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Linking Household Income and Expenditure Statistics with SNA to Construct Micro Social Accounting Matrices(SAM) in the Case of Korea

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All contents included in this paper are solely my own and do not necessary reflect the official views of KNSO.

I. Introduction

It is very useful to construct a micro social accounting matrices(SAM) to evaluate effects of polices relating to households for example income distribution policy[1]. To construct this, first of all, macro data such as total household income or consumption expenditure need to be disaggregated according to households groups or characteristics. However, there are discrepancies about same totals by definition between macro and micro data e.g. SNA household sector and micro household survey statistics, so we have to integrate these two consistently.

Up to now household's income and expenditure micro statistics don't have been utilized in estimating SNA income and expenditure in Korea. There are few trials to reconcile the discrepancies between macro and micro data[2]. Moreover, researchers to compile SAM in the case of Korea have never tried to address this issue directly.

Generally many studies tend to adjust micro survey statistics to SNA data, given the assumption that macro data is accurate. There are a few approaches to reconcile two statistics based on micro statistics[3]. There are also technical approaches to reconcile macro statistics and micro data[4]. The choice of method to reconcile between macro statistics and micro data seems to mainly depend on SNA compiling system.

This paper starts from admitting that the micro survey data have to be reconciled with the macro data, but the latter may be estimated differently from real data. Although micro survey data show underreporting compared with macro data, there is high possibility that SNA macro data are so overvalued as time is away from benchmark year.

In this paper we have an aim to compare and integrate the data of income and consumption expenditure between micro data e.g. Household Income Expenditure Survey(HIES) and macro statistics SNA for 2003-2007. Section II presents the statistical issues in constructing a micro SAM and overviews micro survey data. Section III tries to integrate HIES data and SNA statistics, and then suggests control values of macro SAM. Section IV shows the disaggregation by types of occupation of household head which is necessary to compile a micro SAM in the case of Korea. Finally, section V makes a short concluding remark.

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[1] Round(2002)
[2] Kang(2001)
[3] Siddiqi and Salem(2006)
[4] Maki and Garner(2004), Robilliard, Anne-sophie and Robinson(1999)

II. Statistical Issues in constructing a micro SAM

It is necessary to make a macro SAM for compiling a micro SAM. A macro SAM is to represent the transactions between institutions. The value of each cell describes the payment from row to column. The summations of every row and a corresponding column of <table 1> are same.

<Table 1> A standard Structure of a macro SAM

	Activi-ties	Commodi-ties	Labor	Capital	House-holds	Enter-prises	Govern-ment	Capital Account	Rest of World	Total
Activities										
Commodities					**Expenditure(C)**					
Labor										
Capital										
Households			**Wages, Salaries(A)**	**Operating Surplus(B)**						
Enterprises										
Government										
Capital Account										
Rest of World										
Total										

Note: Transactions done in colored cells. We deal only on A, B and C here.

There are two main sources to build a macro SAM in the case of Korea. One is national account and the other is input-output table. The two compose SNA. We expect values of the two statistics be identical about variables such as product, consumption and income. However there have been differences between two data as you see in <table 2>. The discrepancies have been explained by following factors. For example,

- The difference of estimation methods[5]
- The difference of valuation[6]
- The difference of import definition[7]

[5] National account first estimates the gross product and the intermediate input, and then counts the value added as the difference. Input-output table first estimates the gross product and the value added, then counts the intermediate input.

[6] The valuation method of national account is conducted by purchaser's price and that of input-output table is done by producer's price.

[7] There exists the difference according to whether to use the import value of CIF.

These gaps are not covered fully by those explanations. We must be filled through compromising the data between national accounts and input output[8]. And we can choose one of the two as a macro data to construct a macro SAM. We chose the values of national accounts in this paper for the time being owing to comparability and availability of data.

<Table 2> Difference between national accounts and input-output table

	Difference	1990	1995	2000	2003
Product	Gross Output	3.3%	0.9%	8.8%	10.7%
	_Intermediate consumption	-2.1%	-3.0%	-2.9%	-1.6%
	GDP	-4.7%	-6.1%	3.5%	5.5%
Expenditure	_Households' final consumption	0.8%	-1.1%	2.7%	3.3%
	_Government's final consumption	-2.4%	-1.9%	3.2%	3.7%
	_Gross capital formation	1.5%	1.0%	2.9%	3.0%
	_Exports	-1.6%	-1.8%	0.6%	0.5%
	_Imports	-0.2%	-0.4%	-0.3%	-0.1%
Income	Compensation of employees	2.1%	2.2%	3.6%	1.4%
	Gross operating surplus	1.0%	-1.5%	6.7%	7.8%

Note: 100 × (national account's value – input-output value)/ national account's value

The more important issue to be addressed for compiling a micro SAM is the discrepancy between the SNA macro data and the micro survey data. By making the two statistics be consistent, we can integrate the macro income/expenditure data and the micro income/expenditure data, can disaggregate the income/expenditure accounts i.e. household related cells of a macro SAM and then can construct a micro SAM.

The micro statistics to represent income and expenditure of household sector are HIES, Farm Household Economy Survey(FHES) and Fishery Household Economy Survey(FiHES). HIES surveys on their income and expenditure of the households except farm household, fishery household, foreigner household by householder's filling up the tables of household accounts by themselves. The coverage of HIES households has expanded from households with over 2 members to households including one member household.

[8] See Lawson, Moyer, Okubo, and Planting(2004) about a trial for integrating national accounts and input-ouput table.

<Table 3> Sample size of HIES

The year of Population Census	HIES	Sample size	Sample size
1980	1982~1987	4,400	Over than 2 members in cities
1985	1988~1992	4,500	
1990	1993~1997	5,500	
1995	1998~2002	5,500	
2000	2003~2005	7,300	Over 2 members in whole country
	2006~Present	8,800	Including one member household

The household income of HIES is divided into the current income and the non-current(temporary) income. Receipts such as withdrawals, revenue from assets selling and insurance payment which are no more than the seemingly change of assets form without increasing net wealth are categorized into the other income. The household expenditure of HIES is divided into the consumption expenditure and non-consumption expenditure. Consumption such as savings, buying of assets and repayments of debts whose forms only change is classified the other expenditure[9].

FHES and FiHES survey individually farm households of 3,200 sample size and fishery households of sample size 1,175[10]. Farm(fishery) income is composed of earnings, business work income, transfer income and income from assets. The earnings indicate the income from farm and fishing activity. Business work income means the income from activities besides farm and fishing. This income means the side job income and assets income. Farm(fishery) expenditure consists of the consumption expenditure, non-consumption expenditure such as tax payment and pension expense. Income/expenditure survey items of FHES and FiHES are less in detail comparing with those of HIES.

There are differences in total income and expenditure between the macro SNA data and the micro survey data. We can imagine the reasons for differences as follows.

- The differences of definitions
  - Whether to include non-profit institutional serving households or not

[9] KNSO(2006)
[10] Both of them don't include households with one member differently from present HIES.

- Whether to include imputed rents of owner-occupied dwellings, retirement grants, employment benefits and FISIM or not
- Non consumption expenditure vs. secondary distribution of income
- The treatment of employees' contribution to pensions and social insurance

- The difference between income/expenditure counting time
- Under-reporting of the micro survey data
- Sampling errors, and so on

<Table 4> Key differences of definition and covrage between SNA and HIES

	Items	HIES	SNA
Income	Salary income	-only salary	- Retirement pay and lump-sum pension included - Employees' contribution to pensions and social insurance
	Mixed income	-Self-employee's income	-Total business income
		-Imputed rent not included	-Imputed rent included
	Asset income	-house rent included	-house rent not included
Expenditure	FISIM	-not included	-included
	Classification	-alcoholic beverages and restaurant included in Food -Lodging charge included in culture and recreation	-not included in Food

III. Integrating HIES data and SNA

The studies to integrate the macro data and the micro survey data have showed two approaches. The first approach, the main stream based on the thought that national accounts is more accurate than the survey statistics, has tried to adjust the micro data to the macro data. The second approach is to reorganize the macro SNA data according to the micro data. However, the reasons for the mismatch are in both sides as Robilliard Robinson(1999) indicated.

> "On the household survey side, there may be sampling errors due to inadequate survey design and/or measurement errors because it is difficult to get accurate responses from households concerning economic variables. On the national accounts side, while supply-side information on output and income for some sectors is based on high-quality survey or census data for agriculture and industry, information for subsistence farmers and informal producers is harder to obtain and usually of lower quality." [11]

To overcome the mismatch between the household survey data and national accounts data we try to make a reciprocal reconciliation. The two sets of data have to be adjusted to new values. Total income/expenditure estimation from the household survey data is based on the sample estimation. The current stratified sampling is conducted relating to some traits of households of enumeration districts. Therefore the weights of income or expenditure could be expressed differently. It is probable national accounts values of years short of basic statistics may be estimated by extension of the benchmark year[12]. In this case national accounts can be adjusted based on the micro data aggregation. Therefore we are focusing the adjustment of the weighting average of the micro data as well as the time series of the macro data.

In order to integrate two kinds of statistics, we proceed to make a step by step approach. Firstly, the income and expenditure values are presented by SNA with considering conceptual differences between SNA and HIES. For instance, housing rent is included in operating income contrary to being included in property income(III-1). Secondly, we separate pure households' primary and secondary income values of SNA from ones of Nonprofit Institutions Serving Households(NPISH)(III-2). Thirdly, we compare these values of SNA with aggregated values which are estimated by HIES, FHES and FiHES based on total number of households(III-3.4). We suggest the control values with mainly depending upon a technical approach with referring to some basic facts(III-5).

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[11] Robilliard Robinson(1999), p1.

[12] Unfortunately we have no exact information on estimation methods of non-benchmark years.

1. Income and Expenditure of SNA

Income items of SNA are composed of value added primary income and secondary distributed income. <Table 5> shows that property income increased faster than other incomes in primary income of households with including NPISH for 2003-2007. SNA data are compiled by integrating various statistics produced by National Tax Service and KNSO. However, we are wondering how values be estimated in years away from benchmark year when basic data for the input-output table are surveyed. The values of SNA are revised when the input-out table is made. The input-output table of benchmark year 2005 is not yet published. We can imagine the widening of gaps between SNA and HIES data as we will see later.

<Table 5> Income of Household by National Accounts, 2003-2007(NPISH included)

Billion Korean Won, %

Income	2003	2004	2005	2006	2007	Annually
Primary Income						
Compensation of employees	319,934.	344,613.	365,038.	384,782.	410,370.	6.42
Wages and salaries	283,667.	305,216.	321,906.	339,104.	*361,654.*	6.26
Employers social contributions	36,266.7	39,397.2	43,132.1	45,678.1	*48,715.6*	7.66
Operating surplus*	79,709.6	78,963.7	79,745.9	82,525.0	83,270.1	1.10
Property income(net)	*43,212.8*	*43,574.7*	*43,704.1*	*48,269.6*	*57,187.1*	7.26
Interest(net)	19,148.2	18,314.9	14,226.4	13,513.5	19,265.6	0.15
Distributed income of	24,064.6	25,259.8	29,477.7	34,756.1	37,921.5	12.04
Secondary Income						
Current taxes on income, wealth	27,138.1	30,511.6	32,173.2	39,348.8	48,614.7	15.69
Social contribution	64.374.1	70.246.6	76.543.9	81.251.0	*88.648.0*	8.33
Social benefits	41,058.1	45,459.0	51,379.4	55,052.8	*62,001.5*	10.85
Other current transfers	11,493.8	14,982.6	14,802.5	19,560.9	22,416.4	18.17

Note: The Bank of Korea. *Rent included, Italic estimatimated, NPISH included

The consumption expenditure of SNA is classified according to COICOP(Classification of Individual consumption According to Purpose) of UN. <Table 5> shows that expenditure on health, education and purchase in abroad have increased remarkably for 2003-2007. Contrary to this the expenditure on items such as alcoholic beverages and tobacco, communications, recreations and culture has decreased. In estimating expenditure in non-benchmark year we are also curious about how values can be estimated in non benchmark year. If the gaps between SNA statistics and micro survey data widen serially, we can imagine the estimation method to extend values of benchmark year to some degree.

<Table 6> Final consumption Expenditure of Household by National Accounts, 2003-2007

Billion Korean Won, %

Expenditure	2003	2004	2005	2006	2007	Annually
Food and non-alcoholic beverages	56,866.0	60,166.5	62,819.3	64,980.1	68,509.0	4.77
Alcoholic beverages and tobacco	9,119.4	9,377.1	10,624.3	10,067.1	10,248.0	2.96
Clothing and footwear	16,418.4	16,481.1	17,447.8	19,418.8	20,508.6	5.72
Housing, water, electricity, gas	63,585.7	66,630.1	70,376.2	74,263.6	78,248.4	5.32
Furnishings, household equipment	15,773.3	15,819.5	16,860.4	17,891.0	19,559.0	5.53
Health	17,024.4	18,389.9	20,630.3	22,866.7	24,889.7	9.96
Transport	42,171.0	42,573.6	46,177.3	49,019.7	52,968.2	5.86
Communications	21,077.4	21,589.8	22,056.2	22,617.3	23,747.7	3.03
Recreations and culture	29,162.4	28,310.4	30,111.8	31,395.2	33,204.1	3.30
Education	22,010.5	23,467.7	24,943.6	27,224.2	29,353.4	7.46
Restaurant and hotels	28,922.3	29,457.6	30,221.9	31,873.8	33,451.0	3.70
Miscellaneous goods and services	54,090.5	54,235.9	56,658.0	61,999.0	69,106.6	6.32
Final consumption expenditure	376,221.	386,499.	408,927.	433,616.	463,793.	5.37

Note: The Bank of Korea

2. Nonprofit Institutions Serving Households(NPISH)

The amounts of NPISH income have to be deducted from household accounts of SNA to link with HIES data. The account of NPISH has not been established well, especially in its income, we cannot help to estimating those values by depending on other indirect information. We referred to the expenditure accounts of NPISH which is showed in SNA and used the NPISH data of U.S. BEA[13].

In the case of NIPSH income we calculated the values of corresponding items(i.e. interest income, dividend) as ratios of total NPISH expenditure and obtained the result of <table 8>. We suppose that each items' ratios over total expenditure of NPISH are similar with ones of other countries. In the case of expenditure, we can use SNA household expenditure data as it is, because SNA presents the values of households with excluding those of NPISH.

<Table 7> Income of NPISH

Billion Korean Won

	2003	2004	2005	2006	2007
Rent	1.8	6.3	8.1	9.1	10.8
Dividends	196.0	198.4	198.3	192.6	179.6
Interest	140.8	141.3	106.4	89.3	109.4
Residents(net)	1,610.6	1,671.6	1,782.5	1,904.8	2,014.3
The rest of the world(net)	-9.0	-7.0	-4.4	-14.5	-10.5

Note: The Bank of Korea, BEA

[13] Mead, Lan, McCully, and Reinsdorf(2003).

<Table 8> Income of Household by National Accounts, 2003-2007(NPISH excluded)

Billion Korean Won

Income	2003	2004	2005	2006	2007
Primary Income					
Compensation of employees	319,934.0	344,613.9	365,038.	384,782.5	410,370.0
Wages and salaries	283,667.4	305,216.7	321,906.	339,104.4	*361,654.4*
Employers social contributions	36,266.7	39,397.2	43,132.1	45,678.1	*48,715.6*
Operating surplus	79,709.6	78,963.7	79,745.9	82,525.0	83,270.1
Property income(net)	*42,875.9*	*43,235.1*	*43,399.4*	*47,987.7*	*56,898.1*
Property income(out)	27,605.8	26,662.9	34,461.3	43,357.8	46,917.6
Interest(net)	19,007.4	18,173.6	14,120.0	13,424.2	19,156.2
Distributed income of corporation	23,868.6	25,061.4	29,279.4	34,563.5	37,741.9
Secondary Income					
Current taxes on income, wealth, etc	27,138.1	30,511.6	32,173.2	39,348.8	48,614.7
Social contribution	64.374.1	70.246.6	76.543.9	81.251.0	*88.648.0*
Social benefits	41,058.1	45,459.0	51,379.4	55,052.8	*62,001.5*
Other current transfers	9,892.2	13,318.0	13,024.4	17,670.6	20,412.6

Note: The Bank of Korea

3. Total income and expenditure of households by HIES

Income and expenditure data are published with representing average values not total values. In order to make comparison with SNA data it is needed to estimate total values by aggregating the weighted ones. Besides, HIES exclude the farm, forest and fishing households from survey population. Therefore we have to aggregate income and expenditure data of HIES and the data of other sources such as farm and fishing household economic surveys. The aim of part is to estimate the total income and expenditure by aggregating micro survey data through following process. That is,

- to calculate weights and mean values by items of income and expenditure of HIES
- to estimate the values of households with one member not included in HIES
- to calculate weights and mean values by items of income and expenditure of farm, forest and fishing households
- to estimate the values of omitted from total domestic residents

We can divide total population into some groups by survey population. HIES have included the general households[14] with over two members until 2005(<table 3>) and with including one

[14] Households of farm, forest and fishing and grouped households are excluded from HIES survey.

member household from 2006. Households of farm, forest and fishing have been surveyed separated from HIES. The values of group households with sharing common accommodation are estimated on the basis of lowest income households(10 percentile). We applied total mean values except them to ones of omission households.

<Table 9> Household's numbers trend by survey population in 2003-2007

Persons

	2003	2004	2005	2006	2007
HIES(one member)	2,591,457	2,780,948	2,970,950	3,024,949	3,086,069
HIES (over 2 members)	10,262,065	10,134,626	10,088,969	9,805,007	10,025,020
Farm households	1,360,934	1,320,517	1,272,908	1,244,192	1,214,889
Fishing households	88,151	84,890	83,682	75,944	75,520
Forest	85,058	89,606	97,108	100,182	105,072
Group households	15,465	15,720	16,551	16,158	16,417
Omission households	995,531	1,220,242	1,356,248	1,804,647	1,797,573
Total	15,398,663	15,646,550	15,886,415	16,071,079	16,320,560

Note: Foreigner excluded. Population Survey.

In the case of income we estimated the total values aggregating the values of each household by income items which are comparable with ones of SNA. In the case of expenditure the total values of each household group are estimated by aggregating the values by commodities classification of SNA. We can see that the aspect of growth rates in income and expenditure items for 2003-2007 estimated by micro data is different from ones in SNA.

<Table 10> Income of Household by micro data, 2003-2007

Billion Korean Won, %

Income	2003	2004	2005	2006	2007	Annually
Primary Income						
Wages and salaries	245,168.	261,923.	273,607.	264,916.	284,731.	3.81
Retirement pay and lump-sum pension	2,201.6	2,578.0	3,056.9	3,216.3	3,524.1	12.48
Operating surplus	107,817.	112,399.	113,907.	105,700.	105,912.	-0.44
Property income(net)	-1,973.2	-2,829.0	-3,124.1	-3,016.5	-2,914.1	-
Secondary Income						
Current taxes on income, wealth, etc	10,498.1	11,845.0	12,292.3	12,334.0	14,090.2	7.63
Social contribution	10,029.1	10,843.0	11,357.4	10,992.7	11,360.2	3.16
Social benefits	12,806.4	15,369.5	18,686.2	21,616.4	23,950.0	16.94
Other current transfers	31,922.3	33,617.2	37,387.9	37,319.4	40,215.0	5.94

Note: KNSO

<Table 11> Final consumption Expenditure of Household by micro data, 2003-2007

Billion Korean Won, %

Expenditure	2003	2004	2005	2006	2007	Annually
Food and non-alcoholic beverages	41,012	43,964	45,341	46,657	44,360	1.98
Alcoholic beverages and tobacco	4,227	4,785	5,268	5,559	5,264	5.64
Clothing and footwear	14,897	14,946	1,830	1,298	16,463	2.53
Housing, water, electricity, gas	26,930	28,429	30,739	32,909	32,464	4.78
Furnishings, household equipment	3,715	4,161	4,663	5,286	5,847	12.01
Health	15,077	16,279	17,983	19,444	19,814	7.07
Transport	30,074	32,039	35,014	38,028	36,981	5.30
Communications	18,833	19,881	20,269	20,901	19,550	0.94
Recreations and culture	13,245	14,280	15,150	15,803	15,768	4.46
Education	29,221	30,576	32,039	33,857	30,578	1.14
Restaurant and hotels	35,955	39,453	40,736	41,716	41,040	3.36
Miscellaneous goods and services	51,323	53,107	54,277	58,734	58,771	3.45
Total	249,056	262,947	263,124	279,054	286,503	3.56

Note: KNSO

4. Comparison of income and expenditure between SNA and Micro data estimation

(1) Income

Comparing the values of total income between SNA household accounts excluding NPISH's and household micro survey data by income items shows that the formers are bigger than the latters in most items except operating surplus and other current transfers. These differences represent the results obtained after compromising the definition and coverage between two data. That is, wages and salaries of micro data include retirement pay and lump-sum pension and employees' contribution to pensions and social insurance which are regarded as compensation of employee in SNA.

In the case of primary income some other causes of the differences can be traced. Firstly, an additional income(a side income) of households actually belongs to operating surplus in micro data; however it may belong to wages and salaries in SNA data. This is a factor to make the former be smaller than the latter. Secondary imputed rent income is counted in SNA as an operating income, not so in micro data. Conversely this is a factor to make the former be bigger than latter. The difference scale of property income mainly depends on amounts of the discrepancy in interest income. The reason of widening the gaps relates the fact that interest

income is positive in SNA data and interest income is negative in micro data. We can imagine the underreporting of interest income in micro data. Interest revenue looks likely to be more underreported comparing with interest payment.

In case of secondary income it is very difficult to compare between SNA and micro data. As now it is almost impossible to explain the difference of items coverage and components of each item systematically.

<Table 12> Comparison of income between SNA and micro data, 2003-2007

Billion Korean Won

Income	2003	2004	2005	2006	2007
Wages and salaries	38,498.8	43,293.4	48,298.8	74,187.5	76,922.7
Operating surplus*	-28,108.0	-33,436.2	-34,161.9	-23,175.8	-22,642.2
Property income(net)	17,243.3	19,401.2	12,062.2	7,646.4	12,894.6
Primary income Total	27,634.1	29,258.4	26,199.1	58,658.1	67,175.1
Current taxes on income, wealth	16,640.0	18,666.6	19,880.9	27,014.8	34,524.5
Social contribution	54,345.0	59,403.6	65,186.5	70,258.4	77,287.8
Social benefits	28,251.7	30,089.5	32,693.2	33,436.4	38,051.5
Other current transfers	-22,030.1	-20,299.2	-24,363.5	-19,648.8	-19,802.4
Secondary income total	77,206.6	87,860.5	93,397.1	111,060.8	130,061.4

Note: The Bank of Korea, KNSO

As now we can find some important facts regarding to integrating SNA data and micro data. First of all the ratio of amounts explained by micro data about SNA data totally in primary income is over 90% in SNA benchmark year 2003. And these ratios has decreased annually; 2003: 93.3%, 2004: 93.4%, 2005: 94.2%, 2006: 87.6%, 2007: 86.7%. The gaps between SNA and micro data has widened continuously since the benchmark next year. Considering these facts we can adjust the values of two data more realistically. The values of micro data of the benchmark year are based on SNA values and then we adjusted the values of SNA according the changing rate of primary income in micro data.

(2) Expenditure

The consumption expenditure of SNA has been estimated differently among corn products, goods and service products. Up to now expenditure on corns is said to be directly estimated from basic statistics including HIES. Goods are estimated sequentially by tracing total process from production and distribution to final demand(Commodity Flow method). The ratio of micro data estimation to SNA for 2003 is 66.2% and has decreased since 2005. This implies that the

values of SNA are possible to be overestimated relatively to micro data for 2005-2007.

<Table 13> Comparison of expenditure between SNA and micro data, 2003-2007

%

Expenditure	2003	2004	2005	2006	2007
Food and non-alcoholic beverages	72.1	73.1	72.2	71.8	64.8
Alcoholic beverages and tobacco	46.4	51.0	49.6	55.2	51.4
Clothing and footwear	90.7	90.7	10.5	6.7	80.3
Housing, water, electricity, gas	42.4	42.7	43.7	44.3	41.5
Furnishings, household equipment	23.6	26.3	27.7	29.5	29.9
Health	88.6	88.5	87.2	85.0	79.6
Transport	71.3	75.3	75.8	77.6	69.8
Communications	89.4	92.1	91.9	92.4	82.3
Recreations and culture	45.4	50.4	50.3	50.3	47.5
Education	132.8	130.3	128.4	124.4	104.2
Restaurant and hotels	124.3	133.9	134.8	130.9	122.7
Miscellaneous goods and services	94.9	97.9	95.8	94.7	85.0
Total	66.2	68.0	64.3	64.4	61.8

Note: The Bank of Korea, KNSO. Values of micro data/Values of SNA

Particularly low level of the ratios in some items(alcoholic beverages and tobacco, housing, water, electricity, gas, furnishings, household equipment, and recreations and culture) can be explained by a few factors relating sample survey bias. There is possibility that high level expenditure households may be excluded from sample survey because they are reluctant to answer their real expenditure scale just as property income. Omitting of high expenditure household is likely to be relating to the low values of recreations and culture.

And there is a tendency not to answer the consumption amounts(values) exactly in the item such as alcoholic beverages and tobacco because of its social unacceptability.

Finally expenditure of SNA includes imputed rents of owner-occupied dwellings. Consequently the value of the item of housing in SNA is bigger than one in micro data as you see the <table 13>. In addition, there are items for which the values in micro data are bigger than in SNA; education, restaurant and hotels. This implies that there may be also underestimated in SNA systematically.

From this reasoning it is plausible that we choose the higher values in each item from possibility of the underreporting of micro data and underestimation of SNA.

5. Reciprocal adjustments for fixing control values between micro data and SNA statistics

As I referred earlier the adjustment between SNA statistics and micro data have to be reciprocal. On one hand SNA statistics tend to be extended from benchmark year data. The more it be away from benchmark year, the wider the gaps be with micro data. That is the discrepancies between SNA statistics and micro data become bigger as time passed. On the other hand the micro data has a possibility to underreport the real values because of omitting of high income and expenditure households from household surveys. Moreover some items such like imputed rents of owner-occupied dwellings is not included in micro data. As now the values of each item in income and expenditure can be quantified accurately. Only supposing real values would lie between the larger and smaller, we try to suggest possible control values for compiling the micro SAM.

We tried to fix the control values to primary income excluding asset income and expenditure. To compile a micro SAM it is needed to fix the transferred income. As now, however, we have no information of inflow and outflow on asset income and transferred income, knowing the net values of those. Tor getting control value of reconciled income items(wages and salaries, employer's social contribution and operating surplus) we did the process as follows.

- For 2003-2007, 50% of the difference between micro data and SNA statistics in operating surplus is allocated to wages and salaries of micro data.
- We regard the income items of SNA(414,913.7) as control values for 2003.
- We adjust the composing ratio of micro data for 2003 and apply growth rate of micro data for 2004-2007

As a result, we obtained these values of <table 14>.

<Table 14> Reconciled control values of wages and salaries, operating surplus, 2003-2007

Billion Korean Won

Income	2003	2004	2005	2006	2007
Compensation of employees+ Operating surplus	414,913.7	441,246.5	459,695.2	444,652.7	469,425.0
Compensation of employees	315,531.0	339,830.6	357,065.7	344,899.8	369,165.1
Wages and salaries	277,090.9	298,072.4	311,348.8	296,484.3	317,530.0
Employers social contributions	38,440.1	41,758.2	45,716.9	48,415.5	51,635.0
Operating surplus	99,382.7	101,415.8	102,629.5	99,752.9	100,259.9

In reconciling expenditure values we consider bigger values between SNA statistics and micro data as control values for 2003. We also apply growth rate of micro data for 2004-2007 like the case of income integration.

<Table 15> Reconciled control values of expenditure, 2003-2007

Billion Korean Won

Expenditure	2003	2004	2005	2006	2007
Food and non-alcoholic beverages	56,866.0	60,959.2	62,868.5	64,693.2	61,508.2
Alcoholic beverages and tobacco	9,119.4	10,323.2	11,365.3	11,993.1	11,356.6
Clothing and footwear	16,418.4	16,472.4	2,016.9	1,430.6	18,144.3
Housing, water, electricity, gas	63,585.7	67,125.1	72,579.3	77,703.0	76,652.3
Furnishings, household equipment	15,773.3	17,666.9	19,798.4	22,443.5	24,825.4
Health	17,024.4	18,381.7	20,305.7	21,955.5	22,373.2
Transport	42,171.0	44,926.4	49,098.1	53,324.4	51,856.3
Communications	21,077.4	22,250.3	22,684.5	23,391.9	21,879.8
Recreations and culture	29,162.4	31,441.2	33,356.8	34,794.5	34,717.5
Education	29,221.0	30,576.0	32,039.0	33,857.0	30,578.0
Restaurant and hotels	28,922.3	28,864.6	31,808.8	33,425.2	37,062.1
Miscellaneous goods and services	54,090.5	55,970.7	57,203.8	61,901.1	61,940.1
Total	383,431.8	404,957.7	415,125.0	440,912.9	452,894.0

IV. Compiling of a micro SAM

There are various methods to disaggregate household account given control values. Researchers have disaggregated household income and expenditure by income level(for example 10 percentile), expenditure or region according to the aims of the analysis. However disaggregation by income or expenditure level is difficult to be utilized for analyzing the policy effect[15]. For the target of policy is changeable and is difficult to define the grouping of the levels. So we try to find an appropriate disaggregation method which seems to be more stable.

This section represents the disaggregation by types of occupation of household head. The advantage of this disaggregation method is that the target of policy is clear and would be useful to analyze the income and consumption effect of policy to these groups.

<Table 16> Disaggregation of wages and salaries by types of occupation of household head, 2003-2007

%

		2003	2004	2005	2006	2007	Growth rate (2003~2007)	
							weight	mean
One member		6.0	6.6	7.5	8.9	8.9	**4.46**	**9.75**
Over 2 members	officer worker	40.4	38.9	38.2	37.5	36.7	**-2.11**	**4.06**
	manual worker	32.9	32.3	31.4	29.8	30.3	**-1.68**	**3.03**
	self-employed	7.7	8.1	8.2	6.5	6.8	**-4.92**	**4.68**
	Unemployed	2.3	2.4	2.4	2.6	2.3	**11.32**	**-3.63**
Farm		4.0	3.6	3.4	3.5	3.5	**-2.80**	**3.36**
Fishing		0.2	0.2	0.1	0.2	0.1	**-3.79**	**4.47**
Forest		0.2	0.2	0.2	0.1	0.1	**5.42**	**-10.85**
Grouped		0.0	0.0	0.0	0.0	0.0	**1.50**	**1.16**
Omission		6.5	7.8	8.5	11.2	11.0	**15.92**	**2.31**
Total		100	100	100	100	100	**1.46**	**3.81**

Note: KNSO

The <table 16> shows distribution of wages and salaries by types of occupation of household head for 2003-2007. The share of households with one member to total income has increased during this time. Even though the growth rate of numbers of households with one member is high, the wages and salaries of them have grown so quickly.

[15] The main reason to construct a micro SAM is to analyze the effect of policy for households.

<Table 17> Disaggregation of operating surplus by types of occupation of household head, 2003-2007

%

		2003	2004	2005	2006	2007	Growth rate (2003~2007)	
							weight	mean
One member		3.2	3.6	4.2	4.8	6.1	**4.46**	**11.93**
Over 2 members	officer worker	2.9	3.1	3.4	2.9	3.4	**-2.11**	**5.86**
	manual worker	2.9	3.0	3.4	3.2	2.7	**-1.68**	**-0.66**
	self-employed	65.3	62.6	61.2	57.2	58.0	**-4.92**	**1.74**
	Unemployed	0.5	0.5	0.7	0.6	0.7	**11.32**	**-0.95**
Farm		16.0	16.7	15.9	17.2	15.1	**-2.80**	**1.01**
Fishing		1.2	1.2	1.2	1.2	1.2	**-3.79**	**4.32**
Forest		1.4	1.4	1.4	1.6	1.6	**5.42**	**-2.45**
Grouped		0.0	0.0	0.0	0.0	0.0	**1.50**	**-0.80**
Omission		6.5	7.8	8.5	11.2	11.0	**15.92**	**-1.81**
Total		100	100	100	100	100	**1.46**	**3.81**

Note: KNSO

In the share of operating surplus and expenditure by household types to total, the household with one member have increased its share for 2003-2007 remarkably due to the big growth of mean comparing with weight.

<Table 18> Disaggregation of expenditure by types of occupation of household head, 2003-2007

%

		2003	2004	2005	2006	2007	Growth rate (2003~2007)	
							weight	mean
One member		4.8	5.6	6.7	8.0	8.6	**4.46**	**14.07**
Over 2 members	officer worker	24.6	24.2	23.5	22.0	22.9	**-2.11**	**3.56**
	manual worker	23.2	23.1	22.7	21.4	21.3	**-1.68**	**2.76**
	self-employed	25.9	25.3	24.5	21.5	20.5	**-4.92**	**2.38**
	Unemployed	7.9	7.8	7.7	8.8	9.8	**11.32**	**-1.99**
Farm		7.1	6.5	6.5	6.8	6.1	**-2.80**	**2.30**
Fishing		0.4	0.4	0.4	0.4	0.4	**-3.79**	**2.98**
Forest		0.4	0.4	0.4	0.5	0.5	**5.42**	**4.35**
Grouped		0.1	0.1	0.1	0.1	0.1	**1.50**	**2.67**
Omission		5.6	6.8	7.4	10.6	9.7	**15.92**	**2.03**
Total		100	100	100	100	100	**1.46**	**3.81**

Note: KNSO

V. Conclusion

This is a trial version to reconcile SNA statistics and micro data. Since past decades there have been various attempts to integrate world widely. However, this topic has been raised fully in Korea. The one of the most important reasons relates to the national statistical system to compile the macro statistics and micro statistics. Contrary to most countries the SNA has been compiled by The Bank of Korea, by KNSO. Household surveys which are a basic statistics have been produced by KNSO just like other countries. Micro date have not been used to compile SNA statistics. We can say that two institutions have compiled and estimated the related macro and micro statistics separately. We are trying to integrate SNA statistics and micro survey statistics each other. It will take a little long time to reconcile two statistics. As now the utilization percentage of micro survey data in compiling the SNA statistics is very low.

To improve the usefulness of micro survey data for compiling SNA household sector, the consistency of definition of income and expenditure items has to be demanded. In addition, the information on concrete estimation method of SNA and sample weighting of micro survey has to be shared each other.

References

Adler, Hans J. and Michael Wolfson, A prototype micro-macro link for the Canadian household sector, *Review of Income and Wealth*, 1988, Series 34, No. 4

Hamada Koji, Estimation of the household sub-sector accounts of SNA, ESRI Discussion Paper Series No.20, December 2002.

Kang, Seok Hun, Comparison of Survey Data and Aggregated Data, the Journal of Econometrics, Vol. 11, No. 1, March 2000.

Kavonius, Ilja Kaavonius and Veli-Matti Tormalehto, Contrasting Factor Income of the Income Distribution Survey to National Accounts Primary Income in Finland, presented in 27th IARIW Conference, August 2006.

KNSO, Household Income and Expenditure Survey, micro data, 2003-2007

KNSO, Korea Statistical Informational Service, http://www.kosis.kr.

KNSO, the Guideline of HIES, 2006

Lawson , Ann, Brian Moyer, Sumiye Okubo, and Mark Planting, Integrating Industry and National Economic Accounts: First Steps and Future Improvements, prepared for Conference on Research in Income and Wealth (CRIW), April, 2004

Ledbetter, Mark A., Comparison of BEA Estimates of Personal Income and IRS Estimates of Adjusted Gross Income, *Survey of Current Business*, April 2004

Maki, Atsushi and Shigeru Nishiyama, Consistency between Macro- and Micro Data Sets in the Japanese Household Sector, *Review of Income and Wealth*, Series 39, No 2. June 1993.

Maki, Atsushi and Thesia I. Garner, The Gap Between Macro and Micro Economic Statistics: Estimation of the Misreporting Model using Micro-data Sets Derived from the Consumer Expenditure Survey, in Econometric Society 2004 Australasian Meetings, January 2004.

Mead, Charles Lan, Clinton P. McCully, and Marshall B. Reinsdorf, Income and Outlays of Households and of Nonprofit Institutions Serving Households, *Survey of Current Business*, April 2003

Opitz, Alexander Opitz and Norbert Schwarz, Income and Expenditure of Private Households in the context of a SAM, presented London Group Meeting in Copenhagen, September 2004.

Ravallion, Martin, Measuring Aggregate Welfare in Developing Countries: How Well Do National Accounts and Surveys Aggree?, World Bank Working Paper #2665 August 2001

Robilliard, Anne-sophie and Sherman Robinson, Reconciling Household surveys and National Accounts Data Using A Cross Entropy Estimation Method, TMD Discussion Paper # 50, November 1999

Round, J, Social Accounting Matrices and SAM-Based Multiplier Analysis. Ch. 14 in Tool Kit. 2002

Ruggles, Richard and Nancy D. Ruggles, The Integration of Macro and Micro Data for the Household Sector, *Review of Income and Wealth*, September 1986.

Ruggles, Richard and Nancy D. Ruggles, The Role of Microdata in the National Economic and Social Accounts, *Review of Income and Wealth*, 1975, vol. 21, issue 2

Ruser, John, Adrrienne Pilot and Charles Nelson, Alternative Measures of Houshold Income: BEA Personal Income, CPS Money Income, and Beyond, presented to FESAC, December 14, 2004

Sakuramoto Takeshi , The Estimation of the SNA Saving Rate Based on the Family Income and Expenditure Survey in Japan, *Rikkyo economic review*, Vol.59, No.4, March 2006

Siddiqi Yusuf and Meier Salem, A social Accounting Matrix for Canada, presented in 29th IARIW Conference, August 2006.

Smeeding, Timothy M., Toward a uniform definition of household sector, *Review of Income and Wealth*, 2001, Series 47, No 1.

The Bank of Korea, Economic Statistics Yearbook, 2003-2007

The Bank of Korea, Quarterly National Accounts in Korea: Manual Concepts, Sources and Methods, 2007