

# **Analysis of the Joint Distribution of Income and Wealth Among Households Headed by Middle-Aged and Older People**

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## **Introduction**

The pace of population aging has been unprecedentedly fast in Korea, and this makes old age income security an increasingly important public concern for people in the country. Whereas many studies conducted on old age income security have focused on household income, little research attention has been paid to household assets. The importance of household assets lies in that they provide against unexpected situations that involve, for example, job loss, illness, or family breakdown. Also, assets with high liquidity could themselves be a source of consumption fund.

Research on senior citizens' asset wealth only began gaining momentum in Korea as recently as the early 2000s, before which crude data on senior citizens' assets was difficult to come by. Income poverty is usually expressed in terms of "relative poverty," which means having an income below half the equivalized median income. In Canada, relative poverty is measured in general by what is known as "Low-Income Cut-Offs." People living on less than 60 percent of median income are regarded in the EU as being in poverty. In the United States, poverty line is equivalent to 30~35 percent of the equivalized median income. Wealth poverty is a term much less agreed upon. This study is aimed at looking at some of the key features and implications of household wealth held by middle-aged and older Koreans.

## **Literature review**

Davies and Shorrocks, in their paper "The Distribution of Wealth" (1999), examined the concentration of household wealth in several countries in the mid-1980s. They found that inequality in wealth distribution was low in Australia, Korea, Ireland, Japan, and Sweden. The Gini coefficients for these countries were in the range of 0.5~0.6, with the top 1 percent holding around 20 percent of total household wealth. The group of countries with slightly higher Gini coefficients included Canada, Denmark, France and Germany, where the top 1 percent owned 26 percent of total household wealth. The Gini value was the highest in the United States, at around 0.8, with 30 percent of total household wealth owned by the top 1 percent. Davies and Shorrocks epitomized their findings as what they called "stylized facts of wealth distribution," which are as follows. Wealth is more unequally distributed are consumption expenditure, total income, and labor income. While developed countries' Gini coefficients for income hovers in the range of 0.3~0.4 with the top 1 percent owning no more than 10 percent of total

household income, their wealth Gini coefficients are in the 0.5~0.9 range, with the top 1 percent holding about 15~35 percent of total household wealth. Financial assets are more unequally distributed than non-financial assets, and inherited wealth is more unequally distributed than wealth in general. Also, every age group has as its part a group of families or individuals with very little wealth. Inequality in wealth distribution on the whole has abated throughout the 20th century, although there are some cases that point to the opposite conclusion, as does the US where, since the mid-1970s, wealth inequality has intensified.

Smeeding *et al.* in 2006, in their "Cross-National Comparison on Income and Wealth Status in Retirement," analyzed the role of income and wealth in economic security in older Americans aged 65 and over and their counterparts in six other developed countries (Canada, Finland, Germany, Italy, Sweden and the United Kingdom). The importance of this study lies in that it is one of the pioneering works on the joint distribution of income and wealth, income and asset poverty in older persons, the role of home ownership in economic security in older persons, and differences in wealth holdings by educational attainment.

In his 2008 paper "The Distribution of Wealth in Spain," Azpitarte explored household wealth distribution and performed the decomposition of wealth inequality using the *Spanish Survey of Household Finances* conducted in 2002 by the Bank of Spain. The findings include: assets were more unequally distributed than income, and housing assets were more equally distributed than financial assets. The analysis of asset inequality decomposition indicated that financial assets made for increasing inequality in the distribution of total assets, while housing assets contributed to decreasing it. Age-group classifications explained little as to why assets were less equally distributed than was income, while home or business ownership did contribute to explaining the fact that inequality was greater in asset distribution than in income distribution.

Sang-ho Nam, in his "Household Wealth Distribution and the Decomposition of Inequality by Factor Components" (2008), analyzed inequality in household wealth distribution using the Korea Labor and Income Panel Study. The Gini coefficients for net worth and total income were 0.731 and 0.438 in 2006 in Korea, with a correlation coefficient of 0.313 between total income and net worth, a level slightly lower than the one estimated for the United States (0.49). In the same year, the top 1 percent, 5 percent, and 10 percent accounted for 16.7 percent, 39.8 percent, and 54.3 percent, respectively, of total household net worth. Wealth inequality has trended upward at a rapid pace over the past 7 years in Korea. A recent decomposition analysis of the distribution of household net worth revealed real estate assets as the most important factor driving inequality in net worth. In another study (*Wealth Distribution and Poverty in Older Persons in Korea*) coauthored with Soon-hyun Kwon, Nam found that in Korea, wealth for the most part was more concentrated than income and that the older the household head, the more likely the household was in asset poverty. Also, using logit analysis in

looking at determinants of asset poverty, Nam and Kwon concluded that households with female heads, on monthly rent, or with children under 5 years of age were more likely to be asset-poor than households with home ownership, high educational attainment, high income, or high health levels.

### Analysis of wealth holdings

The data used in this study is as of 2013, the latest available from the Korean Retirement and Income Study, which has been conducted every other year since 2005 by the National Pension Research Institute. The most widely used concept of income is disposable income. Disposable income is defined as the sum of labor income, property income, current private transfers and current public transfers minus taxes and social insurance contributions.

The term 'net worth', as used in this study, refers to the sum of all financial and real assets less liabilities, where pension assets are not taken into account. In studies devoted to analysis of income distribution, the concept of equivalized income is often used to estimate the welfare levels of individuals in the household. Equivalized income is household income adjusted by using equivalence scales, of which the most widely used is the square-root scale. In studying household wealth, however, it is conventional to take the household itself as the unit of analysis. The data used here are mostly on households whose heads were 50 years old or older (as little as 6 percent, or 300 households, were those with heads younger than 50). It should also be noted that this study applies neither top- nor bottom-coding, as the structure of the data used in this study is well established to the extent that there is little need for adjusting outliers.

Table 1 is a summary of the 5th wave of the Korean Retirement and Income Study. The median of total assets was KW190 million and the arithmetic mean KW340 million. The mean value of real estate assets for all surveyed households was KW244 million and the median was KW130 million. For all the asset and income variables examined here, the mean-to-median ratio was greater than 1, implying a distribution skewed to the right.

Of the surveyed households, those with zero net worth accounted for 0.04 percent, while 0.08 percent had zero financial assets. Over 13 percent were without any real estate assets, and 64.5 percent were found to have debts of varying sizes. A little under 3 percent of the sample were with either zero net worth or a negative net worth. Households with zero or negative ordinary income represented 0.12 percent, while figure was 0.59 percent in the case of zero or negative disposable income.

<Table 1> Key features of the Korean Retirement and Income Study (5th, 2013), in KW10,000

Percentiles	Total wealth	Real estate wealth	Financial wealth	Total debt	Net worth	Income
1%	0	0	0	0	-3,500	-270
5%	300	0	0	0	0	294
10%	1,250	1,000	0	0	1,000	513
25%	5,650	4,500	0	0	5,000	958

50% (median)	18,550	16,000	500	0	17,150	2,403
75%	42,500	33,500	2,655	2,000	39,230	4,325
90%	79,500	72,000	6,500	10,000	72,200	6,259
95%	112,000	105,000	11,000	15,000	104,000	7,724
99%	244,800	220,000	26,000	36,450	219,000	12,120
Observation number	4,946	4,946	4,918	4,932	4,946	4,946
Mean	33,899	30,704	2,603	2,924	30,984	3,006
Standard deviation	51,089	47,785	6,763	8,593	47,389	2,710
Skewness	5.2	5.4	8.7	8.1	5.2	2.3
Kurtosis	49.6	53.4	121.1	150.0	51.2	16.7

How strong the linear relationship is between quantitative variables is measured in terms of Pearson correlation coefficients. The correlation was high at 0.9665 between total wealth and net worth and also high at 0.9851 between total wealth and real estate wealth. The Pearson correlation coefficient was the lowest between financial wealth and total debt (0.3276).

<Table 2> Pearson correlation coefficients

	Total wealth	Real estate wealth	Financial wealth	Total debt	Net worth	Income
Total wealth	1.0000					
Real estate wealth	0.9851	1.0000				
Financial wealth	0.5045	0.4038	1.0000			
Total debt	0.6283	0.6222	0.3276	1.0000		
Net worth	0.9665	0.9523	0.4683	0.4797	1.0000	
Income	0.4213	0.3861	0.4369	0.3903	0.3752	1.000

However, the Pearson correlation, assuming as it does a linear relationship for the variables under consideration, is of less use when comparing the shapes of distributions. An alternative would be looking at the inter-variable relationships in terms of Spearman's rank correlation coefficients. For two variables ( $X_i, Y_i$ ) converted to ranks ( $x_i, y_i$ ), the Spearman rank coefficient is computed as:

$$\rho = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)}$$

where  $d_i$  = difference in paired ranks and  $n$ =number of observed cases.

Table 3 shows Spearman's rank correlation coefficients. Here, too, the correlation was low between income and debt (0.2965) and between debt and financial wealth (0.2252). While between total wealth and real estate wealth and between total wealth and net worth, the correlation was very high at 0.9898 and 0.9841, respectively, the correlation coefficients were relatively low between total wealth and total debt (0.5683) and between real estate wealth and total debt (0.5689). The Spearman correlation coefficients were lower between total wealth and financial wealth (0.4473), between financial wealth and net worth (0.4419) and between income and net worth (0.3593).

<Table 3> Spearman's rank correlation coefficients

	Total wealth	Real estate wealth	Financial wealth	Total debt	Net worth	Income
Total wealth	1.0000					
Real estate wealth	0.9898	1.0000				
Financial wealth	0.4473	0.3639	1.0000			
Total debt	0.5683	0.5689	0.2252	1.0000		
Net worth	0.9841	0.9730	0.4419	0.4481	1.0000	
Income	0.3775	0.3435	0.4222	0.2965	0.3593	1.000

The correlation between variables varies widely across income groups. For example, in the case of between income and financial wealth, the Spearman correlation coefficient was much higher (0.2836) for the top quintile than for the bottom quintile (0.1145). The coefficient between financial assets and debts turned out to be 0.0639 for the top quintile income group and 0.1003 for the bottom quintile, revealing no significant association between the two variables. The correlation coefficient between income and net worth was 0.3900 for the top quintile and -0.0256 for the bottom quintile, where no significant relationship is observed.

The Spearman correlation coefficient between real estate assets and debts was 0.4865 for the top quintile. The coefficient was higher with the bottom quintile at 0.6275, suggesting that debt-based asset accumulation is more pervasive for the less-well-to-do. Total wealth and real estate wealth showed a Spearman correlation coefficient of 0.9837 and 0.9813 for the top quintile and the bottom one, respectively, which implies that real estate wealth account for most of household wealth across almost all income groups in Korea.

<Table 4a> Spearman's rank correlation coefficients between total assets, debts, and income for the bottom quintile

	Total wealth	Real estate wealth	Financial wealth	Total debt	Net worth	Income
Total wealth	1.0000					
Real estate wealth	0.9813	1.0000				
Financial wealth	0.4675	0.3973	1.0000			
Total debt	0.6178	0.6275	0.1003	1.0000		
Net worth	0.9898	0.9672	0.4933	0.5365	1.0000	
Income	-0.0381	-0.0535	0.1145	-0.0341	-0.0256	1.000

<Table 4b> Spearman's rank correlation coefficients between total assets, debts, and income for the top quintile

	Total wealth	Real estate wealth	Financial wealth	Total debt	Net worth	Income
Total wealth	1.0000					
Real estate wealth	0.9837	1.0000				
Financial wealth	0.3433	0.2346	1.0000			
Total debt	0.4668	0.4865	0.0639	1.0000		
Net worth	0.9817	0.9608	0.3558	0.3322	1.0000	
Income	0.4030	0.3718	0.2836	0.2024	0.3900	1.000

In a multivariate regression analysis, we examined the simultaneous determinants of net worth and income. For Koreans, net worth rose until the late 60s and then declined when compared with the base age group (those younger than 50), while income peaked at the age of around 50 and declined thereafter. Net worth was higher

for those with a college degree or more than for those with a middle school diploma or less. A similar result was observed for income. Net worth was considerably lower in one-person households than in couple-only households. In terms of income, couple-only households were better off than one-person households but worse off than other family types. Male household heads on average had more wealth and income than female household heads.

<Table 5> Multivariate regression: results

	Net worth		Income	
	Estimate	p-value	Estimate	p-value
Age				
50~59	0.1733	0.000	0.1250	0.000
60~69	0.2873	0.000	0.0737	0.000
70~79	0.1665	0.000	-0.0944	0.000
80+	0.0718	0.163	-0.1949	0.000
Educational level				
High school diploma	0.0544	0.564	-0.0213	0.658
College degree or more	0.3865	0.000	0.1804	0.000
Household type				
One-person	-0.4377	0.000	-0.3888	0.000
Couple	-0.0655	0.005	-0.2505	0.000
Sex	0.1183	0.001	0.1437	0.000
Residence				
Seoul	0.1164	0.000	0.0005	0.962
Metropolitan city	0.0070	0.729	-0.0144	0.154
R-sq.	0.2142		0.5015	
F-value	113.2	0.000	417.6	0.000

## Recap and conclusion

Using data from the Korean Retirement and Income Study, we looked at some of the key features of household net worth and disposable income distributions in Korea. The correlation coefficient between total assets and real estate assets was in the region of 0.98 across all income groups, meaning that real estate wealth account for most of household wealth across almost all income groups. The relationship between real estate wealth and debt revealed that real estate wealth accumulation was more debt-dependent in low-income households than in high-income households. The correlation coefficient between net worth and income varied to a considerable extent across different income groups. The top quintile revealed a coefficient that implies a certain degree of association between net worth and income, while the bottom quintile showed no correlation to speak of between the two variables. Likewise, there was no significant correlation between financial wealth and debt.

Our multivariate regression analysis found that age, educational attainment, household type, and the sex of the household head were determinants of both wealth and income. People's household wealth was found to continue increasing until their late 60s, whereas income reached its highest point in those in their early 50s. People with a college degree or more held more wealth and earned higher income than those with less education. Male household heads had more wealth and higher income than

their female counterparts. Given the disadvantageous position of women in general in the labor market, households headed by divorced or widowed women are more likely than the rest to become and remain poor. For older women, support needs to be provided in a way that increase the ability of their families to provide support for their old age. Also, there is a need for support in education and housing expenses for female-headed households with school-age children, as they are highly likely to be income-poor.