpaid work and leisure, is required.

Another example demonstrating the inter-linkages between the market and household sectors is the labor force participation of women. Individuals who are employed may find it useful to hire a cleaner to clean their house of pay for childcare services, rather than doing this work themselves. Under the System of National Accounts only the marketed work of cleaners, childcare workers is accounted for, and much of this is just a shift from household production to market production. Nonetheless, the same tasks are being done, the residence is being cleaned and children are being cared for.

In the other direction, the market is pushing some activities back to the household by, for example the own house repair and renovations carried out. There are also shifts between the government and household sectors. In order to understand the net effect of these interactions on all sectors, a comprehensive approach, including both market and

household production, is required.

Valuing unpaid work makes it possible to compare the value of labor services in the market economy with those engaged in household production. The development of a full satellite account would allow a better understanding the economic dynamics both within and between households, and between the household and other sectors in the economy. The account would provide a database consistent with conventional accounts, allowing a structured analysis of the household economy within the context of conventional national measures.

The valuation of the labor component of unpaid work presented in this paper highlights the contribution of women to total productive activity through their significant role in unpaid work. It also highlights the contribution of those who assist other households and institutions through voluntary unpaid labor.

The economic value of housework provided by women to be estimated in this study is to suggest objective and consistent criteria against which women may be appropriately compensated in legal actions involving injury, death, or divorce. The composition of this paper is as follows. First, this paper describes the reason to measure of value unpaid work in section 2, and described the pattern of unpaid work time use in section 3. Next, this paper estimates economic value of women's unpaid work in section 4, which introduces estimate methods, and results. Finally, the conclusions of this paper are presented in section 5.

Ⅱ. Reasons to Measure of Value Unpaid Work

Campaigns promoting awareness of household's unpaid work, in general, and that of women, in particular, have been conducted in countries around the world, in Korea. Knowledge of households' unpaid work is increasingly pertinent for public policy decision-making. Questions like how many hours households spend at various types of unpaid work during the year, how this evolves over time, and woman's and men's contributions make visible the hidden cost (in terms of reduced household non-market output) of economic growth. Information on the outputs and productivity of unpaid work, and of quality differences between home provision and alternative modes, by other institutional sectors of the economy, may help form a more complete assessment of the impacts of cutbacks in social services.

There are long-standing arguments for incorporating measures of household non-market production within broader measures of economic activity like GDP. One important argument is the shifting of resources from the non-market to the market sector that take place with economic growth. These shifts of resources lead to a growth in the market activity at the expense of the non-market unrecorded economy. Moreover, there may be a shifting back and forth of resources between the two sectors over the business cycle. Because the market draws resources from the non-market sector during periods of expansion and release those during phases of contraction, measured economy cycles may overestimate the cyclical character of the economy as a whole.

Another argument concerns the size difference of the household sector between countries. International comparisons of economic activity can be made more meaningful if broader and comparable measures of economic activity are available.

Statistics Korea has not long recognized the significance of unpaid work done by Koreans. At Statistics Korea, the measurement and valuation of household' unpaid work dates back to the mid nineties, originating with a review of proposals to modify the

Gross Domestic Product. Estimates have been made for 1999 and 2004 with improved sources data and refined definitions and methods introduced at each stage. In the last-twenties, a project was undertaken to revise previous estimates of the value of household' unpaid work. The estimates were put on a comparable footing to analyze a little longer-term trends in household' unpaid work. Among the main findings of this in-depth study was a sharp decline in the value of household work relative to GDP until the last-nineties and a reversal of trend in the 2004.

Recently, I updated valuation of households' unpaid work for 2004, along with a reworking of previously published micro-based estimates of the valuation of unpaid work for the year 1999.

Ⅲ. Pattern of Unpaid Work Time Use

This study classified time use data which includes household care, family care, and volunteer service by Reid's third party criterion. Although the absolute length of time allocation for unpaid work and the types of such labor exhibit the biggest differences between genders, differences are also revealed according to different age groups, and working condition.

Of overall women aged 20 or older, fulltime housewives were found to perform the longest unpaid work (6.52 hrs), while working housewife spent 3.49 hrs, compared to the average for all women (4.18 hrs) of the category. Overall men perform relatively less amount (0.42 hrs) of unpaid work in general. The details are in <Table 1-A>. See the <Table 1-B> also, fulltime housewives were found to perform the longest unpaid work (5.49 hrs); while a working housewife spent 3.22 hrs, compared to the average for all women (3.41 hrs) in that category. All men perform relatively less amount (0.47 hrs) of unpaid work. It is a little more than 1999(0.42hrs).

<Table 1-A> Per Day Average Unpaid Work, 1999

(Unit: Hours. Minutes)

Classification of Activities	Overall Women			Overall Men
		Housewife	Working Housewife	
4 Household Work	3.21	4.59	3.08	0.27
41 Food Preparation	1.41	2.27	1.43	0.05
42 Clothes Care	0.29	0.42	0.25	0.00
43 Cleaning/Arrangement	0.38	0.54	0.34	0.07
44 House Upkeep	0.04	0.05	0.03	0.05
45 Purchasing Goods	0.15	0.26	0.12	0.03
46 H' hold Management	0.03	0.05	0.02	0.01
49 Other Related Travel	0.12	0.20	0.10	0.04
5 Family Care	0.53	1.49	0.38	0.12
51 Care of Preschool Child	0.32	1.11	0.18	0.06
52 Care of School- Age Child Care	0.10	0.17	0.12	0.01
53 Other Related Travel	0.11	0.20	0.09	0.05
Household Work(4+5)	4.14	6.48	3.46	0.39
6 Voluntary Services	0.04	0.04	0.03	0.03
61 Voluntary Services	0.02	0.02	0.02	0.02
64 Related Travel	0.02	0.02	0.01	0.01

Unpaid Work(4+5+6)	4.18	6.52	3.49	0.42

Source: Report on the Time Use Survey, NSO, Korea, Raw Data, 1999.

<Table 1-B> Per Day Average Unpaid Work, 2004

(Unit: Hours. Minutes)

Classification of Activities	Overall Women			Overall Men
		Housewife	Working Housewife	
4 Household Work	2.47	4.00	2.41	0.29
41 Food Preparation	1.37	2.17	1.39	0.07
42 Clothes Care	0.24	0.36	0.24	0.01
43 Cleaning/Arrangement	0.35	0.50	0.32	0.08
44 House Upkeep	0.04	0.06	0.03	0.05
45 Purchasing Goods	0.15	0.23	0.12	0.04
46 H' hold Management	0.02	0.04	0.02	0.01
49 Other Related Travel	0.12	0.19	0.10	0.05
5 Family Care	0.51	1.44	0.38	0.15
51 Care of Preschool Child	0.28	1.04	0.16	0.07
52 Care of School- Age Child Care	0.10	0.18	0.11	0.01
53 Other Related Travel	0.13	0.22	0.10	0.07
Household Work(4+5)	3.38	5.45	3.19	0.45
6 Voluntary Services	0.03	0.04	0.03	0.03
61 Voluntary Services	0.02	0.02	0.02	0.01
64 Related Travel	0.02	0.02	0.01	0.01
Unpaid Work(4+5+6)	3.41	5.49	3.22	0.47

Source: Report on the Time Use Survey, NSO, Korea, Raw Data, 2004.

From the result, household management was found to occupy the least amount of household work time. With in family care women spent the least amount of time on school aged child care. In detail, unpaid work time of housewives was indicated through ordering of food preparation (41), cleaning/arrangement (43), care of preschool child (51), and clothes care (42) show a high percentage of traditional unpaid household work time. Thus, working housewives were found to follow a similar pattern, but the time used for care of school-aged children was understandably smaller. That is because working housewives tend to rely on secondary facilities for the caring of their school-aged children. For working housewives without children, unpaid work time for care of preschool children is not included.

The main characteristics analysis of unpaid work time spent by women of all ages yielded the following results <Table 2-A>: among women aged 20 or older, those in their 30s allotted the longest unpaid work time with 5.33. Those in their 40s and 50s came similarly next with 4.29. Thus, those in their 60s or older spend 3.38 of unpaid work time, followed by the drastic drop for those in their 20s's to three hours and 10 minutes. See the <Table 2-B>: among women aged 20 or older and those in their 30s allotted the longest unpaid work time with 5.00. Those in their 40s and 50s were similar with 3.51 and 3.48. Thus, those in their 60s or older spend 3.14 of unpaid work time; finally a drastic drop was recorded for those in their 20s's with 2.12.

<Table 2-A> Average Housework in a Day Related to the Ages and the Activities, 1999

(Total women over 20 years old)

(Unit: Hours. Minutes)

Classification of Activities	Ages

2 digit	3 digit	total	20s	30s	40s	50s	60s+
4 Household care		3.21	2.03	3.49	3.57	3.55	3.09
41 Food prep.	411, 412	1.28	0.49	1.41	1.49	1.44	1.22
	413	0.13	0.05	0.13	0.16	0.19	0.18
42 Clothes care	421	0.19	0.12	0.21	0.22	0.24	0.19
	422	0.05	0.03	0.05	0.05	0.05	0.06
	423,424	0.03	0.02	0.02	0.02	0.01	0.01
	425	0.02	0.02	0.02	0.02	0.01	0.01
43 Cleaning & arrangement	431	0.08	0.06	0.09	0.08	0.07	0.08
	432, 433	0.30	0.19	0.34	0.34	0.34	0.30
44 House upkeep	441	0.01	0.00	0.01	0.01	0.02	0.01
	442, 443	0.03	0.01	0.02	0.03	0.04	0.05
45 Purchasing goods for h'hold care	451, 452	0.15	0.12	0.19	0.17	0.17	0.09
	453	0.00	0.00	0.01	0.01	0.00	0.00
46 Household management	461	0.01	0.01	0.02	0.01	0.01	0.00
	462	0.00	0.00	0.00	0.00	0.00	0.00
	463	0.02	0.02	0.02	0.02	0.02	0.01
49 Other h'hold care activities 84 Household care travel	499, 841	0.12	0.09	0.15	0.14	0.14	0.09
5 Family care		0.53	1.05	1.40	0.28	0.29	0.24
51 Care of preschool child	511, 512, 519	0.32	0.54	0.57	0.04	0.16	0.13
52 Care of school-aged child	521, 522, 523, 529	0.10	0.02	0.29	0.12	0.01	0.02
53 Care of spouse 54 Care of parents 55 Other family care 85 Family care travel	530, 540, 550, 851	0.11	0.09	0.15	0.11	0.12	0.08
Household work(4+5)		4.14	3.08	5.30	4.25	4.24	3.33
6 Voluntary services		0.04	0.01	0.03	0.04	0.05	0.05
61 Helping neighbors	610	0.02	0.01	0.02	0.02	0.03	0.04
64 Voluntary services 86 Related voluntary services travel	641	0.00	0.00	0.00	0.01	0.00	0.00
	642	0.00	0.00	0.01	0.00	0.00	0.00
	643	0.01	0.00	0.00	0.01	0.01	0.01
	644, 649, 861	0.01	0.00	0.01	0.01	0.01	0.01
Unpaid work(4+5+6)		4.18	3.10	5.33	4.29	4.29	3.38

Source: Report on the Time Use Survey, NSO, Korea, Raw Data, 1999.

<Table 2-B> Average Housework in a Day Related to the Ages and the Activities, 2004
(Total women over 20 years old)

(Unit: Hours. Minutes)

Classification of Activities		Ages					
2 digit	3 digit	total	20s	30s	40s	50s	60s+
4 Household care		2.47	1.21	3.02	3.13	3.16	2.49
41 Food preparation	411,412	1.24	0.35	1.32	1.37	1.40	1.26
	413	0.13	0.03	0.10	0.14	0.18	0.19
42 Clothes care	421	0.16	0.07	0.17	0.19	0.19	0.17
	422	0.05	0.03	0.06	0.06	0.06	0.06
	423, 424	0.02	0.01	0.03	0.04	0.03	0.02
	425	0.01	0.01	0.01	0.01	0.01	0.01
43 Cleaning & arrangement	431	0.06	0.05	0.08	0.06	0.05	0.06

5

	Code						
	432, 433	0.29	0.16	0.33	0.33	0.33	0.30
44 House upkeep	441	0.01	0.00	0.01	0.01	0.01	0.01
	442, 443	0.03	0.02	0.03	0.04	0.04	0.05
45 Purchasing goods for household care	451, 452	0.14	0.10	0.18	0.17	0.15	0.09
	453, 454	0.01	0.01	0.01	0.01	0.00	0.00
46 Household management	461	0.01	0.01	0.01	0.01	0.01	0.00
	462	0.00	0.00	0.00	0.00	0.00	0.00
	463	0.01	0.01	0.02	0.02	0.02	0.00
49 Other household care activities 84 Household care travel	499, 841	0.12	0.09	0.15	0.14	0.14	0.09
5 Family care		0.51	0.50	1.55	0.34	0.28	0.21
51 Care of preschool child	511, 512, 513, 519	0.28	0.40	1.09	0.06	0.14	0.10
52 Care of school-aged child	521, 522, 523, 524, 529	0.10	0.01	0.28	0.14	0.01	0.02
53 Care of spouse 54 Care of parents 55 Other family care 85 Family care travel	531, 539, 541, 549, 551, 559, 851	0.13	0.08	0.18	0.14	0.12	0.09
Household work(4+5)		3.38	2.11	4.57	3.47	3.44	3.09
6 Voluntary services		0.03	0.01	0.03	0.04	0.04	0.05
61 Helping neighbors	611, 612, 619	0.00	0.01	0.02	0.02	0.04	0.04
64 Voluntary services 86 Related voluntary services travel	631	0.00	0.00	0.00	0.00	0.00	0.00
	632	0.00	0.00	0.00	0.00	0.00	0.00
	633	0.00	0.00	0.01	0.01	0.00	0.01
	634, 639, 861	0.00	0.01	0.01	0.01	0.01	0.01
Unpaid work(4+5+6)		3.41	2.12	5.00	3.51	3.48	3.14

Source: Report on the Time Use Survey, NSO, Korea, Raw Data, 2004.

Details of activities and ages reveal that the most time is spent doing food preparation by 50s, and 40s followed by 30s, in comparison to those in their 20s who spend over half the time as those in their 40s. There were relatively small differences among the age groups in terms of household management activities. With respect to family care, women in their 30s showed the longest time allocation with 1 hour and 55 minutes, followed by those in their 20s showing 50 minutes, the chart also indicates that those in their 40's experience a drastic drop of greater than 70% to only 34 minutes while this trend continues for those in their 50's and 60's who show little change with 28 minutes and 21 minutes consecutively respectively. In particular, women in their 30s showed the biggest time expenditure on 'care of a preschool child' and 'care of school-aged child,' but those in their 20s concentrated more on 'care of a preschool child.' This result also shows that 50 years or older women are caring for their grandchildren in subrogation of their working children. This paper can draw meaningful conclusions and characteristics of the time used by comparing time use by working housewives for paid and unpaid work.

In Korea (1999), men and women over the age of 20 spend 7 hours 24 minutes in the average, day completing productive labor. Of those hours, unpaid household labor makes up 2 hours 30 minutes and paid labor contributes 4 hours 54 minutes. If classified by gender, a woman participates in unpaid labor for 3 hours 35 minutes and 4 hours 18 minutes for paid labor daily. On the other hand, a man participated in unpaid work for only 42 minutes and 6 hours 14 minutes for paid labor. The ratio of paid work compared to unpaid work of a household for women was similar, but men showed a large gap which was apparent with unpaid work totaling only 10% and remaining 90% for paid work. The result (2004) shown same trend as 1999.

In the case of Japan, of all women 15 years old or above (by 1996 standard) participated in paid work for 2 hours 48 minutes per day and 3 hours 50 minutes for unpaid work of the total productive labor performed for 6 hours 38 minutes, which yielded a difference of 1 hour 2 minutes. Comparatively, same categories of women in Korea spent decisively longer (by 43 minutes). Japanese men aged 15 years or above spent for unpaid work 31 minutes and 5 hours 36 minutes for paid work. The time spent by Korean men of the category participated longer by 38 minutes for paid work, and 28 minutes for unpaid work.

This study compared a time use analysis performed in developed nations during a similar period that was based on a relative ratio (unpaid work / paid labor×100) on unpaid work. Korean women spent relatively 1.2 times less on unpaid work than others like Japanese women who spent 1.3 times(Fukami; 1998) more and Canadian women (in 1999 among women aged 16 years or above) who spent 1.6 times(Hamdad; 2003) more for unpaid work, respectively. Meanwhile American women (in 1997 among women aged 15 years or above) spent 1.7 times more (Swiebel; 1999), as well as Australian women (in 1997 among women aged 15 years or above) who spent 2.3 times more (Trewin; 2000), and British women (in 1999 among women aged 16 years or above) who spent 2.4 times greater for unpaid work than recorded in 1999 research (Parent, Rogerson, and Wright; 2000), relatively. Meanwhile, New Zealand (Tatau; 2001) women (in 1999 among those aged 16 years or above) were similar to Korean women with 1.2 times more hours used for unpaid work than the previous research purposed.

The above observation presents a limited explanation on the variation of average hours spent for unpaid work among the surveyed nations, also it does not compensate for the possibility that the rates of unpaid work according to each category may change every sample year, so too the scope of unpaid work, and the target population.

The Korean women's participation in unpaid work compared to paid work and the same comparison for other countries. In detail, Australian women worked 5 hours 3 minutes, and their American counterparts spent 4 hours 46 minutes for productive work. Canadian counterparts spent 4 hours 40 minutes, which is slightly shorter than the prior two, but longer than the hours spent by Japanese women (3 hours 50 minutes), by English (4 hours 16 minutes), and by New Zealand women (3 hours 57 minutes).

IV. Estimation of Value for Household Work

Information on the time spend on household' unpaid work comes from Statistics Korea's the Time Use Survey (TUS), repeated every five years. So far, two time use surveys have been conducted in 1999 and 2004. The first survey was carried out in

1999, with new results in 2001 and 2002. As TUS five year cycle, another survey is in the field in 2004 with results pronounced 2006. The TUS covers all persons aged 10 years and over living in private households, individual and diary day in Korea. A total of 17,000 households and 46,109 individuals aged 10 years and above from 850 enumerated districts were randomly selected to form the survey sample. Female respondents accounted for 51.5% of the sample, while male respondents accounted 48.5%.

Prior to 1999, the estimates were compiled based on population counts, time use averages for specific demographic groups, and imputed hourly cost for each activity by persons in each group. The population was subdivided into groups defined by sex, family status, labor force status and number of children. The formula for the value of unpaid work involved estimating a value of each type of unpaid work for specific demographic groups and aggregating these values.

With the 1999 and 2004 studies, the estimated are prepared directly using micro data from the time use survey so that they can be compared and analyzed along far more dimensions than previously. The formula used in previous analyses still applies but in this case, the summation is across all survey respondents, the number of persons in each population group is replaced with the weight of each respondent in the survey. The average annual hours spent on each unpaid work activity by persons in each population group is replaced with the annualized time reported by type of unpaid work by each respondent. The imputed hourly cost for each activity by population group is replaced with a cost imputed to each respondent.

In the case of non-marketed goods and services, the national accounting approach is to assess value in relation with costs. National accounts guidelines recommend the imputation at the price of some equivalent marketed good or service or, as a next best approach, imputation at the cost of inputs. Valuing the labor component of unpaid work requires that a price of labor (wage rate) be borrowed from the market. While actual hours worked, analyzed by activity, can be measured with some precision, there is no agree upon, unique market wage rate that should be used to value these hours. The choice of imputed wage rate has a significant bearing on the valuation and, indeed, is the critical factor in any subsequent paid/unpaid work comparisons.

There are several options available for the choice of an imputed market wage. These can be broadly grouped into two categories depending on their underlying assumption, namely market replacement cost and opportunity cost.

Estimation Method

Market Replacement Cost Method

＊Individual Function Replacement Cost Method (IFRC)

Individual Function Replacement Cost Method assigns values to the time spent on unpaid work by household members according to the cost of hiring a market replacement for each individual function. Thus, for example, time spent on cleaning is valued using a rate of pay for commercial cleaners, and time spent on child minding is valued according to the rate of pay for child care workers. The most important element in this method is finding a suitable occupation to correspond to the unpaid work, and at the same time classifying and selecting matching an individual specialist or occupation within the market.

Also, estimation should be made by subdividing unpaid work according to action,

and calculate a pay scale of a specialist performing this job. This problem can result in overestimation of the value of unpaid work since it cannot reflect that a female unpaid worker's ability to perform an unpaid work may be poorer than the performance of the market substitute due to a higher degree of specialty and thus correspond incorrectly (Hefferan, 1982). Even for same sample subjects, job differentiation and substitutive job's wage must be carefully selected since the actual pay varies greatly on experience and education level of the substitute.

As for the required data, the woman who participated in the time that it takes with each function, a salary of a labor market corresponding to this, an age generation unpaid work is numerical. It is defined in the equation below. The data sought after by the method would reveal time consumed by each function, matching wage in the labor market, and number of women engaging in unpaid work by age. The following is an equation that expresses the method.

$$UWK_{IFR} = \sum_{i=1}^{N}\sum_{i=1}^{M} H_{ij} PK_j W_{ij}$$

Where

UWK_{IFR} : Individual replacement cost estimate for unpaid work

H_{ij} : Average hours in 1999 and 2004 spent on unpaid work function i per number of persons in woman demographic group j

PK_j : Number of Korean women in demographic group j

W_{ij} : Average hourly rate of pay applicable to unpaid work on function i for women in demographic group j

Under the Korean Standard Classification Occupations, we applied comparable occupations of similar activities with three digit wages and classified them into 24 unpaid jobs for women, which belonged to a pool of 52 productive activities.

<Table 3> Occupation Matched to Unpaid Work Activities

Time Use Codes	Unpaid Work Activities	KSCO Code	KSCO Description
4. Household Care			
411-412	Meal preparation, dish washing	512	Housekeeping and restaurant services workers
413	Snack prep. / preserving	741	Food processing and related trades workers
421	Laundry	913	Domestic and related helpers, cleaners and launderers
422	Folding and storing clothes	512	Housekeeping and restaurant services workers
423-424	Ironing/care of clothes, Clothes repair	913	Domestic and related helpers, cleaners and launderers
425	Handicraft	743	Textile, garment and related trades workers
431	Arrangement	512	Housekeeping and restaurant services workers
432-433	Cleaning dwelling,	914	Building caretakers, window and

			related cleaners
451-452	Daily necessities/groceries	512	Housekeeping and restaurant services workers
453	Capital goods	341	Finance and sale associate professionals
461	Book-keeping	412	Numerical clerks
462	Planning and budgeting	131	General Manager
463	Administrative services	412	Numerical clerks
499-841	Other h'hold care activities, Travel	512	Housekeeping and restaurant services workers
5. Family Care			
511-512, 519	Physical care, reading, other	233	Primary and pre-primary education teaching professionals
521-523, 529	Physical care, teaching	233	Primary and pre-primary education teaching professionals
530, 540, 550, 851	Care of spouse	323	Nursing and midwifery associate professionals
6. Voluntary Services			
610	Helping neighbors	511	Travel attendants and related workers
641	For national or local event	511	Travel attendants and related workers
642	For school/kindergarten children	233	Primary and pre-primary education teaching professionals
643	For the disabled or aged	323	Nursing and midwifery associate professionals
644, 649, 861	Other voluntary services	511	Travel attendants and related workers

Source: Korean Standard Classification Occupations (KSCO), NSO, 1993, and Survey Report on Wage Structure, MOL, 2000.

In order to increase the accuracy of the three digit wages survey of unpaid work value estimation in IFRC method, it is necessary to accompany the analysis that defines comparable wages of the market that appropriately match with unpaid work action based on Time Use Survey. In spite of these limitations, a characteristic of the average hourly wage is that they are very similar to one another <See Table 4-A>. For example, average hourly wages for household care for women in their 50s with 5,746 won, 20s with 5,515 won, 40s with 5,357 won, 30s with 5,202 won, and 60s over with 4,259 won. However, the average hourly wages for secondary unpaid household work such as purchasing goods for household care and household management were relatively high. Likewise the average wage time spent in family care for women in their 40s is 5,868 won and 5,859 won for women in their 60s or above.

<Table 4-A> Hourly Average Wages by Ages, 1999

(Unit: Won)

Time Use Codes	KSCO Code	Average Wages					
		Mean	20s	30s	40s	50s	60s+
4. Household Care		4,966	5,515	5,202	5,357	5,746	4,259
411-412	512	4,372	4,487	4,663	4,353	4,558	3,814
413	741	3,299	3,669	3,348	3,513	3,456	2,559
421	913	3,429	3,572	3,874	3,415	3,218	2,932
422	512	4,372	4,487	4,663	4,353	4,558	3,814
423-424	913	3,429	3,572	3,874	3,415	3,218	2,932
425	743	3,172	3,365	3,539	3,281	2,997	2,573
431	512	4,372	4,487	4,663	4,353	4,558	3,814

Time Use Codes	KSCO Code	Mean	20s	30s	40s	50s	60s+
432-433	914	3,701	3,548	2,930	4,380	4,204	3,752
451-452	512	4,372	4,487	4,663	4,353	4,558	3,814
453	341	8,002	6,312	9,135	11,223	12,331	2,457
461	412	7,168	5,130	7,539	8,073	10,194	5,916
462	131	9,862	7,170	8,944	10,742	11,895	11,439
463	412	7,168	5,130	7,539	8,073	10,194	5,916
499-841	512	4,372	4,487	4,663	4,353	4,558	3,814
5. Family Care		7,661	5,718	7,260	9,392	9,332	7,327
511-512, 519	233	8,122	5,398	6,955	9,555	10,812	9,049
521-523, 529	233	8,122	5,398	6,955	9,555	10,812	9,049
530, 540, 550, 851	323	6,739	6,358	7,869	9,066	6,371	3,884
Household work (4+5)		5,392	4,705	5,527	5,994	6,312	4,743
6. Voluntary Services		5,412	4,856	5,821	5,868	5,682	5,859
610	511	4,065	3,362	4,262	3,799	4,023	4,838
641	511	4,065	3,362	4,262	3,799	4,023	4,838
642	233	8,122	5,398	6,955	9,555	10,812	9,049
643	323	6,739	6,358	7,869	9,066	6,371	3,884
644, 649, 861	511	4,065	3,362	4,262	3,799	4,023	4,838
Unpaid work (4+5+6)		5,396	4,635	5,526	5,996	6,216	4,899

Source: Survey Report on Wage Structure, MOL, Korea, 2000.

<Table 4-B> Hourly Average Wages by Ages, 2004

(Unit: Won)

Time Use Codes	KSCO Code	Average Wages					
		Mean	20s	30s	40s	50s	60s+
4. Household Care		6,224	5,850	6,874	7,096	6,517	4,785
411-412	421	4,864	5,327	5,426	5,048	4,704	3,813
413	751	4,864	5,327	5,426	5,048	4,704	3,813
421	911	4,864	5,327	5,426	5,048	4,704	3,813
422	421	4,864	5,327	5,426	5,048	4,704	3,813
423-424	911	4,864	5,327	5,426	5,048	4,704	3,813
425	753	4,356	4,456	5,039	4,533	4,110	3,640
431	421	4,864	5,327	5,426	5,048	4,704	3,813
432-433	912	4,844	4,675	5,418	5,320	4,725	4,083
441	712	5,308	6,126	5,082	5,163	5,063	5,105
442-443	912	4,844	4,675	5,418	5,320	4,725	4,083
451-452	421	5,579	3,900	4,259	5,878	9,209	4,649
453-454	261	10,149	8,548	13,337	12,580	10,359	5,920
461	315	11,833	8,444	13,044	16,203	13,886	7,588
462	030	9,071	7,402	10,253	12,030	9,771	5,901
463	315	9,734	7,597	10,924	11,572	9,633	8,944
499-841	421	4,864	5,327	5,426	5,048	4,704	3,813
5. Family Care		11,301	7,515	10,778	13,428	11,008	13,774
511-513, 519	153	9,016	6,471	9,384	12,169	12,261	4,795
521-524, 529	153	12,443	8,037	11,475	14,058	10,382	18,264
531, 539, 541, 549, 551, 559, 851	143	12,443	8,037	11,475	14,058	10,382	18,264
Household work (4+5)		8,763	6,683	8,826	10,262	8,763	9,280
6. Voluntary Services		8,325	5,555	7,145	9,150	9,678	10,095
611-612, 619	431	5,579	3,900	4,259	5,878	9,209	4,649
631	431	5,579	3,900	4,259	5,878	9,209	4,649
632	153	12,443	8,037	11,475	14,058	10,382	18,264
633	143	12,443	8,037	11,475	14,058	10,382	18,264
634, 649, 861	431	5,579	3,900	4,259	5,878	9,209	4,649
Unpaid work (4+5+6)		8,617	6,307	8,266	9,892	9,068	9,551

Source: Survey Report on Wage Structure, MOL, Korea, 2005.

In spite of these limitations, a characteristic of the average hourly wage is that they are very similar to one another <See Table 4-B>. For example, average hourly wages for household care for women in their 40s with 7,091 won, 30s with 6,874 won, 50s with 6,517 won, 20s with 5,850 won, and 60s over with 4,785 won. However, the average hourly wages for secondary unpaid household work such as purchasing goods for household care and household management were relatively high. Likewise the average wage time spent in family care for women in their 60s is 13,774 won and 11,008 won for women in their 50s.

Next, the number of total women who participated in unpaid work by age variation was computed by summing the number of women aged 20s old who engaged in paid work according to the Annual Report on the Economically Active Population Survey and the number of women who participated in unpaid work per age group. We classified items such as 'commuting,' 'old age,' etc to correspond to unproductive labor action and exclude them in this study's analysis target. The numbers of total women per age group are as shown in <Table 5-A>. Of the total number of sample women, 3,963 (or 26.6% - largest of the groups) were in their 30s followed by 22.2 % for women in their 40s, 21.5% for women in their 20s, 15.5% for women in their 60s and 14.7% (or 2,196 persons – only half of the women in 30s) for women in their 60s.

<Table 5-A> Unpaid Work of Total Number of Women Participants, 1999

(Unit: Thousand persons)

	20s	30s	40s	50s	60s+	Sum
Number	3,207	3,963	3,301	2,196	2,237	14,904
Ratio (%)	21.52	26.59	22.15	14,73	15.01	100.0

Source: Annual Report on the Economically Active Population Survey, NSO, Korea, 2000.

<Table 5> Unpaid Work of Total Number of Women Participants, 2004

(Unit: Thousand persons)

	20s	30s	40s	50s	60s+	Sum
Number	3,052	4,087	3,916	2,385	2,656	16,096
Ratio (%)	18.96	25.39	24.33	14,82	16.50	100.0

Source: Annual Report on the Economically Active Population Survey, NSO, Korea, 2005.

Next, See the <Table 5-B>, of the total number of sample women, 4,087 (or 25.4% - largest of the groups) were in their 30s followed by 24.3 % for women in their 40s, 19.0% for women in their 20, 16.5% for women in their 60s and 14.8 for women in their 50s.

* *Generalist Replacement Cost Method (GRC)*

The Generalist Replacement Cost Method is for estimating the wage for unpaid work done by women by treating the unpaid work as if it is a market job and assume that a household has hired a person from the market to perform that job for pay (Goldschmidt-Clermont, 1982). It has been used readily for practical use, but the most basic element in the method is the selection of substitutable jobs

In general the substitutable occupation mainly selected by existing domestic/foreign studies was the average market salary of a general administrator occupation (KSCO code 13) or a housekeeper. One unavoidable problem in this case is that in using the salary of a housekeeper or a day housekeeper as an equivalent of a female unpaid work,

the value of unpaid work tends to be underestimated. On the other hand, selecting a general administrator as the replacement occupation tends to yield overestimated value because the wage of the occupation, in general, is relatively higher than other occupations.

In order to resolve the bi-polar problems, Trewin (2000) used the 1997 Australian TUS data and corresponded to the applicable occupations' average salary for men and women, while Tatau (2001) used the equivalent for New Zealand TUS data in 1999 to obtain the median wage without discrimination for sex or age for the same purpose. In this work, we approached in two ways to take the average replacement wage.

An estimation equation is as follows:

$$UWK_{GRC} = \sum_{j=1}^{N} H_j PK_j W_{Hj}$$

Where

UWK_{GRC} : General replacement cost estimate for unpaid work

H_j : Average hours in 1999 and 2004 of all unpaid work functions per person

in woman demographic group j where $\quad H_j = \sum_{i=1}^{M} H_{ij}$

PK_j : Number of Korean women in demographic group j

W_{Hj} : Average hourly rate of pay applicable for generalist woman demographic group j in 1999 and 2004

The above equation calculates the value of women's unpaid work by using the hours spent by women in household work (Hj), the number of women who participate in unpaid work by age (PKj) and the average replacement wage (W_{Hj}). The average replacement wage (W_{Hj}) was approached in two methods. First, the replacement average wage for women in respect of household management, family care, and voluntary services was used as the weighted value for the value of unpaid work time versus unpaid work ratio by each activity with weight (GRC I). This method's merit is that hourly productivity can be covered partly since differed time expenditure of different activities are reflected in time dispersion as oppose to simply applying the average wage of all occupations.

The second method, similar to the previous one in terms of replacing household worker with the replacement occupation, and applying gross replacement wage of all women as the wage for KSCO 512(GRC Ⅱ). The advantage of this method is that consistent result can be yielded since the same estimation method is used, avoiding conflict of results caused by using different estimation methods <See Table 6-A>.

<Table 6-A> Hourly GRC I, II by Ages, 1999

(Unit: Won)

	20s	30s	40s	50s	60s+	Sum
GRC I	4,752.3	5,615.6	6,168.3	6,460.3	4,886.0	5,576.5
GRC II	4,487.1	4,663.5	4,352.9	4,558.1	3,814.1	4,375.2

(Unit: Won)

	20s	30s	40s	50s	60s+	Sum
GRC I	5,789.4	7,813.4	8,767.1	8,042.5	5,585.6	7,224.3
GRC II	5,120.1	5,353.0	5,061.2	4,737.4	3,815.9	4,553.3

The replacement cost of unpaid work done by women by age group according to GRCⅠ was the highest for those in the 50s with 6,460 won of average hourly wage followed by the 40s, 30s, 60s, and the 20s with 4,752 won (about 1,700 won difference compared to the highest 50s). According to GRC Ⅱ, women in their 30s were found to receive the highest hourly wage with 4,663 won among the age groups. On the other hand, women in their 60s were found to receive the least wage. Comparing the result with the results yielded by GRCⅠ, it is found that all age groups show lower distribution. It can be deduced that the replacement cost of occupation using GRCⅡ tends to be lower than other occupations. See the <Table 6-B>, the replacement cost of unpaid work done by women by age group according to GRCⅠ was the highest for those in the 40s with 8,767 won of average hourly wage followed by the 50s, 30s, 20s, and the 60s with 5,586 won (about 3,181 won difference compared to the highest 50s). According to GRC Ⅱ, women in their 30s were found to receive the highest hourly wage with 5,353 won among the age groups. On the other hand, women in their 60s were found to receive the lowest wage.

Opportunity Cost Method

* *Gross Opportunity Cost Method (GOC)*

The Gross Opportunity Cost Method estimates unpaid work in terms of the earnings assumed to be foregone by householders when they devote time to unpaid work rather than paid employment. The method is based on the assumption that the value of time spent doing unpaid work at home equals its 'opportunity cost' elsewhere, i.e. the valuation of the next best alternative use. For example, if the wage earnable in the market accurately reflects the value limit of the hourly wage for the unpaid work, by multiplying the market wage by the hours of unpaid work, not only the total value of the unpaid work, but also the implicit value of the unpaid work can be attained.

According to Hefferan (1982), the value of unpaid daily work performed by a woman doing housework equals the value of paid daily work. In theory, this method has the most sophisticated analysis framework. However, a problematic factor is that even under the same household conditions and the same unpaid work hours, individual characteristics such as level of education and skill may differ from the value due to differentiated wage. For example, if you assume that the value of a woman "being at home" is the same as the implicit market income, the value of "being at home" reflects not just the concept of doing housework, but the overall value of the woman's labor as a whole. And if you compare this value with the generalist replacement cost method, the estimation result using the gross opportunity cost method for the value of unpaid work performed by women, according to Hawrylyshyn (1976), tend to be overestimated.

Below is the estimation equation.

$$UWK_{GOC} = \sum_{j=1}^{N} H_j PK_j W_{GOCj}$$

Where

UWK_{GOC} : Gross opportunity cost estimate for unpaid work

H_j : Average hours in 1999 and 2004 of all unpaid work functions per women in demographic group j by age group

PK_j : Number of persons in Korea in women demographic group j by ages

W_{GOCj} : Gross opportunity cost average of hourly rate of pay for women in demographic group j by age group

In most former studies, GOC is found by multiplying the total average market pay scale by the total time expenditure for unpaid work of age groups. In that sense, the GOC method cannot escape the limitation in reflecting the varying values that can result from various factors including employment status, psychological income, and the appropriateness of market wage ratio for an individual worker.

By age, GOC for women in then 30s appeared to be 6,333.1 won; 50s with 4,252.2 won; 4516.5 won to those in the 60s, for those in 20s of their 5,086.3 won; and 4889.3 won for the 40s group. See <Table 7-A>. It excluded women in the 50s and was higher than each age and GOC II used an average salary of a domestic worker. However, it appeared low GOC I. In this study, we attempt to overcome such limitation by separating the applicable women population by age and then estimate the value of unpaid work so as to reflect the gap among the hourly productivity limits of different age groups on the estimation of the opportunity cost. The total hourly opportunity cost, as shown in <Table 7-A>, was highest for women in their 30s with 6,333.1 won followed by those in their 20s with 5,086.3 won, those in their 40s with 4,889.3 won, those in their 60s with 4,516.5 won and those in their 50s with 4,252.2 won. Except for the 50s group, the total hourly opportunity cost of each age group was larger than the GOC II found using the average of wage of household laborer. However, the total hourly opportunity costs were found to be lower than GOC II based on the average unpaid work wage method.

<Table 7-A> Hourly Opportunity Cost by Ages, 1999

(Unit: Won)

	20s	30s	40s	50s	60s+
Gross Opportunity Cost	5,086.3	6,333.1	4,889.3	4,252.2	4,516.5
Income Tax	10.6	19.5	25.9	8.1	12.1
Net Opportunity Cost	5,075.7	6,313.6	4,863.4	4,244.1	4,504.4

<Table 7-B> Hourly Opportunity Cost by Ages, 2004

(Unit: Won)

	20s	30s	40s	50s	60s+
Gross Opportunity Cost (GOCⅠ)	7,610.7	10,738.6	7,843.4	6,713.6	5,661.4
Income Tax	10.6	19.5	25.9	8.1	12.1
Net Opportunity Cost (GOCⅡ)	7,600.1	10,719.1	7,817.5	6,705.5	5,649.3

See <Table 7-B>, it excluded women in the 30s and was higher than each age and

GOC II used an average salary of a domestic worker. However, it appeared low GOC I. The total hourly opportunity cost was highest for women in their 30s with 10,739 won followed by those in their 40s with 7,843 won, those in their 20s with 7,611 won, those in their 50s with 6,714 won and those in their 60s with 5,661 won.

*Net Opportunity Cost Method (NOC)

Net Opportunity Cost estimates the value of unpaid work performed by women using implicit net opportunity cost with the assumption that the women engage in paid worker. The NOC is equivalent to the net income, which is calculated by deducting labor related expenses and taxes from the gross opportunity cost. Even though the flaw in this approach is the involuntarily unemployment or non-monetary compensation are not compensated, as pointed out by Murphy (1982), the approach does have certain merits in estimating the value of unpaid work as it reflects the different characteristics of individual unpaid workers to a degree.

Below is the estimation equation of the approach.

$$UWK_{NOC} = \sum_{j=1}^{N} H_j PK_j W_{NOCj}$$

Where

UWK_{NOC} : Net opportunity cost estimate for unpaid work

H_j : Average hours in 1999 and 2004 on all unpaid work functions per woman in demographic group j by ages

PK_j : Number of Korean in women in demographic group j by ages

W_{NOCj} : Net opportunity cost average hourly rate of pay for women in demographic group j by ages

However, the difficulty with the NOC is the trouble in collection of accurate data regarding tax and labor related expenses, which are the fundamental data of the method, thus the accuracy of the estimation is questionable at best. In an effort to resolve that problem, we estimated the average income tax of female workers using the Annual Report on the Family Income and Expenditure Survey (NSO, 2000) and deducted it from the gross opportunity cost in order to utilize the net opportunity cost method. As shown in <Table 7-A>, the two estimation methods are basically similar, but NOC is used instead of GOC.

As for the women in their 30s, even though their tax burden is lower than that of the women in their 40s, the former (30s) is viewed to be higher because of lager gross opportunity cost. In terms of average income tax, women in their 40s had the highest level followed by those in their 30s, then 20s, and then those in their 50s. In comparing the income tax level of the largest (30s) and the lowest (50s), the difference was found to be nearly threefold. The hourly net opportunity cost was shown to be the highest for women in their 30s with 6,313.6 won followed by the 20s, 40s, 50s and then the 60s. As shown in <Table 7-B> also that. The hourly net opportunity cost was shown to be the highest for women in their 30s with 10,791.1 won followed by the 40s, 20s, 50s and then the 60s.

Hybrid Cost Method (HC)

The Hybrid Cost Method used in this study consolidates the advantages of the various methods and supplements the disadvantage of each of the existing estimation methods discussed above. The HC I is an estimation method in which over or under estimation of the values of unpaid work estimated by the four methods (IFRC, GRC I, GOC, and NOC) are mitigated by using the ratio of the average wages of each of the four methods against the total wage as the weight. In addition IC II utilizes a similar analysis method to HC I in respect of IFRC, GRCII, GOC, and NOC. The estimation equation for HC I is as follows.

$$UWK_{HC} = \sum_{k=1}^{4} w_k UW_k$$

Where w_k : wage weight by estimation methods ($w_1 + w_2 + w_3 + w_4 = 1$)

Therefore, the merit of HC I is that it uses existing estimation methods while improving the objectivity and accuracy of the estimation. Wage weight I is the resultant yielded by applying the estimated weights average wage of unpaid work through GRC I, and wage weight II measured the weight on the average unpaid work yielded using GRC II <See Table 8-A>. Among the weights found by various methods, the one yielded by IFRC was found to be the highest while the differences among them were relatively trifling (between 0.01 and 0.05). See the <Table 8-B>, among the weights found by various methods, the one yielded by GOC was found to be the highest while the differences among them were relatively trifling (between 0.07 and 0.10).

<Table 8-A> Wage Weight by Methods, 1999

	IFRC	GRC	GOC	NOC
Weight I	0.2591	0.2649	0.2382	0.2376
Weight II	0.2734	0.2244	0.2514	0.2506

<Table 8-B> Wage Weight by Methods, 2004

	IFRC	GRC	GOC	NOC
Weight I	0.2516	0.2383	0.2553	0.2548
Weight II	0.2732	0.1731	0.2771	0.2766

Estimation Result by Methods

Each resulting value of unpaid work by each of the estimation methods is shown in <Table 9-A>. Under the market replacement cost method, the yearly total estimate by IFRC was 113.6 trillion won, while the same for GRCl was 133.7 trillion won, 105.2 trillion won for GRC II. Under the opportunity cost method, GOC yielded 124.7 trillion won and NOC yielded 124.0 trillion won. The total yearly estimate by HCl yielded 124.1 trillion won, and HC II yielded 117.1 trillion won which used four methods. The yearly total per capita value of unpaid work performed by women were found to be between 7,620 thousand won and 8,970 thousand won depending on the estimation

method. The figures yielded by HCl and HC II were 7,860 thousand won and 8,320 won, respectively. The monthly value of unpaid work turned out to be between 635 thousand won and 747 thousand won, while the equivalent for the HCl and, HC II appeared to be 655 thousand won and 693 thousand won, respectively.

\<Table 9-A\> Monetary Valuation of Unpaid Work of Total Women by Methods, 1999

(Unit: Billion Won, Won, GDP Ratio)

		20s	30s	40s	50s	60s+	Sum
IFRC	Total Estimates	17,239.73 (13.5)	41,282.05 (33.72)	25,897.66 (24.94)	17,283.61 (17.36)	11,919.78 (10.83)	113,622.84 (100.00)
	Personal Estimates	5,375,657	10,416,869	7,845,399	7,870,497	5,328,469	7,675,145
	GDP Ratio	3.57	8.55	5.36	3.58	2.47	23.53
GRC I	Total Estimates	17,591.04 (13.15)	45,095.53 (33.72)	33,356.46 (24.94)	23,217.01 (17.36)	14,488.76 (10.83)	133,748.80 (100.00)
	Personal Estimates	5,485,202	11,379,139	10,104,956	10,572,409	6,476,872	8,974,020
	GDP Ratio	3.65	9.34	6.91	4.81	3.00	27.71
GRC II	Total Estimates	16,609.52 (15.78)	37,449.60 (35.57)	23,539.33 (22.35)	16,380.92 (15.56)	11,310.29 (10.49)	105,289.66 (100.00)
	Personal Estimates	5,179,146	9,449,812	7,130,968	7,459,435	5,056,008	7.623.647
	GDP Ratio	3.44	7,76	4.88	3.39	2.34	21.81
GOC	Total Estimates	18.827.37 (15.09)	50,857.53 (40.75)	26,440.03 (21.18)	15,281.57 (12.25)	13,393.07 (10.73)	124,799.58 (100.00)
	Personal Estimates	5,839,907	12,776,460	8,009,703	6,958,822	5,987,067	8,373,563
	GDP Ratio	3.90	10.54	5.48	3.17	2.77	25.85
NOC	Total Estimates	18,728.58 (15.09)	50,633.11 (40.81)	26,177.88 (21.10)	15,226.77 (12.27)	13,313.21 (10.73)	124,079.55 (100.00_
	Personal Estimates	5,839,907	12,776,460	7,930,289	6,933,866	5,951,366	8,325,252
	GDP Ratio	3.88	10.49	5.42	3.15	2.76	25.70
HC I	Total Estimates	18,064.90 (14.56)	46,796.10 (37.71)	28,069.72 (22.62)	17.889.89 (14.41)	13,282.60 (10.70)	124,103.21 (100.00)
	Personal Estimates	5,632,959	11,808,250	8.503.399	8,146,581	5,937,686	8,326,839
	GDP Ratio	3.74	9.69	5.81	3.71	2.75	25.70
HC II	Total Estimates	17,870.66 (15.25)	45,173.41 (38.55)	25,574.88 (21.82)	16,062.00 (13.71)	12,502.69 (10.67)	117,183.65 (100.00)
	Personal Estimates	5,572,393	11,398,791	7,747,616	7,314,209	5,589,044	7,862,564
	GDP Ratio	3.70	9.36	5.29	3.33	2.59	24.27

\<Table 9-B\> Monetary Valuation of Unpaid Work of Total Women by Methods, 2004

(Unit: Billion Won, Won, GDP Ratio)

		20s	30s	40s	50s	60s+	Sum
IFRC	Total Estimates	12,869.6 (8.66%)	58,700.6 (39.51%)	40,366.8 (27.17%)	24,218.7 (16.30%)	12,424.8 (8.36%)	148,580.5 (100.0%)
	Personal Estimates	4,216,782.2	14,362,768.8	10,308,170.1	10,154,588.9	7,502,869.7	9,309,035.9
	GDP Ratio	1.65%	7.54%	5.19%	3.11%	1.60%	19.09%
GRC I	Total Estimates	12,582.2 (7.20%)	56,795.8 (32.50%)	51,866.5 (29.68%)	35,168.1 (20.13%)	18,327.4 (10.49%)	174,740.0 (100.0%)
	Personal Estimates	4,122,598.7	13,896,700.6	13,244,776.4	14,745,521.5	11,067,252.9	11,415,370.0
	GDP Ratio	1.62%	7.30%	6.66%	4.52%	2.35%	22.45%
GRC II	Total Estimates	10,894.8 (10.25%)	42,572.0 (40.05%)	27,135.0 (25.52%)	16,837.4 (15.84%)	8,870.6 (8.34%)	106,309.8 (100.0%)

	Personal Estimates	3,569,717.0	10,416,449.1	6,929,255.5	7,059,713.8	5,356,635.2	6,666,354.1
	GDP Ratio	1.40%	5.47%	3.49%	2.16%	1.14%	13.66%
GOC	Total Estimates	14,792.5 (10.22%)	66,129.4 (45.69%)	35,741.1 (24.69%)	18,677.2 (12.90%)	9,391.5 (6.49%)	144,731.7 (100.0%)
	Personal Estimates	4,846,805.7	16,180,437.5	9,126,938.3	7,831,104.0	5,671,224.4	8,731,302.0
	GDP Ratio	1.90%	8.50%	4.59%	2.40%	1.21%	18.59%
NOC	Total Estimates	14,771.8 (10.23%)	66,009.4 (45.70%)	35,623.1 (24.66%)	18,654.6 (12.92%)	9,371.5 (6.49%)	144,430.4 (100.0%)
	Personal Estimates	4,840,055.2	16,151,055.7	9,096,799.7	7,821,655.7	5,659,103.4	8,713,734.0
	GDP Ratio	1.90%	8.48%	4.58%	2.40%	1.20%	18.55%
HC I	Total Estimates	13,776.6 (9.02%)	62,005.2 (40.59%)	40,717.4 (26.65%)	23,995.4 (15.71%)	12,279.0 (8.04%)	152,773.6 (100.0%)
	Personal Estimates	4,513,964.6	15,171,334.9	10,397,703.1	10,060,960.1	7,414,829.0	9,511,758.3
	GDP Ratio	1.77%	7.97%	5.23%	3.08%	1.58%	19.63%
HC II	Total Estimates	13,878.8 (9.20%)	62,451.1 (41.39%)	39,763.3 (26.35%)	23,039.2 (15.27%)	11,761.3 (7.79%)	150,893.7 (100.0%)
	Personal Estimates	4,547,457.6	15,280,418.1	10,154,050.7	9,660,055.4	7,102,254.7	9,348,847.3
	GDP Ratio	1.78%	8.02%	5.11%	2.96%	1.51%	19.38%

The value of unpaid work estimated by GRCⅠ was the highest with 27.7% of GDP and that of GOC was 25.8% of GDP. The value found by GRCII was the lowest with about 21.8% of GDP. Against GDP, HCⅠ was 26% and HC II was 24%. Comparing the results of the estimation methods, this study found that the value of unpaid work was equivalent to 21.8% to 27.7% of GDP.

Consequently, the value of unpaid work performed by all Korean women was 124 trillion won or 26% (HCⅠ) of 1999's GDP. The per capita yearly value was calculated to be 8.32 million won and monthly value was 693 thousand won.

For women in their 30s, the total value was found to be 46.7 trillion won while per capita value of the group 11,800 thousand won. The total value for women in their 20s and 50s were 18 trillion won and 17.8 trillion won, respectively, but per capita figure for the 50s were higher than the 20s by 2,500 thousand won with 8,140 thousand won. Also, against GDP, the 30s group took up the highest share with 9.69% followed by 3.74% for the 20s and 3.71% for the 50s, while the 40s took up the lowest weight with 5.81%.

Each resulting value of unpaid work by each of the estimation methods is shown in <Table 9-B>. Under the market replacement cost method, the yearly total estimate by IFRC was 148.6 trillion won, while the same for GRCⅠ was 174.7 trillion won, 106.3 trillion won for GRC II. Under the opportunity cost method, GOC yielded 144.7 trillion won and NOC yielded 144.0 trillion won. The total yearly estimate by HCⅠ yielded 124.1 trillion won, and HC II yielded 150.9 trillion won which used four methods. The yearly total per capita value of unpaid work performed by women were found to be between 6,666 thousand won and 11,415 thousand won depending on the estimation method. The figures yielded by HCⅠ and HC II were 9,512 thousand won and 9,349 won, respectively. The monthly value of unpaid work turned out to be between 556 thousand won and 951 thousand won, while the equivalent for the HCⅠ and, HC II appeared to be 779 thousand won and 793 thousand won, respectively. The value of

unpaid work estimated by GRCⅠ was the highest with 22.5% of GDP and that of HC was 19.6% of GDP. The value found by GRCII was the lowest with about 13.7% of GDP. Against GDP, HCⅠ was 19.6 and HC II was 19.4%. Comparing the results of the estimation methods, this study found that the value of unpaid work was equivalent to 13.7%－ 22.5% of GDP. The value of unpaid work performed by all Korean women was 153 trillion won or 20% (HCⅠ) of 2004's GDP. The per capita yearly value was calculated to be 9.51 million won and monthly value was 793 thousands won. For women in their 30s, the total value was found to be 62.0 trillion won while per capita value of the group 12,643 thousand won. The total value for women in their 40s and 50s were 41 trillion won and 24.0 trillion won, respectively, but per capita figure for the 50s were higher than the 20s by 5,884 thousand won with 10,060 thousand won. Also, against GDP, the 30s group took up the highest share with 7.97% followed by 5.23% for the 40s and 3.08% for the 50s, while the 60s took up the lowest weight with 1.58%.

The rest of the estimation methods (GRCI, GRC II, GOC, NOC, and HC II) also showed that women in the 30s group took up the highest weight. As such, Korean women in their 30s were found to make the most contribution in terms of the value of unpaid work.

Comparative Analysis of Existing Studies

In comparing the estimation results of this study with some other recent studies, the studies that used small samples were excluded from the comparison target. It is reasonable to compare this study with only those recent studies that looked at the total estimated value of unpaid work done by women based on the nationwide the Time Use Survey data, which, we executed at the National Statistics Office in 1999. Korean Women's Development Institute (KWDI, 2001) used IFR, GRC II and GOC in respect of all women aged 10 years and older as the target of analysis. <Table 10> shows the results.

<Table 10> Comparisons Estimates of Unpaid Work in Domestic Research

(Unit: Won)

	IFRC	GRC II	GOC
KWDI (2001)	432,000	430,000	533,000
Kwon (2001)	639,595	635,304	697,797
Kwon (2005)	775,753	555,530	727,509

The monthly estimate for GOC was 533 thousand won, while the estimation of the same by this study yielded 698 thousand won, 165 thousand won higher. We suspect the reason for the deviation is that even though the scope of the compatible individual occupations were similar to IFRC method, in this study, all women 20 years and older made up the analysis pool and were divided into five age groups. In GRC II, the salary of the same types of occupation (KSCO cord 512) were used, but a deflection of estimates is existing because, this study subdivides the pool into different age groups, and match them with appropriate average salary of the equivalent occupation.

Therefore, the estimates of this study were higher, but the order GOC, IFRC, and then GRCII in terms of decreasing size was the same with KWDI. For overall women, the monthly per capita value of unpaid work based on IFRC found by this study was

639 thousand won, 207 thousand won higher than the result yielded by KWDI (432 thousand won). Also, based on GRCII, this study yielded 635 thousand won which is higher than the other study's result by 205 thousand won. Adversely Kwon (2005) result IFRC's highest estimates, and then GOC, GRC II.

This study, unlike former studies, included the total value of voluntary services (within about 1%) performed by all women and the standard age target was also different, but the key difference is that this study used a more scientific and accurate estimation methods by age. Essentially, this study presented a different quality and quantity of data, than other studies. Particularly, it improved upon existing estimation methods because it used a sample scale difference of the total female Time Use Survey and varying age groups, as well as each action participation time rate and the matching salary data, which reflected wages of the relevant types of occupations. Also, by using the NOC and HC I to expand the scope of unpaid work from simple household work to include unpaid work performed outside the home and voluntary service, this study presents more valuable result.

Comparing with developed nations, for example Japan, a study done in 1996 found that the value of total unpaid work as a country was estimated to be 15.2% of GDP by GRCII, 23.2% of GDP by GOC. Conversely, the same ratio for Koreans 20 years or older was 25.6% (1999) of GDP by GOC, and 21.8% (1999) by GRCII. This trend was same for Japan, but in terms of weight, the estimation was higher by 3.5% to 10.4%.

The reason, according to Oda K. and Sato R. (1997), is that the time expenditure for Japan is relatively shorter than others. In addition, the Japanese study does not incorporate actions such as 'commuting,' 'house management and garden management' in the scope of unpaid work category. Another factor is that 16 years and older is the data pool in general, the Japanese study used 15 years and older. Therefore, despite the Japanese salary level being relatively higher than that of Korea, dissimilarity between the two countries exists due to the difference in estimation data pool, the ratio of time expenditure for unpaid work, the scope of unpaid work and applied estimation methods.

Dennis Trewin (2000), based on an Australian Time Use Survey data in 1997, estimated the national and regional values of unpaid work performed by men and women 15 years and older by adding NOC to an existing estimation method. Particularly, it not only reflected the wage ratio for men and women, but it applied weighted average wage for each applicable category. Also, the study separately estimated unpaid work and unpaid household labor. As a result, estimations for men and women using weighted averages were found to be slightly higher than estimation by individual wages for men and women.

Among the results, NOC and IFRC took up 48% of GDP, while GOC took up 60%; GRC II took up 43%. Unlike the Korean case, GOC was the highest. The reason for such result is that the matching Australian market salary for unpaid household labor such as 'house management and garden management' is relatively higher, and time expenditure for the unpaid work is higher as well.

Because there is some difference between estimation methods used for labor force participation rate and size of the values of unpaid work against respective GDPs as well as matching occupations' wage levels, it is difficult to compare the result of this on the same plane. Nonetheless, the study done in New Zealand in 1999 using GRC II and all population 15 years and older as the analysis pool, estimated the total value of unpaid work to be 39% of GDP(Tatau; 2001), while a similar study done in Canada in 1992 yield 32% to 54% of GDP depending on the estimation method(Hamdad; 2003). A German study that looked at all of the population 12 years and older and a study done in Switzerland that looked at all of the population 14 years and older estimated the value

to be anywhere between 31% and 71% depending on the study period and age group differential (Sausa-Poza, Widmer, and Schmid; 1999). While it may not be feasible to compare such studies horizontally, it can be deduced that differences in economic, social, cultural, and climatic conditions which influence the time ratio, wage, population and estimation method for unpaid work impacts respective GDPs varyingly.

Ⅴ. Summary and Conclusions

This paper estimated the total value of unpaid work performed by Korean women using market replacement cost and opportunity cost methods based on the Time Use Survey data for 1999 and 2004 with NSO, and used integrated cost method which utilized the weighted average of the two methods in order to improve the accuracy of the estimations. Particularly, the difference between this and other existing studies is that; (i) this study used wage data that is subdivided into different actions of unpaid work, and (ii) this study endeavored to yield more objective and accurate result by developing the value of unpaid work to HC I, so as to utilize a standardized estimation method. Moreover, since the value estimated per age group by this study is the result of giving weight through population distribution ratio per age group, the particular characteristics of different age groups are reflected in the estimations.

The estimated value of women's unpaid work in Korea in 2004 was ₩135,816 billion. Between 1999 and 2004, the value of unpaid work increased by 9.4% (in nominal term) comparing to 1999. As a percentage of GDP, however, it fell six percentage points, from 26% to 18%. Ninety-six percent of unpaid work occurred inside the household, while the remaining 4% was for the benefit of the community or persons outside the household. The value of unpaid work in 2004 per woman was 8,267,798 won. For both men and women, the value of unpaid work per married person was greater than the value per unmarried person. In Korea, the ratio of unpaid work (including voluntary work) to paid work fell steadily from 1999 to 2004, a period marked by a stronger participation of women to the paid labor market. Estimated for 2004 indicate a decline related to the counter-cyclical effects in unpaid work.

Women accounted for 62.6% of the total estimated value of unpaid work in 2004, versus 64.9% in 1999. Clothing care is undertaken almost exclusively by women (88.6%) and repair and maintenance largely by men (67.7%). Women contributed to almost the three-quarter of meal preparation (71.6%) and cleaning (71%) and for more than the two thirds of the help and care to children and adults within the household (67.9%). Women also contributed 53.6% to the value of volunteer and community work in 2004, with men contributing the remaining 46.4%.

Compared to former studies, this paper estimates that the total value of unpaid work performed by women are relatively higher. That is because, in conjunction with using the different sample size in respect of Time Use Survey, more microeconomic wage data correspond to each age group and occupation, as well as reflecting time expenditure per action as weights. The end, the degree of objectivity of the estimation methods and the precise approach used in this study is more concrete than other studies. It should also be noted that this study provides the value of unpaid work performed by all women based on NOC and HC, two methods not used in previous studies. The

difference in years compared, detailed estimation methods, and the analysis pooled the limited national comparisons of estimations. Nonetheless, the 2004 Korean estimation of the value was similar to Japan's 1996 result (13.7% to 19.6% of Japan's GDP) against the respective GDPs.

In the future, estimation methods for the economic value of unpaid work should be developed to produce more methods and research data that could rival the methods for estimating paid work. An important issue is that if the value of unpaid labor is discounted in estimating the total economical value of an economy, the most fundamental economic unit -the household economy- can be underestimated in relation to other economic units such as corporation and the government. In this work, the research surrounding estimations of unpaid work in the area that the economic academia should work to develop more scientific methods. This paper aims to create a new momentum for analyzing the impact the female unpaid work and its effect on economic growth as a whole.

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